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REVIEW

Anatomical Points of Cupping Therapy for Musculoskeletal Pain: A Systematic Review

Aris Setyawan[1], Isma Nur Hikmah[1], Eka Oktavianto[1], I Made Moh. Yanuar Saifudin[1]

[1]*Nursing Study Program, STIKes Surya Global, Yogyakarta, Indonesia*

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Corresponding Author:
I Made Moh. Yanuar Saifudin
Nursing Study Program, STIKes Surya Global, Yogyakarta, Indonesia
Email:
yanuar.ikadek@stikessuryaglobal.ac.id

Abstract

Background: The prevalence of musculoskeletal pain is rising and plays a substantial role in disease and disability worldwide. There have been several previous studies on cupping therapy's effectiveness in reducing musculoskeletal pain. However, studies that specifically review the literature on cupping points to reduce musculoskeletal pain are lacking.
Purpose: This study aimed to identify the anatomical points of cupping therapy for musculoskeletal pain.
Methods: A systematic review was employed. PubMed, ScienceDirect, and Google Scholar were used for the search process. The screening was performed based on inclusion and exclusion criteria. Crowe Critical Appraisal Tool (CCAT) was used to measure the quality of the articles. Standardized forms were used to extract essential characteristics from articles, including study design, participant and sample, and results. Data were narratively analyzed for thematic synthesis.
Results: From a total of 1,045 articles acquired, eight articles were included in data synthesis. All articles were randomized control trials (RCT) design. Seven regions of cupping points were identified, including upper-middle-lower fibres of the trapezius muscles, the inter-scapular area around the 2-4th vertebrae torachalis, the sacrum area, between the lower vertebrae and the coccyx bone, the 1-5th vertebrae lumbalis, the 3-5th vertebrae lumbalis, knee joint, and lower border of the spinous process of the second lumbar vertebra (L2).
Conclusion: Seven anatomical points of cupping therapy for musculoskeletal pain were identified by this systematic review based on studies. Single research could not define the whole range of advantages of each point. To support the previously described theories regarding cupping and develop new ones, future novel scientific studies are also required.

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1. Introduction

Musculoskeletal pain is extremely prevalent and contributes significantly to worldwide disability and disease, with most countries reporting neck and low back pain as the primary cause of disability. The treatment of musculoskeletal pain often consists of a combination of physical therapy, self-management, and short-term analgesic medicine to improve function and control pain (Babatunde et al., 2017; Vos et al., 2017). Cupping therapy is currently one of the conventional treatments frequently taught and used in the medical field to reduce musculoskeletal pain (Micozzi, 2014). The growing body of research demonstrating cupping's efficacy as a therapeutic intervention has led to its widespread use in complementary medicine (Siregar et al., 2021). Practitioners of both conventional and complementary medicine have employed cupping therapy for ages. Recent research indicates that it might help treat pain-related disorders (Aboushanab & AlSanad, 2018). A study by Stephens et al. (2022) reported that health professionals in the USA perform cupping as a typical supplemental therapy. Health professionals are reported to use cupping to treat muscular discomfort, myofascial trigger points, and musculoskeletal pain.

Cupping therapy is a traditional medical treatment that dates back centuries and has been used in many countries and regions worldwide. Dry-cupping and wet-cupping are the two primary subsets that fall under the umbrella term "cupping therapy". The process of dry cupping involves applying a vacuum to various parts of the body to collect blood from that area without making any incisions in the skin. The method of using a vacuum at different points on the body in conjunction

with incisions (small, light scratches made using a razor) is called wet cupping (or *hijama* in Arabic). This method removes previously referred to as "harmful blood", which refers to accumulated blood just beneath the skin's surface (Aleyeidi et al., 2015; Mahdavi et al., 2012).

East Asian countries have utilized cupping therapy as a conventional treatment for several diseases since ancient times. Cupping therapy is said to have begun in Egyptian civilization (1550 BC), then spread to Chinese culture, Greek culture, the Middle East, and today all seven continents. Cupping therapy was first performed with hollow animal horns, which evolved into bamboo cups, eventually replaced by glass or plastic cups. Prophetic medicine refers to the health and disease remedy knowledge derived from the prophet Muhammad's (570 CE) teachings, recommendations, and sayings (hadiths) (Qureshi et al., 2018). Ancient societies such as the early Greeks and Egyptians acknowledged the therapeutic possibilities of cupping therapy. Initially, it was employed to treat diseases and pain; however, clinical experience has expanded its application to a broad spectrum of chronic conditions (Rauf, 2019). Health promotion, prevention, and treatment are among the many purposes for which cupping therapy has been employed. This therapy involves the placement of a suction cup to an acupoint, a particular spot of the skin. Even though the exact mechanism of action is unknown, cupping therapy is routinely utilized to alleviate chronic pain (Khan, 2017).

Cupping therapy has been demonstrated to be beneficial for lower back pain, neck and shoulder pain, headaches and migraines, knee pain, facial paralysis, brachialgia, carpal tunnel syndrome, rheumatoid arthritis, hypertension, and asthma (Al-Bedah et al., 2019; Darmawan et al., 2017; Setyawan, Sari, et al., 2020). According to research, cupping can help individuals with low back pain caused by blood vessel spasms and muscle spasms to relax. Therefore, cupping is useful for reducing pain, particularly on minor pain scales (Al-Eidi et al., 2019; Parawansa et al., 2020). The location of cupping therapy is determined by the problem being treated. The back is the most common application site, followed by the chest, abdomen, buttocks, and legs. Cupping can also be used to treat other body parts, including the face. The majority of cupping points are located in the head and neck region, back, front chest, abdomen, anterior, posterior, and sides of trunk, front of upper arms, front, rear, and sides of both legs, and feet; nevertheless, the dorsal side of the body contains the most cupping points (Qureshi et al., 2017).

There have been several previous studies regarding cupping to reduce musculoskeletal pain. Hanan and Eman (2013) published the results of their research where *hijama* can reduce the incidence of disability and lower back pain; however, the study did not entirely mention the cupping points used. Research results by Abdulaziz et al. (2021) proved the effectiveness of cupping points in the waist area in reducing pelvic pain in women. Arslan et al. (2015) published the results of research on cupping points to treat neck and upper shoulder pain. Both of these studies are experimental research, not a literature review. Mohamed et al. (2022) conducted a literature review regarding cupping therapy for musculoskeletal and sports rehabilitation, but it did not discuss the points of cupping. Concerning the results of the literature search that the researchers have conducted, there has not been a study that reviews the literature specifically regarding cupping points to reduce musculoskeletal pain. Therefore, it is essential and valuable to do a literature review research on cupping points to alleviate musculoskeletal pain. This study aimed to identify the anatomical points of cupping therapy for musculoskeletal pain.

2. Methods

2.1 Research design

A systematic review method based on the Joanna Briggs Institute Manual of Evidence Synthesis was employed. This study developed and synthesized representative literature to establish new frameworks and views on the issue. The process included (1) defining the purpose, (2) defining inclusion criteria, (3) defining the strategy for searching, selecting, and extracting articles, (4) analyzing evidence, (5) presenting results, and (6) summarizing the evidence (Peters et al., 2020).

2.2 Search method

This systematic review utilized three databases for its literature search: PubMed, Science Direct, and Google Scholar. Researchers used Boolean operators to widen or restrict the literature searches with the following term: "Cupping Therapy", "Cupping Treatment", "Cupping Therapy

Points", and "Cupping Treatment Points". The databases were searched by four authors (AS, INH, IMMYS, and EO).

2.3 Inclusion and exclusion criteria

The inclusion criteria of the studies were (1) the articles related explicitly to cupping therapy, (2) the articles that discuss the anatomical points of cupping therapy for musculoskeletal pain, (3) original research articles (4) publications published between 2018-2021, (5) English-language articles, and (6) full-text availability. In addition, the articles with no specific research methodology, including the protocol, editorial, and narrative review, were excluded.

2.4 Screening of articles

Three reviewers (AS, IMMYS, and INH) independently assessed all titles and abstracts of the articles obtained from the search method to identify papers that met the inclusion and exclusion criteria. In the event of disagreement, a fourth independent reviewer was engaged (EO). When studies covered subjects unrelated to the anatomical regions where cupping therapy was used, they were excluded from the full-text review. Based on the inclusion and exclusion criteria, the findings and analysis from databases such as PubMed, Google Scholar, and ScienceDirect were retained.

2.5 Data extraction

After the initial screening, the full text was obtained for further assessment. All authors together simultaneously extracted the data. A standardized form was used to extract essential characteristics from the articles, which were then extended into structured points, such as study design, participant and sample, and results. The synthesis outcomes are presented in Table 1 (See Appendix 1).

2.6 Quality appraisal

Before the data extraction process, the Crowe Critical Appraisal Tool (CCAT) review of the article was conducted to determine the viability of the article's contents. There were eight categories and 22 items in the form. A category could have a maximum score of 5 and a minimum score of 0. The score was given based on the presentation of item descriptors. The more item descriptions checked, the higher the score obtained. However, the assessment was not only based on the item descriptors but also looked at the importance of each item being assessed. The appraisal process was entirely up to the appraiser's judgement. The methodological quality was evaluated separately by two reviewers (EO and IMMYS). Through discussion with two other reviewers (AS and INH), the findings were validated, and the requirements' completion was determined.

The total CCAT score can be calculated as a percentage by calculating the sum of the eight category scores multiplied by a maximum score of five and dividing by 40. In addition, the CCAT evaluation is conducted by considering the points of each category to prevent the assessment of research publications with a high overall score but a very low category score. If the scores for each category are not assessed, poor performance in one or more areas will be masked by the overall result (Crowe, 2013).

2.7 Data analysis

A narrative method, specifically thematic synthesis described by Purssell and Gould (2021) was used to analyze the data. The characteristics of the articles, including the study design, participant and sample, and results were all taken into consideration while describing the research findings. Every study was assessed by three reviewers (EO, INH and IMMYS) who also noted every aspect of the articles under investigation. Reviewers looked more closely at each individual study to see if it used the same language to describe the same aspects or if it used a different one. Through this approach, a set of fundamental components was produced. Each specific cupping points was then assessed once more to see if it fell into one of the categories or not. A fourth reviewer (AS), who was a lead author, double-checked the earlier procedures.

3. Results

3.1 Literature search

A total of 1,045 articles were initially acquired, after conducting duplication screening and a management reference system employing Endnotes, left as many as one 1,038 articles. Based on the title and abstract, 1,014 items were omitted from the records during the screening step because they did not meet the inclusion criteria. Eight included articles were produced as a result of full-text screening. The results and the flow of the search process are illustrated in Figure 1 based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2009 Flow Diagram (Liberati et al., 2009; Moher et al., 2015).

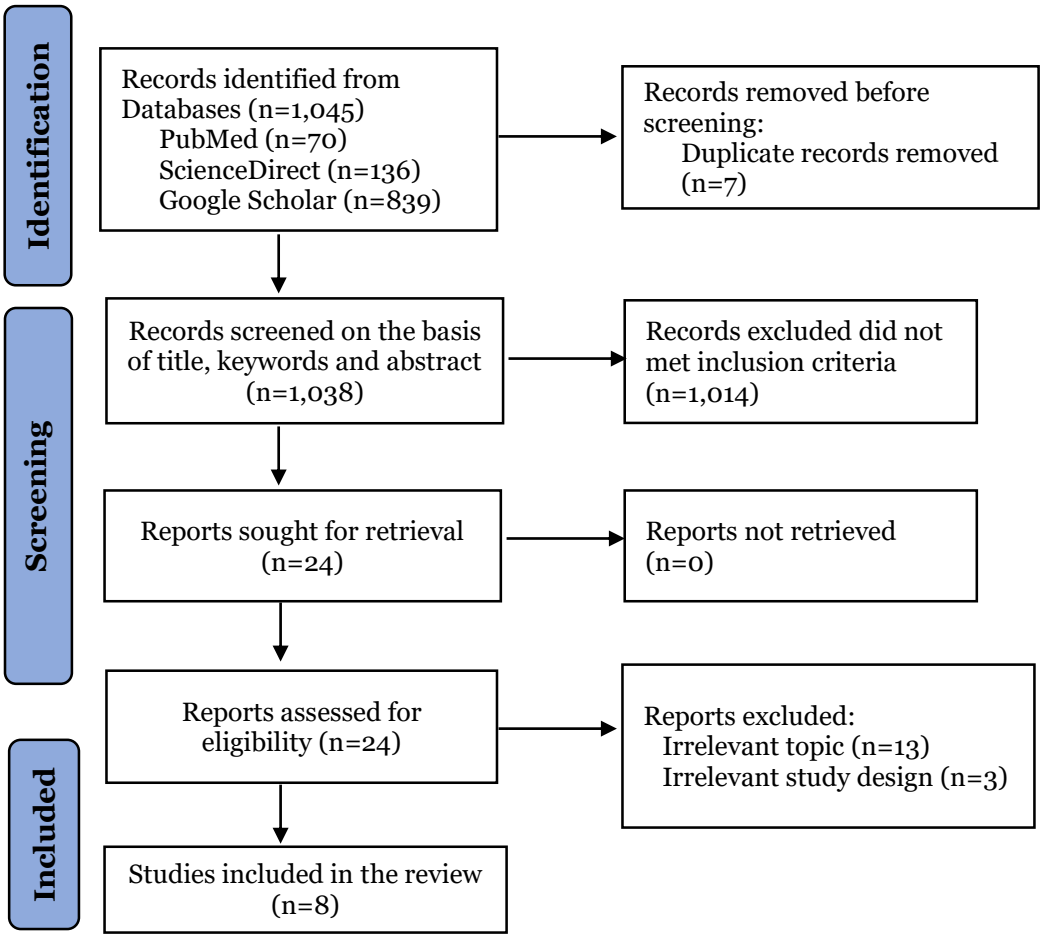


Figure 1. Literature search flow based on PRISMA guideline

3.2 Risk of bias for the included studies

According to the CCAT results table for the eight articles, the overall average scores for each assessment category were in the good category. Three articles were obtained a score of 92.5% (Abdulaziz et al., 2021; Al-Eidi et al., 2019; Mardani-Kivi 2018), two articles were obtained a score of 90% (Chiu et al. 2020; Yang et al., 2018), one article obtained a score of 87.5% (Islam et al., 2021), one article obtained score 85% (Moura et al., 2021), and one article obtained a score of 65% (Silva et al., 2021). The results of the evaluation of the article's quality are shown in Table 2 (See Appendix 2).

3.3 Characteristics of the study

Eight articles were included in the screening process. The eight articles were randomized control trials (RCTs) with as many as 30-198 samples made up of the participants and showed various recommendations for cupping duration, ranging between 3 minutes to 20 minutes per session period of every one week to two weeks. The eight articles explained the benefits of each cupping location, including neck and myofascial pain syndrome (Chiu et al., 2020; Yang et al., 2018), low back pain, pelvic pain, and physical disability (Abdulaziz et al., 2021; Al-Eidi et al., 2019; Mardani-Kivi, 2018; Moura et al., 2021; Silva et al., 2021) and knee pain (Islam et al., 2021).

Two studies were carried out in China (Chiu et al., 2020; Yang et al., 2018), two studies in Brazil (Moura et al., 2021; Silva et al., 2021), one study in Iran (Mardani-Kivi, 2018), one study in India (Islam et al., 2021), one study in Egypt (Abdulaziz et al., 2021) and one study in Saudi Arabia (Al-Eidi et al., 2019). Both wet and dry cupping was demonstrated in eight included articles. Wet cupping was demonstrated by Mardani-Kivi (2018), while dry cupping was explained by the remaining studies (Abdulaziz et al., 2021; Al-Eidi et al., 2019; Chiu et al., 2020; Islam et al., 2021; Moura et al., 2021; Silva et al., 2021; Yang et al., 2018). Dry cupping is a painless skin bruising method involving lighting the bottom of a glass cup, placing it over the skin, and then rinsing the cup bottom with methylated spirits. On the other hand, wet cupping incorporates two different application techniques in prophetic medicine. The first is the cupping, puncturing and cupping (CPC) technique. The CPC process used six phases: skin demarcation, sterilization, cupping, puncturing, and cupping and sterilization. Second, the puncturing and cupping (PC) technique consisted of four steps: skin demarcation, sterilization, puncturing, and cupping (Aboushanab & AlSanad, 2018).

3.4 Anatomical points of cupping therapy

Eight included articles showed seven various locations of the cupping points to relieve musculoskeletal pain according to their benefits, which included one (1) cupping point for neck and myofascial pain syndrome, five (5) cupping points for non-specific and chronic low back pain, pelvic pain and physical disability, and one (1) cupping point for knee pain as shown in Table 3.

Table 3. Regions and benefits of cupping points

No	Regions	Benefits	Cupping Duration	Type of Cupping
1.	Upper, middle, and lower fibres of the trapezius muscles	Neck and Myofascial pain syndrome (Chiu et al., 2020; Yang et al., 2018)	15-20 minutes each time, twice a week, for four weeks	Dry cupping
2.	The inter-scapular area around the vertebrae torachalis T2-T4	Nonspesific low back pain (Mardani-Kivi, 2018)	Once a week and lasted about 20 minutes	Wet cupping
3.	Sacrum area, between the lower vertebrae and the coccyx bone	Nonspesific low back pain (Mardani-Kivi, 2018)	Five times and lasted about 20 minutes	Wet cupping
4.	Vertebrae lumbalis L1-L5	Nonspesific low back pain (Silva et al., 2021)	10 minutes once a week for eight weeks	Dry cupping
5.	Bilateral bladder meridian (BL) 23, spinal neurogenic acupoint located in 1.5 cun lateral to the lower border of the spinous process of the second lumbar vertebra (L2).	Pelvic pain (Abdulaziz et al., 2021)	20 minutes each time, with no specific period	Dry cupping
6.	Knee joint (medially above, medially below, laterally above and laterally below the joint line)	Knee osteoarthritis (Islam et al., 2021),	15 minutes every 2 days for a period of 20 days.	Dry cupping
7.	The lower border of the spinous process of the second lumbar vertebra (L2), bilateral bladder meridian (BL) 23, BL 24, and BL 25.	Chronic Low back pain and physical disability (Moura et al., 2021; Al-Eidi et al., 2019).	10 minutes each time, with no specific period	Dry cupping

3.4.1 Cupping points for neck and myofascial pain syndrome

The trapezius muscles' upper, middle and lower fibers were cupping points to relieve neck and myofascial pain syndrome pain. It was done by dry cupping for 15 minutes twice a week for four weeks (Chiu et al., 2020; Yang et al., 2018).

3.4.2 Cupping points for chronic low back pain, pelvic pain, and physical disability

The interscapular area around the thoracic vertebrae T2-T4 and the sacrum area, between the lower vertebra and the coccyx bone, and lumbar vertebrae L1-L5 were cupping points for nonspecific low back pain. They were done both by wet cupping carried out five times, each of which lasted for about 20 minutes (Mardani-Kivi, 2018) and dry cupping for 10 minutes weekly for eight weeks (Silva et al., 2021). Bilateral bladder meridian (BL) 23, 24, 25, and the lower border of the spinous process of the second lumbar vertebra (L2) were cupping points to reduce pelvic pain, chronic low back pain, and physical disability (Abdulaziz et al., 2021; Al-Eidi et al., 2019; Moura et al., 2021). The dry cupping therapy was done on the two points lasting for about 10 -20 minutes for each session.

3.4.3 Cupping points for knee joint pain

The knee joint is a cupping point to relieve knee pain done by dry cupping for 15 minutes for a period of 20 days (Islam et al., 2021). Cupping was placed on the knee joint that was being treated, with the first cup placed medially above the joint line, the second cup below the joint line, the third cup above the joint line, and the fourth cup below the joint line. Throughout the process, the cups' maximum tolerable pressure was maintained.

4. Discussion

This study aimed to identify the anatomical points of cupping therapy for musculoskeletal pain. Based on the results, eight articles were included, and seven regions of cupping points were identified. The cupping points can be classified into three categories, namely one cupping point for myofascial syndrome, and five cupping points for non-specific and chronic low back pain, pelvic pain and physical disability, and one cupping point for knee joint pain.

4. 1 Cupping points for myofascial pain syndrome

The review reported that anatomical points for myofascial pain syndrome were located on the upper, middle, and lower fibres of the trapezius muscles (Figure 2). According to Chiu et al. (2020), cupping therapy on the trapezius muscles' top, middle, and lower fibres can boost functional recovery and maintain soft tissue health, and reduce myofascial pain. Additionally, Yang et al., (2018) reported the result from randomized controlled trial that cupping therapy in this site significantly reduced the neck pain severity in patients. The upper, middle, and lower fibres of the trapezius muscles are located close to the pain. These points are also employed in cupping techniques to lessen myofascial pain. By removing the metabolic wastes that generate pain, lactic acid, interstitial fluid, and the causative pathological substance (CPS) mechanism, cupping therapy relieves pain (Setyawan, Budiyati, et al., 2020). According to the theories of diffuse nopsious inhibitory control theory, pain gate theory, and reflex zone theory, the vacuum effect at the point of cupping will affect the biomechanics of the skin. The first suction on the skin will excite the skin nerves, which will then travel through the delta and c nerves to the spinal cord and then towards the thalamus, where they will promote the release of endorphins. This endorphin is what will lessen the discomfort (Yang, 2018). Previous studies had shown that cupping might help improve local oxygen intake, blood microcirculation, hemodynamic activity, lower deoxyhemoglobin and boost oxyhemoglobin (Chen et al., 2017). This effect may aid in the treatment of neck and myofascial pain syndrome and the facilitation of muscular function. Previous research corroborated this conclusion, and it was reported that cupping therapy conducted during the recovery period from strenuous exercise could speed muscle fatigue recovery and retain superior exercise performance (Chen et al., 2017; Li et al., 2017).

4. 2 Cupping point for nonspecific and chronic low back pain, pelvic pain and physical disability

The review showed that the anatomical points for nonspecific low back pain included three areas: (1) on the interscapular area surrounding the T2–T4; (2) on the sacrum between the lower vertebrae and coccyx bone, and (3) on the vertebrae lumbalis L1 to L5 (Figure 3a). Mardani-Kivi

(2018) pointed out that cupping therapy have a potential therapeutic effect on nonspecific neck and upper shoulder pain. The study also found that cupping therapy for persistent nonspecific low back pain (PNSLBP) patients had an immediate response and was as effective as conventional treatment in pain intensity reduction. The points included the interscapular area surrounding the T2-T4 and the sacrum between the lower vertenbrae and coccyx bone. Individuals with nonspecific low back pain have also been proven to benefit from cupping therapy (Silva et al., 2021). The cups were positioned bilaterally on the lower back, parallel to the L1 to L5 vertebrae, with a 3-centimetre gap between them.

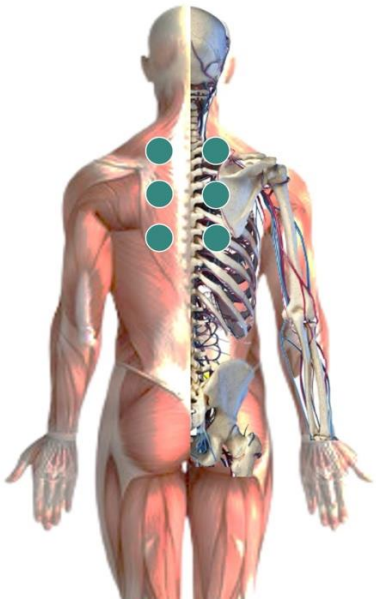


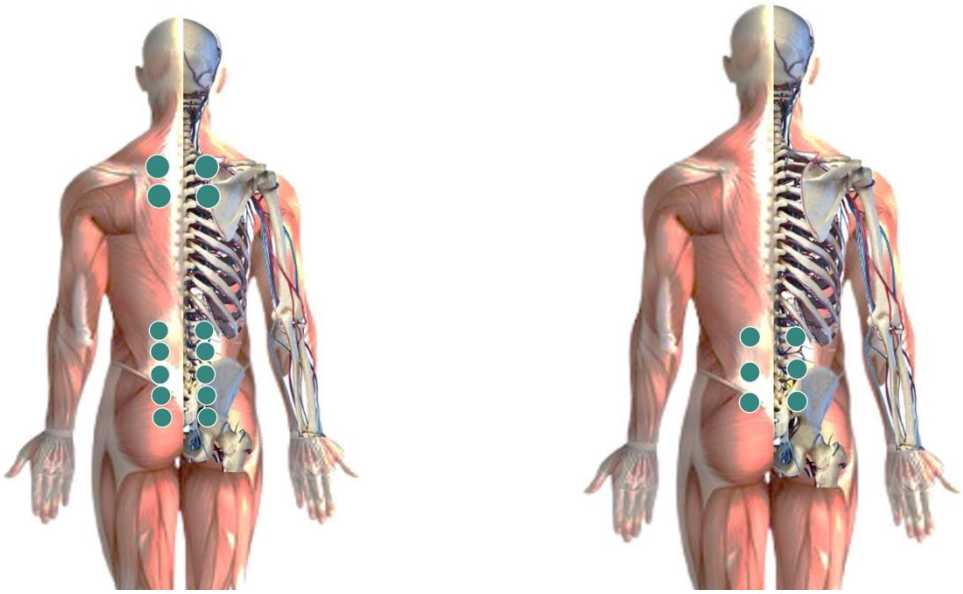
Figure 2. Cupping points for neck and myofascial pain

In addition to nonspecific low back pain, Al-Eidi et al. (2019) evaluated the effects of traditional cupping and Asian cupping techniques in treating chronic low back pain patients. Cupping points for Chronic Low Back Pain (CLBP) included the bilateral bladder meridian (BL) 23, BL 24, and BL 25 points that were the most uncomfortable. This discomfort results from the location of more superficial nerves. BL 23 is at the level between the L2 and 3 processus spinosus, BL 24 is at the level between the L3 and 4 processus spinosus, and BL 25 is at the level between the L4 and 5 processus spinosus (Figure 3b). Additionally, Moura et al. (2021) in their study showed that cupping therapy in the lower border of the spinous process of the second lumbar vertebra (L2) effectively treated chronic back pain and physical impairment. This point is effective because it is closer to the area of pain. When cupping therapy is carried out on the point, a mechanism will occur to release lactic acid and P substance for alleviating pain (Setyawan, Budiyati, et al., 2020). Furthermore, Abdulaziz et al. (2021) claim that cupping therapy can assist women with persistent pelvic pain in experiencing less pain. Cupping on bladder meridian (BL23) spinal neurogenic acupoint was effective in reducing the effects of pelvic pain in women with chronic pelvic problems (CPP). Dry cupping on this site reduces pain, promotes local blood and lymphatic circulation, activates the autonomous nerve system, stimulates the skin, and diminishes skin sensitivity. The mechanism of the referred visceral pain is thought to involve neurogenic inflammation and central sensitization of the spinal cord. Acupoint sensitization stressed that pathological changes in the functional activity of internal organs can affect the size and function of neurogenic acupoints on the surface of the body.

4. 3 Cupping point for knee joints

Knee pain is a problem for public health and one of the main sources of discomfort and functional impairment (Hay et al., 2017). According to Islam et al. (2021), dry cupping in the following points:(1) medially above the joint line, (2) medially below the joint line, (3) laterally above the joint line, and (4) laterally below the joint line, effectively reduces knee pain. Hence,

regarding the quantity of suction, the duration of dry cupping treatment for people with knee pain is 15-20 minute application. Furthermore, Zhao et al. (2009) found that dry cupping application that lasts more than 30 minutes can lead to a complication, namely burn injuries. According to some studies, cupping therapy has a pain-relieving effect comparable to that of an analgesic. Ischemia, which results in inflammation and pain mediators, occurs in low back pain. This mediator will activate the pain-related nerve fibres, resulting in pain. Lactic acids are built up in the tissues more due to anaerobic metabolism when ischemia occurs. Removing inflammatory and pain-causing mediators from the body by cupping therapy will lead to less activation of the pain nerve fibres. Additionally, there is the release of the endorphin hormone, which aids in pain relief (Setyawan, 2022; Setyawan, Budiyati, et al., 2020).



(3a) (3b)

Figure 3. cupping points for low back pain, pelvic pain and physical disability

Unknown physiological processes may underlie the effects of cupping. Cupping results may be divided into a series of categories, including neurological, hematological, immunological, and psychological consequences (Silva et al., 2021). Sites for cupping therapy are chosen according to the condition being treated. The most frequent areas for application are the back, chest, abdomen, buttocks, and legs. However, the cupping technique can also treat other areas, such as the face (Yoo & Tausk, 2004). In addition to being a robust, efficient, and effective therapy in and of itself, cupping therapy should be seen as a potent, curative, and potentiating treatment. Although cupping therapy has specific indications, much like any other medical treatment methods, it is a valuable adjuvant preventative and therapeutic procedure in which blood and interstitial fluid are eliminated. There are significant variances in how the cupping point is determined, as seen by the multiple references to evidence. Cupping therapy is effective when used as a treatment for musculoskeletal pain disorders. Cupping treatment is one of the most efficient ways to cure various illnesses when performed alone or in conjunction with other therapeutic procedures (El Sayed et al., 2013; El Sayed et al., 2014).

5. Implications and limitations

According to the study's findings, several cupping locations have been proven to lessen discomfort brought on by musculoskeletal issues. Health professionals or cupping practitioners might utilize these findings when treating musculoskeletal pain as proof. The findings of this study can also be used as a foundation for further experimental studies on the effects of cupping on musculoskeletal pain issues. Although substantial efforts were made, our review has significant limitations, including limited sources and bias of selective publishing and reporting, which must be considered that may influence both the quality and the quantity of research and limit the conclusiveness of this review.

6. Conclusion

This systematic review identified seven anatomical points of cupping therapy for musculoskeletal pain based on certain studies explaining its various benefits. No single research could explain the full spectrum of benefits of every point. The beneficial effects of cupping therapy need to be substantiated by large randomized clinical trials, systematic reviews and meta-analyses in future. Basic scientific innovative research is also necessary to verify the discussed cupping theories and invent new ideas.

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Author contribution

AS and EO conceptualized, designed, drafted the initial draft and framework, authored the paper, and analyzed the data. The data were conceptualized and interpreted by IMMYS and INH. All authors have read and approved the version of the manuscript that has been published.

Conflict of interest

We have no conflicts of interest to disclose.

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Appendix 1

Table 1. The included studies characteristics

Author	Design	Participants & Sample	Results
Chiu et al. (2020)	Experimental design	40 participants with myofascial pain	Shoulder and upper extremity function significantly improved.
Mardani-Kivi (2018)	A Randomized Clinical Trial	180 individuals with nonspecific low back pain	There was a significant reduction of NSLBP among participants.
Al-Eidi et al. (2019)	A randomized clinical trial	70 participants with at least three months of chronic low back pain (CLBP)	There was a significant reduction of CLBP immediately following the intervention, seven days later, and fourteen days later. There was no significant difference between the two groups on any of the outcome measures 14 days after the intervention.
Silva et al. (2021)	Randomized controlled trial	90 participants with nonspecific low back pain	Cupping was effective in relieving pain, physical function, mobility, quality of life, psychological symptoms, and medication use in patients with nonspecific chronic low back pain.
Moura et al. (2021)	Randomized, parallel-group controlled clinical trial	198 patients with chronic low back pain	Patients who received cupping therapy showed significant changes in pain relief, and physical impairment were observed during the follow-up session.
Yang et al. (2018)	Randomized controlled clinical trial	70 individuals with neck and nonspecific myofascial pain	This study suggests that pulsating cupping may have greater analgesic effects on nonspecific myofascial pain than static cupping, possibly due to its greater effect on enhancing local skin blood perfusion.
Islam et al. (2021)	Randomized controlled clinical trial	40 patients with knee osteoarthritis	Significant changes in knee osteoarthritis pain reduction in intervention group.
Abdulaziz et al. (2021)	A randomized controlled trial	30 patients, with 15 intervention group and 15 control group	Inflammation, pain perception and intensity, and the impact of pelvic pain on daily living were all considerably improved by cupping therapy in women with chronic pelvic pain (CPP).

Table 2. The Crowe Critical Appraisal Tool (CCAT) results

No	Author and Year	Result of CCAT Scoring Categories and Items								Total (/40)	Total (%)	Summary
		Pre-liminaries	Introduction	Design	Sampling	Data Collection	Ethical Matters	Results	Discussion			
1.	Chiu et al. (2020)	5	5	4	4	4	4	5	5	36	90	Good
2.	Mardani-Kivi (2018)	5	5	5	5	4	4	4	5	37	92.5	Good
3.	Al-Eidi et al. (2019)	5	5	4	5	4	4	5	5	37	92.5	Good
4.	Silva et al. (2021)	4	3	3	3	4	3	3	3	26	65	Fair
5.	Moura et al. (2021)	5	4	4	4	4	4	4	5	34	85	Good
6.	Yang et al. (2018)	5	4	4	5	4	4	5	5	36	90	Good
7	Islam et al. (2021)	4	4	4	5	4	4	5	5	35	87.5	Good
8	Abdulaziz et al. (2021)	5	5	5	5	4	4	5	4	37	92.5	Good

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ORIGINAL RESEARCH

Targeting Smoking Triggers: A Nurse-led Intervention for Tobacco Smoking Cessation

Sadeq Al-Fayyadh[1], Ali Hussein Alek Al-Ganmi[1], Musaab Majid Abdulwahhab[1], Shaymaa Mohammed Hussein[1], Linda Cook[2], Abdulellah Al-Solais[3], Mayada Sabri[4]

[1]*College of Nursing, University of Baghdad, Baghdad, Iraq*
[2]*Kramer School of Nursing, Oklahoma City University, Oklahoma, United States*
[3]*College of Applied Medical Sciences, Shaqra University, Sahqra, Saudi Arabia*
[4]*College of Education for Pure Science- Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq*

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Corresponding Author:
Sadeq Al-Fayyadh
College of Nursing, University of Baghdad, Baghdad, Iraq
Email:
s.al-fayyadh
@conursing.uobaghdad.edu.iq

Abstract

Background: Nursing interventions tailored to the smoking triggers in patients with non-communicable chronic diseases are essential. However, these interventions are scant due to the nature of factors associated with smoking cessation and the poor understanding of the effect of nurse-led intervention in Iraq.
Purpose: This study aimed to determine the dominant smoking triggers and examine the effects of a tailored nursing intervention on smoking behavior in patients with non-communicable chronic diseases.
Methods: Convenience samples of 128 patients with non-communicable chronic diseases, male and female patients, who were 18-70 years old, were recruited in this quasi-experimental, randomized comparative trial in the outpatient clinic in one major teaching hospital in Baghdad City, Iraq. The intervention included simple yet specific instructions that were given both orally and in written form to the study samples to enable them to manage their craving to smoke for 6 weeks. The smoking triggers were assessed using Why Do You Smoke questionnaire. Participants were randomly allocated to receive either the nurse-led intervention or standard care. Data were analyzed using descriptive statistics, independent sample t-tests, logistic regression, and two-sided tests.
Results: Stress reduction was the dominant smoking trigger among subjects. The percentage of participants who were either able to completely quit smoking or reduce the number of smoked cigarettes per day (n=19, 29.7%; n=28, 43.8%, respectively) was greater in the study group than those in the control group (n=5, 5.8%; n=5, 5.8%, respectively). Study findings demonstrated significant differences in the inability to improve readiness to quit smoking between the intervention group and control group (p=0.000) at the sixth-week follow-up.
Conclusion: The tailored nursing intervention was effective for a successful achievement of smoking reduction and cessation among patients with non-communicable chronic diseases, and a potential to equip nurses in clinical settings to support patients to achieve this is recommended.

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1. Introduction

The tobacco epidemic has been identified as one of the public health threats that jeopardize vital aspects of individuals' life, including but not limited to physical, psycho-social, and financial aspects (World Health Organization, 2019). In spite of intensive health promotion campaigns in developing and developed countries, smoking continues to be a significant public health threat in the current century. Comprehensive recommendations have been urged for the public to quit smoking; however, a high percentage of smokers are unable to move forward in achieving successful cessation (Elshatarat et al., 2016). Multiple studies have confirmed that tobacco smoking is a major modifiable risk factor for coronary heart disease, stroke, lung and upper airways cancer, chronic obstructive pulmonary disease, peripheral vascular disease, infertility, bone and joints problems, type 2 diabetes mellitus, and hypertension (AL-Fayyadh & Mohammed, 2010; West, 2017). Premature tobacco-related deaths and illnesses can be prevented if evidence-based interventions are broadly and effectively used in low-and-middle-income countries

(Alrefaee, 2022). Iraq is one of the middle-income countries that is addressing the smoking epidemic through a public health agenda (Rabbani et al., 2016).

It has been reported that more than 30% of the Iraqi population are smokers, reflecting a serious public health problem (Ibrahim et al., 2018). Thus, effective interventions are clearly needed (Tadzimirwa et al., 2019). Moreover, as a crucial global dilemma of non-communicable chronic diseases (NCDs), World Health Organization reported an annual loss of 40 million persons due to NCDs (World Health Organization, 2017). This catastrophic number institutes about 70% of the mortality rate on an international level (Beech, 2013; World Health Organization, 2017). Besides being a major risk factor in the development of NCDs, tobacco smoking has a negative impact on NCDs' prognosis (Mikkelsen et al., 2019). In fact, targeting patients with NCDs as a vulnerable population in general, and smoker patients in particular, is useful in boosting the sustainable development of the world health agenda (Goodchild et al., 2018). This requires an engagement of all the involved health-related concerners, including community members, the patient and their family, and the health care system (Alnaqeeb, 2022). Nurses, in particular, can play an important role in meeting world health goals by improving outcomes for vulnerable persons, such as those with NCDs. Nurses are an indispensable component of any effective public health education initiative because they are armed with the essential competencies to assess a person's health-oriented deficits (Bergh et al., 2015). Those deficits can be addressed by nurses to improve their client's engagement with health maintenance and promotion practices (Miller & Spilker, 2003).

Smoking cessation, its contributing factors, and smoking triggers have not been studied and reviewed in relation to smoking cessation programs in Middle East countries (Puleo et al., 2022). The available data on the phenomena of smoking cessation has been only found in the general globe or specific developed countries (Maziak et al., 2015). The range of smoking cessation interventions can be divided into behavioral, pharmaceutical, and nontraditional approaches. Individual counseling, group counseling, and telephone counseling conducted by nurses and physicians are all examples of behavioral interventions (Iqbal et al., 2021). A nurse-led intervention has been evidenced to motivate smokers to quit smoking and has clinically significant long-term effects on cessation rates (Pleym et al., 2022). However, other studies vary with the effectiveness of the nurse-led intervention with motivational techniques to support behavioural change, such as smoking quitting among patients with cardiac diseases (Brouwer-Goossensen et al., 2021). Hence, the effectiveness of these interventions needs to be carefully assessed due to the diverse methodologies used in the studies.

The literature has highlighted that many experimental studies examined different pharmacological and non-pharmacological approaches that were developed specifically to help smokers quit smoking (Eisenberg et al., 2020; Liao et al., 2018; Van den Brand et al., 2018). Some were community-based interventions, and others were targeting specific populations (Cartujano-Barrera et al., 2020; Hayes et al., 2019; Shishani et al., 2019). Some were significantly effective, while others were not (Brooks et al., 2017; Perski et al., 2022; Siewchaisakul et al., 2020). However, a literature search reveals no smoking cessation interventional studies that have targeted smoking triggers among smokers with non-communicable diseases (NCDs), particularly in middle-income countries.

This study is built on previous studies in constructing a treatment model (Rice et al., 2017). This model uses tailored nursing interventions that are designed specifically to empower smokers to achieve successful smoking cessation (Agency for Healthcare Research and Quality, 2012). This five-level nursing intervention approach (5A's and F) is consistent with Meleis Transition Theory (Meleis & Trangenstein, 1994), Pender's Health Promotion Theory (Pender, 1996), and Prochaska's Transtheoretical Model (Prochaska & Velicer, 1997). The conceptual premise of Schema theory is also consistent with this study path, predicting a positive change in a patient's behavior by arming the target person with the changed behavior needed for the desired outcome. One such change behavior is "tailored teaching", which involves a realistic understanding of a person's needs, experiences, and, most importantly, behavior triggers (Crawford et al., 2018). Tailored teaching can address a smoker's knowledge deficit about their smoking addictive behavior triggers, enabling an intervention to their trigger other than smoking. This produces a sound, knowledge-based outcome of smoking cessation. In her middle-range transition theory, Meleis emphasized that transitioning toward a health-oriented behavior can be influenced by a person's knowledge level, attitude, planning, and personal-environmental triggers (Meleis &

Trangenstein, 1994). Furthermore, Prochaska and Velicer's (1997) stages of change model is useful in that the nurses must assess the patient's readiness to change and intervene in the appropriate stage.

This study was designed to empirically test the effectiveness of a planned change in addictive behavior. The effects of the nurse-led intervention on tobacco smoking cessation and targetting its triggers are scant and need to be evaluated, specifically in middle east countries such as Iraq. This study will fill the gap in the existing literature on the effectiveness of the tailored nurse-led intervention on smoking behaviour. Therefore, this study intended to investigate the most common smoking trigger among smokers with NCDs and the effect of a tailored nurse-led intervention on smokers' readiness to quit smoking or at least to reduce the number of cigarettes per day.

2. Methods

2.1 Research design

A quasi-experimental, randomized comparative trial was conducted on 128 smokers with NCDs, who were patients in an outpatient clinic in one major teaching hospital in Baghdad City, Iraq. Study participants were recruited during routine visits for follow-up of their health problems and/or for a prescription renewal.

2.2 Setting and samples

This study was conducted in an outpatient clinic of a major teaching hospital in Baghdad City, Iraq, from June 2021-May 2022. The population was a group of patients attending an outpatient clinic for NCDs. Patients with NCDs included those who had cardiovascular disease, diabetic mellitus, cancer, and chronic respiratory diseases. The inclusion criteria included male and female patients who were 18-70 years old at the time of the data collection phase. The exclusion criteria included the subject's involvement with any other ongoing studies. Additionally, subjects who were medically diagnosed with psychiatric illness, were morbidly ill or had impaired physical and mental capacity were excluded from the trial. Patients in both groups were considered a participant when they completed at least one of the pre-test or post-test surveys. A simple randomization approach was used by the researchers in assigning participants to the treatment and control groups. The simple randomization procedure involved throwing a dice (below and equal to 3 for the control group and over 3 for the treatment group). The algorithm diagram in Figure 1 presents the study protocol from participant recruitment to the intervention in details. A power analysis was conducted for an alpha level of 0.05, an effect size of Cohen's d=0.5, and a statistical power level of 0.8 for a sample size of 128 subjects (Grove & Gray, 2018).

2.3 Intervention

To engage NCDs patients in health-related behaviors, a nurse-led intervention for tobacco smoking cessation applied the behavioral approach such as the five-level nursing intervention approach (5A's and F) (Figure 2). The (5A's and F) approach explained how these smoking triggers might impact patients' intentions or directly influence their smoking motivation behaviors. These instructions were specifically developed to help smokers whose smoking behavior was triggered by stress. The nurse-led intervention encompassed a tailored teaching about motivation to quit smoking (e.g., positive or negative effects of smoking), stress reduction (e.g., methods of control stress), handling (e.g., keeping hand busy), pleasure (e.g., relaxation and fun), addiction, and habit. The provided tailored intervention included simple yet specific instructions that were given orally and in written to the study samples to enable them to manage their craving for smoking.

Participants in the intervention group received current standard care through the program plus nurse-led intervention for tobacco smoking cessation that included providing knowledge about smoking triggers using motivation and stress reduction. The current standard NCDs program includes a single one-hour tobacco smoking cessation session provided by various health care providers. The content received by both group participants was recorded and compared to check for equivalence between the groups. Each patient in the intervention group received approximately 30-45 mins of a single nurse-led intervention for a tobacco smoking cessation session. The essence of nurse-led intervention is for the nurse to be simultaneously educator and supportive, as well as directive in moving patients toward behavior change.

Prior to the project, the researchers met to discuss the project and prepare a face to face nurse-led interventions. The principal researcher frequently visited the team members while collecting data to facilitate communication, supervision, early problem detection, and feedback. Three researchers provided information that the patient may need, motivated them to quit smoking, and explored smoking triggers that kept the patients from quitting smoking. Patients in the control group were provided only with current tobacco smoking cessation, which includes the benefits of quitting knowledge and recommendations to enhance smoking reduction and promote healthy lifestyles. They completed the same surveys as the intervention group at baseline.

At the baseline level, sociodemographic data, smoking profile, and tobacco cessation were collected. A 30-45 minutes face to face session developed in the Arabic language explained the prevalence of tobacco mortality, the chemical content of cigarettes, forms and types of smoking products used by the Iraqi population, common withdrawal symptoms, the positive impact of quitting, and adaptive coping mechanisms to quit tobacco use. A team of expert nurses from cardiac, respiratory, oncology and other NCDs departments participated in preparing for tobacco smoking cessation. A pamphlet on instruction to use replacement sources of nicotine was also provided to smokers to ease the process of smoking cessation. A text-message reminder was sent daily to the nurse-led intervention group to use replacement sources of nicotine and to attend follow-ups as recommended for 10 weeks. These text messages were also sent to identify whether participants were able to get replacement sources of nicotine as prescribed. A usual standard treatment was provided to the control group. The standard treatment includes advice on medication adherence, smoking tobacco-related health issues, and a follow-up schedule.

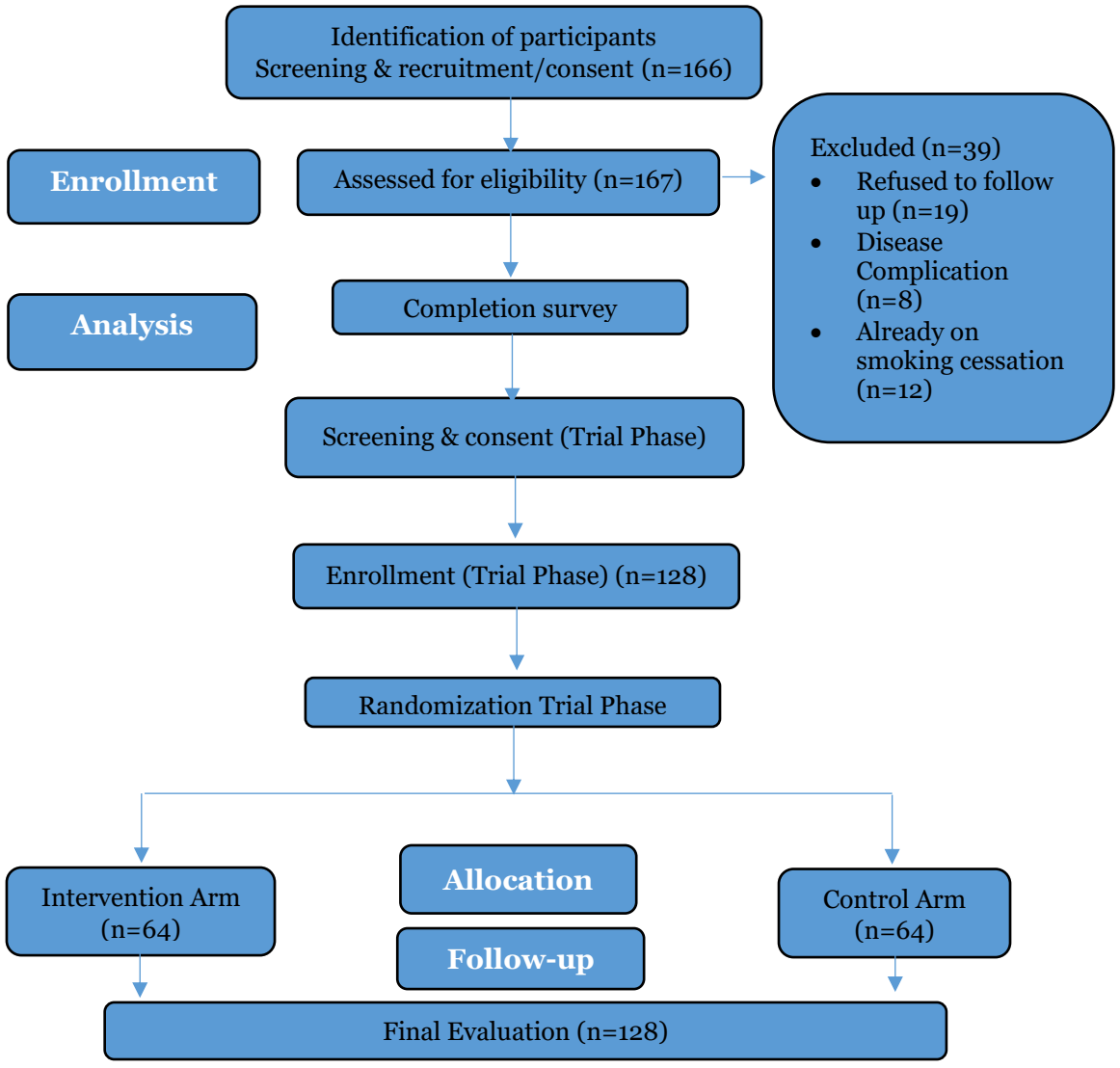

Figure 1. Study protocol

2.4 Measurement and data collection

The data collection phase occurred over a six-week period for each intervention. The "Why Do You Smoke" (WDS) questionnaire (American Lung Association, 1993), was employed in this study using the Arabic version. The WDS questionnaire is designed to identify the most common smoking triggers in NCD patients' and their motivation behaviors. The WDS is a self–assessment tool that has 18 items, which has 6 sub-scales with three items on each scale representing primary smoking motivations (stimulation, handling, pleasure, stress reduction, addiction, and habit), designed to help smokers identify their main reasons for consuming tobacco. The questionnaire had been validated in minor smokers' populations, and demonstrated acceptable internal consistency of alpha coefficients ranging from α=0.54-0.85 in smokers enrolled in a tobacco cessation program (Smith et al., 2008). The questionnaire was also piloted to five participants resulting in no issues being identified. In order to determine the WDS reliability, Cronbach's alpha was calculated. Each subscale has been evaluated for internal consistency using Cronbach's alpha, with α values for stimulation of 0.75, handling of 0.77, pleasure of 0.64, stress reduction of 0.78, addiction of 0.62 and habit of 0.66 (Smith et al., 2008). Results show that Cronbach's alpha of 0.734 signifies good internal consistency (Taber, 2018). Subjects rated their tobacco smoking behavior to each item. Each of the items was Likert-scaled as 1 (never) to 5 (always). Finally, the total score for each subscale was calculated. The one with the highest score was highlighted as the dominant smoking trigger for the particular subject (Smith et al., 2008).

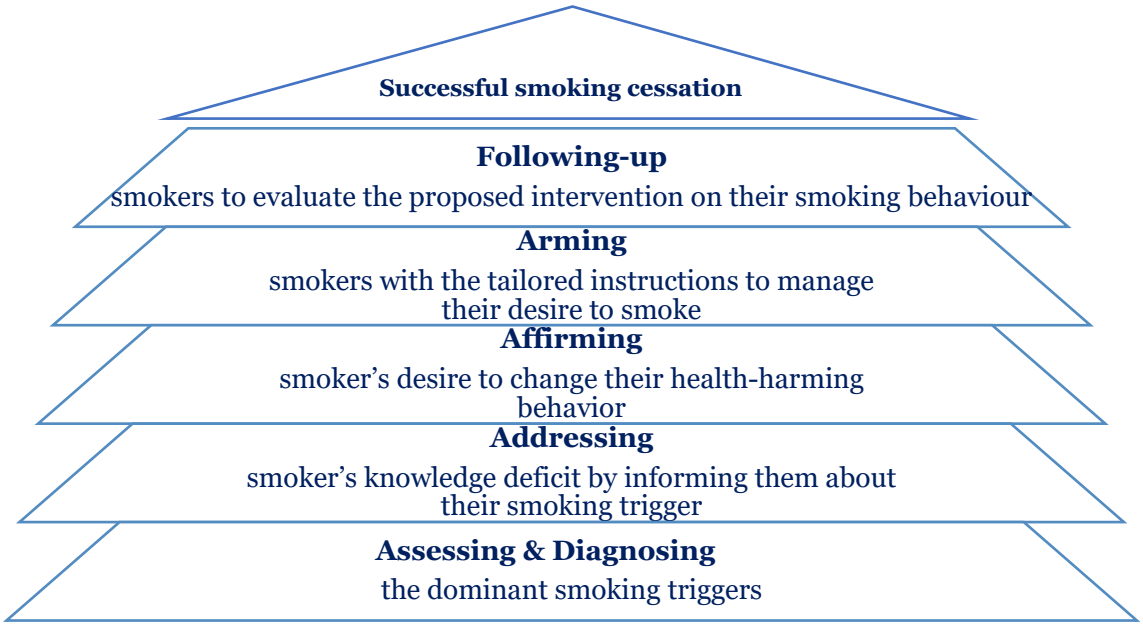

Figure 2. The 5A's & F conceptual model of smoking cessation intervention

2.5 Data analysis

The questionnaires were analyzed using IBM SPSS version 23. Descriptive statistics and inferential procedures were utilized to analyze patients' sociodemographic data and tobacco smoking behavior. To consider whether any of the variables included in the demographic data may potentially affect smoking cessation, a statistical significance was set at p=0.05. The Chi-square test compared the scores of the treatment and control groups after the intervention. The Mann-Whitney U test and the Chi-square test was used to determine the homogeneity of the individual and clinical features between the nurse-led and control group. Intention to treat analysis (ITT) was utilized, and patients who failed for follow-ups were assumed to be smokers or tobacco users. Statistical tests were conducted with a significance set at 0.05.

2.6 Ethical considerations

The Institutional Review Board (IRB) of the School of Nursing, University of Baghdad, approved the study proposal. The IRB approval reference number was 2395 on 21 December 2020. The National Institute of Health (NIH), office of extramural research had certified that the

author of this research paper had successfully passed the protecting human research participant course. All the data collection and other research-related activities were designed to respect and protect human rights, including confidentiality, voluntary participation, informed consent authentication, study protocol description, participation risks and benefits explanation, and the right to withdraw without prior notice. At the study completion, control group subjects were afforded the same educational intervention as the experimental group subjects. The study protocol was successfully approved by the Iranian Registry of Clinical Trials (IRCT). The trial ID was 44600, while the IRCT ID was IRCT20190809044485N2. The clinical trial registration detail can be retrieved from: https://www.irct.ir/trial/44600. The CONSORT checklist for reporting a randomized controlled trial can be seen in Table 1 (See Appendix 1).

3. Results

3.1 Characteristics of respondents

Table 2 shows that the underlined numbers represent the highest percentages of the selected variables for both the treatment and the control groups. Almost half of both the treatment group (n=27, 42.2%) and the control group (n=29, 45.3%) were classified as elderly individuals (≥59 years). The vast majority of both the treatment group (n=54, 84.4%) and the control group (n=58, 90.6%) were males. In terms of educational levels, the majority of subjects in both the treatment group (n=22, 34.4%) and the control group (n=28, 43.8%) were high school graduates. The significant majority of both the treatment group (n=59, 92.2%) and the control group (n=61, 95.3%) were living in urban areas. Almost three-quarters of both the treatment group (n=44, 68.8 %) and the control group (n=48, 75.0%) reported that their income was sufficient to cover their life-related expenses.

Table 2. Sociodemographic characteristics of respondents

Characteristics	Treatment (n=64)		Control (n=64)		*p*
	f	%	f	%	
Age (Years)					
39-48	12	18.8	16	25.0	*p*=0.54*
49-58	25	39.1	19	29.7	
≥59	27	42.2	29	45.3	
Gender					
Male	54	84.4	58	90.6	*p*=0.82**
Female	10	15.6	6	9.4	
Educational level					
Unable to read and write	4	6.3	3	4.7	*p*=0.61**
Able to read and write	2	3.1	3	4.7	
Primary School Graduate	9	14.1	4	6.3	
Secondary School Graduate	13	20.3	7	10.9	
High School Graduate	22	34.4	28	43.8	
College Level Graduate	14	21.9	19	29.7	
Residency					
Rural	5	7.8	3	4.7	*p*=0.34**
Urban	59	92.2	61	95.3	
Income					
Sufficient	44	68.8	48	75.0	*p*=0.47**
Barely sufficient	10	15.6	11	17.2	
Not sufficient	10	15.6	5	7.8	

*Notes. *Mann-Whitney U test, **Chi-square test, p=0.05*

Table 3 indicates that more than one-third of both the treatment group (n=25, 39.1%) and the control group (n=28, 43.8%) were smoking 11-20 cigarettes per day. Results of the smoking history showed that more than three-quarters of both the treatment group (n=50, 78.1%) and the control group (n=52, 81.3%) were smokers for more than three years. Diabetes mellitus type 2 (DMT2) was the most prevalent NCDs among both groups (n=20, 31.2% and n= 23, 35.9% for the treatment and control groups, respectively).

Table 3. Clinical characteristics of respondents

Characteristics	Treatment (n=64)		Control (n=64)		*p*
	f	%	f	%	
Number of smoked cigarettes					
11-20 Cigarette	25	39.1	28	43.8	*p*=0.37*
21-30 Cigarette	12	18.7	5	7.8	
31-40 Cigarette	14	21.9	26	40.6	
≥41 Cigarette	13	20.3	5	7.8	
Smoking history					
1-2 Years	14	21.9	12	18.7	*p*=0.62*
≥3 Years	50	78.1	52	81.3	
Medical Diagnosis					
Hypertension (HTN)	16	25.0	19	29.7	*p*=0.57*
Myocardial infarction (MI)	16	25.0	8	12.5	
Cerebrovascular accident (CVA)	6	9.4	6	9.4	
Chronic obstructive pulmonary disease (COPD)	6	9.4	8	12.5	
Diabetes mellitus type2 (DMT2)	20	31.2	23	35.9	

*Notes.*Chi-square test, p=0.05*

3.2 Smoking triggers of NCDs' patients

The WDS questionnaire was used to classify smokers with NCDs according to their smoking trigger(s). Results showed that almost half (48.4%) of the study samples' smoking behavior could be attributed to stress reduction. Whereas the dominant smoking trigger of patients with NCDs in this study was stress reduction triggers, as shown in Table 4.

Table 4. Classification of smokers with NCDs according to their smoking trigger(s)

Smoking trigger(s)	f	%
Motivational trigger	11	8.6
Keeping hand busy trigger	10	7.8
Relaxation & fun trigger	14	10.9
Stress reduction trigger	62	48.4
Addiction trigger	24	18.8
Habit trigger	7	5.5
Total	128	100

3.3 The comparison of smoking behavior between groups

Table 5 illustrates that the percentage of smoking quitting among the treatment group who were either able to completely quit smoking (n=19, 29.7%) or reduce the number of smoked cigarettes per day (n=28, 43.8%) was greater than their counterparts in the control group. Conversely, results showed that the percentage of the control group subjects who were not able to completely quit smoking (n=54, 84.4%) was greater than their counterparts in the treatment group. There was a statistically significant difference in the participants' tobacco smoking behavior (t (126) 6.677=0.000, $p<.05$) between the treatment group and the control group, which indicated that the nurse-led intervention was effective.

Table 5. Post-intervention comparison between groups

Post-intervention outcomes	Treatment (n=64)		Control (n=64)		Chi-square	*df*	*p*
	f	%	f	%			
I failed quitting smoking	17	26.5	54	84.4			
I managed to reduce the number of smoked cigarettes	28	43.8	5	7.8	13.34	2	0.001*
I completely managed to quit smoking	19	29.7	5	7.8			

*Notes. *Chi-square test, p=0.05*

4. Discussion

From a health promotion perspective, this study was designed to determine the most common smoking trigger among smokers with NCDs and to tailor a nursing intervention to help smokers with NCDs to quit smoking or at least reduce the number of smoked cigarettes per day. The current trial is designed to test the efficacy of a nurse-led intervention and determine which of the smoking triggers are more dominant in tobacco cessation in patients with non-communicable chronic diseases based on Schema theory (Crawford et al., 2018). This study results showed that the nurse-led intervention had significantly improved tobacco smoking behaviors and cessation to quit tobacco use at six weeks of follow-ups. This finding is in line with previous studies conducted on tobacco smokers, which found the intervention useful in improving abstinence and addiction scores among tobacco smokers (Siewchaisakul et al., 2020). Previously, it has been argued that nurse-led intervention using face-to-face and telephonic counseling is effective in improving stress reduction in the early stages of tobacco cessation and post quitting phase (Le Grande et al., 2022). The importance, readiness, and confidence to quit smoking are determined by the positive and negative effects on psychological status. Additionally, the use of text messaging and ongoing follow-up reduced smoking cessation. It is also suggested to use the intervention on a large scale (Lee et al., 2019).

Moving to the interventional phase, this study used the WDS questionnaire to determine the chief drive for smoking tobacco among smokers with NCDs. The study revealed that half of the respondents' smoking behavior can be attributed to stress reduction, signifying that it was the dominant trigger. The biopsychosocial literature has connected stress reduction and smoking with the phenomenon of self-medication and drug abuse. The psychoactive properties of tobacco provide a means of stress coping mechanism and mood regulator (Fathi et al., 2012). A significant percentage of smokers connected their smoking behavior with tobacco's anxiolytic and calming characteristics (Kassel et al., 2003). Furthermore, Slopen et al. (2013) in their study also reported that within the immediate family of smokers' social-relationship-related stress, perceived disparity, and critical problems are the dominant stressors to which smokers attributed their smoking behavior. It might be true that smokers may feel less stressed during smoking and directly after it. However, they are probably unaware that, although smoking may provide emotional relief, it is actually increasing the smokers' physical stress level (Almallah, 2018). Smokers are trapped in this vicious cycle, which makes successful cessation difficult. Several psycho-social, cognitive-behavioral, educational, and even pharmacological interventions have been used to help smokers to quit smoking (Fanshawe et al., 2017; Thurgood et al., 2016).

On the other hand, this study proposed a unique intervention: a tailored face-to-face counseling approach that fits smokers' characteristics. Tailored or individualized nursing interventions are assessment-based customized interventions. They are highly sensitive to individuals' characteristics, culture, personal goals, health status, attitude, and resource availability (Stolt & Suhonen, 2019). The high success rate of tailored interventions can be explained by the high-sensitivity level of these interventions to subjects' unique characteristics when compared with standardized interventions. This study used a tailored nurse-led intervention approach to activate the health-promotion role of nursing to help vulnerable populations, particularly smokers with NCDs, by providing professional counseling. Nurse-led intervention is considered one of the effective approaches for tobacco smoking cessation and targeting smoking triggers. The use of behavioral approaches was found effective in enhancing an individual's impetus to change their addictive behavior in comparison to the drugs alone. The nurse-led intervention is a consciously prepared form of behavior intervention capsule, which is found conducive to changing the behavior of an individual to quit tobacco. Various studies used nurse-led interventions, which were found effective in increasing smoking quitting and higher abstinence among smokers (Lopez-Olivo et al., 2022). However, there are only a few studies that tested the effectiveness of the nurse-led intervention to target smoking triggers and tobacco smoking cessation (Phang et al., 2020).

The tailored intervention in this study was both descriptively and inferentially authenticated. Equipped with core educational competencies, nurses are uniquely prepared to make a substantial difference in smokers' lifestyles by engaging the target population in health maintenance and promotion practices (AL-Fayyadh & Diener, 2017). Smoking cessation was started by measuring the smokers' desire to quit by using "The 5'As: ask, advise, assess, assist, and arrange" with the outcomes "quit" or "not quit". The results of this study revealed that the

intervention group had more desire to quit or reduce smoking cigarettes than participants in the control group. The results also showed that participants who were not willing to quit smoking were more in the control group than those in the treatment group, which indicated the slight impact of the nurse-led intervention. In their classification of nursing interventions, Butcher et al. (2018) supported that "even if standardized interventions are available and found to be effective, a tailored or targeted intervention may promote better adherence, achieve better outcomes, and be more cost-efficient" (p.17). A systematic review conducted by Rice et al. (2017) indicated that nurse-led smoking cessation interventions could enhance a person's success in the cessation of smoking in community settings or in health care centers. Such success can be attributed to the high-sensitivity level of these interventions to subjects' unique characteristics when compared with standardized interventions (Butcher et al., 2018). Therefore, Alexis-Garsee et al. (2018) intensified that using tailored-theoretical based nursing interventions is highly advisable for smokers with chronic health problems as they may face difficult smoking cessation experiences when compared with other populations.

The theoretical framework and the developed conceptual model stated in this study were essential to guide and explain the achieved results of the proposed intervention. This claim can be authenticated by the "5A's and F" model high-sensitivity and flexibility level in dealing with every person as a unique human being. This resulted in a thorough and multi-level assessment of every targeted person's smoking triggers before moving on to the next step. This model is unique in its ability to personalize the intervention based on the target person's smoking behavior trigger after addressing the knowledge deficit and affirming the person's desire to change. The model then addressed arrangements for the follow-up to both support the individual during the change journey and to evaluate the effectiveness of the proposed intervention. Poor information, a bad attitude, and insufficient organizational support for health promotion materials and nicotine replacement therapy were all factors that increased the likelihood of poor smoking control during the pre-contemplation phase (Lee et al., 2019). The environmental context and resources (e.g., lack of time), social influences (e.g., smoking norms within the social network), and intentions are potential factors affecting supporting smoking cessation or temporary abstinence in mental health settings (e.g., lack of positive intentions to deliver support) (Huddlestone et al., 2022).

Investing in the motivational counseling approach to deal with the target individual was a successful approach, which explains the positive outcome of applying the "5A's and F" models. This can be highlighted by showing smokers the positive impact of smoking cessation on diverse aspects of their life. The "5A's and F" model believes that a fear-inducing message showing smokers the negative impact of smoking on their health is necessary (Netemeyer et al., 2016). However, it should not be emphasized more than the positive impact of successful smoking cessation. This premise is well-supported in the literature on smoking cessation interventions (Ruiter et al., 2014). Furthermore, the fear-based educational message is short-lived, while the positive message lasts longer. Therefore, when targeting the sustainable effectiveness of an intervention, the fear-based educational message should not be over-emphasized.

5. Implications and limitations

More attention is required to the role of nurses in assessing NCDs patients' smoking triggers and promoting innovative forms of follow-up that enhance their role in providing tobacco smoking cessation. An effective tobacco smoking quitting follow-up will be a crucial component in building an encouraging plan to achieve treatment plan goals. Tailoring nurse-led interventions to target NCDs patients' stress reduction may be an effective method to enhance patients' ability to quit tobacco smoking and the efficacy of this intervention to increase the patients' awareness about the importance of this smoking trigger. A tailored approach which is designed specifically to empower smokers to achieve successful smoking cessation based on assessing their specified smoking trigger(s) is an effective approach to help smokers with NCDs to quit tobacco smoking successfully. Therefore, the findings of this study have the potential to equip nurses in the clinical setting(s) with a tailored nursing intervention to help their patients achieve smoking cessation successfully. The strength of this study is that this research is relevant, novel, and has advanced published knowledge, as all relevan**t** and similar previous studies were inconclusive.

However, the results of this study are not generalizable to the population in terms of follow-up duration as in to authenticate the intervention's ability to produce a sustainable and generalizable outcome and as a whole. Therefore, future studies using multi-follow-up designs to

overcome this limitation are warranted. The reliance on the self-reported outcome is another limitation of this study, and future studies should use more objective parameters to determine the effectiveness of the proposed intervention.

6. Conclusion

The study concluded that the main smoking trigger among study participants was stress reduction, which should consider to be the main focus when applying the nurse-led intervention for tobacco smoking cessation. The nurse-led intervention was demonstrated as an effective approach in managing patients to quit smoking. The study results offer some insightful information on the subject that can be crucial for improving clinical practice. This study highlights the importance of designing mixed methods research by utilizing randomized controlled trials with bigger samples and objective measurement to assess the effectiveness of the proposed nurse-led intervention and to detect potential smoking triggers succussed by smoking cessation interventions. The results of the study recommend developing a new strategy for helping patients who are struggling to quit. The nurse-led intervention that targets stress reduction may be a practical and affordable method to offer a patient-specific active follow-up to reduce the effort of quitting smoking in patients with NCDs. Finally, nurses' feedback can motivate the patients to continue abstaining.

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Author contribution

All authors (SAF, AHAAG, MMA, SMH, LC, AAS, and MS) were involved in the initial conception of the paper and in the design of the randomized controlled trial. All authors contributed to the preparation of the final manuscript. All authors have agreed on the final version by drafting the article or revising it critically for important intellectual content.

Conflict of interest

The authors declare that they have no conflict of interest.

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Appendix 1

Table 1. The CONSORT 2010 checklist of information to include when reporting a randomised trial
Targeting Smoking Triggers: A Nurse-led Intervention for Tobacco Smoking Cessation: A Quasi-Experimental, Randomized Comparative Trial

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomized trial in the title	√ Page No 1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance, see CONSORT for abstracts)	√ Page No 1
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	√ Page No 1-2
	2b	Specific objectives or hypotheses	√ Page No 2-4
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial), including allocation ratio	√ Page No 5
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	N/A
Participants	4a	Eligibility criteria for participants	√ Page No 6-7
	4b	Settings and locations where the data were collected	√ Page No 4
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	√ Page No 4, 6
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	√ Page No 5
	6b	Any changes to trial outcomes after the trial commenced, with reasons	N/A
Sample size	7a	How sample size was determined	√ Page No 7
	7b	When applicable, explanation of any interim analyses and stopping guidelines	N/A
Randomization:			
Sequence generation	8a	Method used to generate the random allocation sequence	√ Page No 4
	8b	Type of randomization; details of any restriction (such as blocking and block size)	√ Page No 4
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	√ Page No 4-5
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	√ Page No 4
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	N/A
	11b	If relevant, description of the similarity of interventions	√ Page No 6
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	√ Page No 7
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	N/A

Table 1. Continued

Section/Topic	Item No	Checklist item	Reported on page No
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analyzed for the primary outcome	√ Page No 11
	13b	For each group, losses and exclusions after randomization, together with reasons	√ Page No 4-5
Recruitment	14a	Dates defining the periods of recruitment and follow-up	√ Page No 4-5
	14b	Why the trial ended or was stopped	N/A
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	√ Page No 9-10
Numbers analyzed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	N/A
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	√ Page No12
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	√ Page No 7
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	N/A
Harms	19	All-important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	√ Page No 7
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	√ Page No 16
Generalizability	21	Generalizability (external validity, applicability) of the trial findings	√ Page No 16
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	√ Page No 13-16
Other information			
Registration	23	Registration number and name of trial registry	√ Page No 6
Protocol	24	Where the full trial protocol can be accessed, if available	√ Page No 4
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	N/A

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REVIEW

The Effect of Music Therapy on Adult Patients' Heart Rate: A Meta-Analysis

Kamila Alammar[1,3], Omar Ghazi Baker[1,2], Areej Alotaiba[1], Anwar Alkhunaizi[1]

[1]*College of Nursing, King Saud University, Riyadh, Saudi Arabia*
[2]*Department of Community, Psychiatric and Mental Health, College of Nursing, King Saud University, Riyadh, Saudi Arabia*
[3]*Nursing Department, Anfas Medical Care, Riyadh, Saudi Arabia*

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Corresponding Author:
Kamila Alammar
Department of Community, Psychiatric and Mental Health, College of Nursing, King Saud University, Riyadh, Saudi Arabia
Email:
kalammar89@gmail.com

Abstract

Background: Music can be used as a complementary intervention to bring about a positive effect on the quality of life. It has been widely employed in clinical practice as one of the earliest forms of treatment. Despite the fact that music therapy is widely utilized and practiced in clinical and educational contexts, it has received little attention in formal medical settings. In addition, contradictory findings about the effect of music deserve further investigation.
Purpose: This meta-analysis is conducted to examine the effect of music therapy on heart rates among adult patients.
Methods: The MEDLINE, CINAHL, PsycInfo, Cochrane Library, and PubMed databases were used for searching the literature. The literature review was conducted by two independent researchers using the following Medical Subject Headings terms: musicotherapy OR music therapy, AND heart rate OR vital signs AND clinical trials as the topic. Standard mean difference (SMD) with 95% confidence interval (CI) values was used to evaluate the effect of music therapy on heart rates.
Results: Out of 194 studies, 12 studies were included with 1,118 patients. According to the results of the meta-analysis, the heart rates in the experimental groups in which music therapy was used with various diagnoses of adult patients were found to be significantly different in comparison with the control group (SMD=-0.450, 95% CI=-8.86 to -0.31, p=0.04).
Conclusion: The results established that using music therapy for adult patients reduced their heart rates. However, the heterogeneity among the studies was high. Therefore, it is recommended that high-quality trials are warranted to confirm the benefits of music therapy interventions among adult patients.

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1. Introduction

Music has an influence on cultures. It is one of the most delightful aspects of the human experience, as it influences the human body and mind. Music is a universal language that breaks down barriers between different cultures. Melody, harmony, rhythm, and dynamics are some aspects of music that make people feel a certain way. Music can be a powerful tool for eliciting emotions and modifying physiological states (Arjmand et al., 2017; Liang et al., 2021). It has been widely employed in clinical practice as one of the earliest forms of treatment (Ramalingam et al., 2022). Pythagoras, a Greek philosopher, was the first to propose music therapy (Hole et al., 2015). In the 1940s, the United States formally recognized music therapy as an adjuvant therapy (Taylor, 1981).

Music therapy is the practice of utilizing music to help people improve and maintain their overall well-being. It has been shown to be useful in reducing patients' negative feelings, easing pain, and altering their physiological state (Liang et al., 2021). The American Music Therapy Association (2006) defined music therapy as "the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program". Many studies related to the benefits of music therapy have been conducted. Most of them have focused on its use to relieve anxiety, stress, depression, pain, and insomnia (de Witte et al., 2020; Ding et al., 2021; Erkkilä et al., 2021; Liang et al., 2021).

Music therapy has been shown to be effective in a variety of diseases, including dementia, multiple sclerosis, depression, and schizophrenia (Abe et al., 2022; Impellizzeri et al., 2020; Geretsegger et al., 2017; Leubner & Hinterberger, 2017). According to Fancourt and Finn (2019), music can make a substantial contribution to health and well-being. Finn and Fancourt (2018) claimed that listening to music in both clinical and non-clinical settings lowered cortisol levels, which led to a lower level of stress and lower blood glucose levels.

Heart rate is one of the vital signs and it has important physiologic and prognostic significance. According to the American Heart Association, as cited in Mason et al. (2007), the normal sinus heart rate is between 60 and 100 beats per minute. Heart rate variability is influenced by the parasympathetic and sympathetic nervous systems. The parasympathetic nervous system suppresses the heart rate and restores the body to a restful state after stress by releasing acetylcholine. Sympathetic stimulation increases heart rate by releasing norepinephrine (Gordan et al., 2015). Relaxation techniques stimulate parasympathetic nervous system effects and decrease cortisol, epinephrine, and norepinephrine levels as a result of regulating heart rate. Using music in relaxation techniques has been shown to promote cognitive and emotional relaxation (Bradt et al., 2015).

Several studies have examined the effect of music therapy on heart rate. A randomized controlled trial conducted by Uggla et al. (2016) proved that music therapy dramatically reduced children's heart rates following hematopoietic stem cell transplantation. Another study conducted among pre-hypertensive young adults revealed that there was a significant reduction in heart rate after four weeks of music therapy sessions (Mir et al., 2021). Furthermore, Chang et al. (2011) explored the effects of music on psychophysiological parameters among cardiac patients, but they found no significant effect of music therapy on heart rate. A systematic review conducted by Loomba et al. (2012) concluded that music has the positive effect of decreasing heart rate. Despite the fact that music therapy is widely utilized and practiced in clinical and educational contexts, it has received little attention in formal medical settings (Loomba et al., 2012; Pickard, 2022), particularly in Arab countries where utilizing music therapy remains stagnant. Additionally, it is difficult to determine the effect of music therapy on an individual's quality of life, especially when compared to other health interventions. According to Maldonado-Resto (2021), contradictory findings about the effect of music deserve further investigation. Since the effect of music therapy was inconsistent, examining the effect needs further verification (Lu et al., 2021). This presents clear challenges to the national and international incorporation of music into health policies and care (Bickerdike et al., 2017). Formulation of more evidence-based music therapy prescriptions on heart rate promotes music therapy program development within hospital settings. Therefore, this meta-analysis is conducted to examine the effect of music therapy on heart rate among adult patients. It sets the stage for further research into whether music therapy can help decrease heart rates.

2. Methods

2.1 Research design

This meta-analysis was carried out in stages, starting with the formulation of the research question, followed by the identification of relevant research studies, assessment of study bias, summarization of the evidence, and interpretation of the findings. The preferred reporting items for systematic reviews and meta-analyses (PRISMA) procedure (Moher et al., 2009) was used to extract available data linked to the effect of music therapy on heart rate. This protocol facilitated transparency in reporting meta-analytic research.

2.2 Search method

The primary research question was "What is the reported effects of music therapy on heart rate among adult patients?". In this regard, the search included studies with (P) adult patients investigating the effect of (I) music therapy compared with a (C) control group on (O) heart rate in (S) randomized controlled trials (RCTs). An extensive literature review was conducted using the electronic database searches of MEDLINE, CINAHL, PsycInfo, the Cochrane Library, and PubMed to retrieve studies from 2017 up to March 2022. Each database was searched using the following Medical Subject Headings (MeSH) terms: "musicotherapy" OR "music therapy" AND "heart rate" OR "vital signs" AND "clinical trials" as the topic by the first author (KA).

2.3 Inclusion and exclusion criteria

The inclusion criteria of the studies were as follows: (1) randomized controlled trials (RCTs); (2) available in full text, (3) published in English; (4) conducted among the adult patient population; (5) all the studies had to include mean or median scores; and (6) conducted in the last five years (2017-2022). According to the inclusion and exclusion criteria used during the search, qualitative studies, case studies, dissertations, conference abstracts, systematic reviews, symposiums, and studies on non-human subjects were excluded from this review. If studies compared music therapy with complementary and alternative medicine (CAM), they were also excluded from the review.

2.4 Screening of articles

Two research team members (KA and AA) independently screened the studies, and any disagreements were discussed between the two members. When no agreement was obtained, a third reviewer (OGB) was consulted. Zotero software was utilized to import and manage the search results and reject duplicates. The two members then examined the titles and abstracts of the included RCTs. When both members rejected a study, it would be eliminated from consideration. Insufficient title or abstract information required a full article review based on the inclusion criteria.

2.5 Data extraction

After the final list of articles was identified, two investigators (KA and AA) used a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA) to extract the data from each article independently. Each study included in the review had the following information extracted: first author and year of publication, sample size, quantitative data (mean ages, mean score, standard deviation), type and setting of procedure, duration of listening to music, and main findings.

2.6 Quality appraisal

The included studies were independently evaluated by independent reviewers from the research team (KA and AA) using the methodological quality assessment system in review manager (RevMan) version 5.4 (The Nordic Cochrane Center, The Cochrane Collaboration, Copenhagen, Denmark, 2020). The risk of bias for each selected trial was assessed according to seven sources of bias that included selection bias, performance bias, detection bias, attrition bias, reporting bias, and other reported biases. All the items were classified as yes ("low risk of bias"), no ("high risk of bias"), or unclear ("moderate risk of bias"). When the risk of bias for each of the seven components was classified as "low risk of bias", the total risk of bias for the trial was also characterized as "low". Similarly, when one or more of the seven components of bias were rated as high risk, the study was considered as high risk of bias (Higgins et al., 2011). Discrepancies in the evaluation were resolved by a third senior reviewer (OGB). Missing information leads to rating the bias as an unclear risk, which leads to difficulty in assessing the limitations of the trials (Viswanathan et al., 2012).

2.7 Data analysis

The meta-analysis was performed using RevMan software version 5.4 (The Nordic Cochrane Center, The Cochrane Collaboration, Copenhagen, Denmark, 2020) for data synthesis. The means and standard deviation outcomes of the heart rate measurements were extracted from each study. One study provided the adjusted post-test mean (C.H. Lee et al., 2017). The outcome measures of this meta-analysis were presented as the mean differences (MDs) between the music and control groups, with the corresponding 95% confidence intervals (CIs). Random effects models were used to combine the effects from individual studies. Heterogeneity was examined using Cochran's Q test and I^2. The heterogeneity was considered high if the value of I^2 was greater than 50% (Higgins, 2003). When there was significant heterogeneity, a random effects model was used for meta-analysis. A fixed effect meta-analysis was used when there was no significant heterogeneity. Pooled analyses of data from all studies were conducted to determine various outcomes.

3. Results

3.1 Literature search

One hundred and ninety-four articles were identified through database searching via the following search engines: Cochrane Library, EBSCO, MEDLINE PubMed, and PsycInfo. Twenty-six articles were removed due to duplication. The deleted records have the same title, author, and publication year. The remaining records (*n*=168) were exported to an Excel file. The extensive screening by two independent reviewers (KA and AA) using the inclusion and exclusion criteria resulted in the elimination of 125 articles, leaving a total of 43 full-text articles that were downloaded for consideration. Thirty-one articles were excluded for the following reasons: study conducted among healthy participants (*n*=7), comparison to another type of CAM intervention (*n*=8), lack of appropriate statistical data (*n*=12), and non-RCT (*n*=4). Ultimately, 12 articles met all the inclusion criteria and were included in the qualitative synthesis (Figure 1).

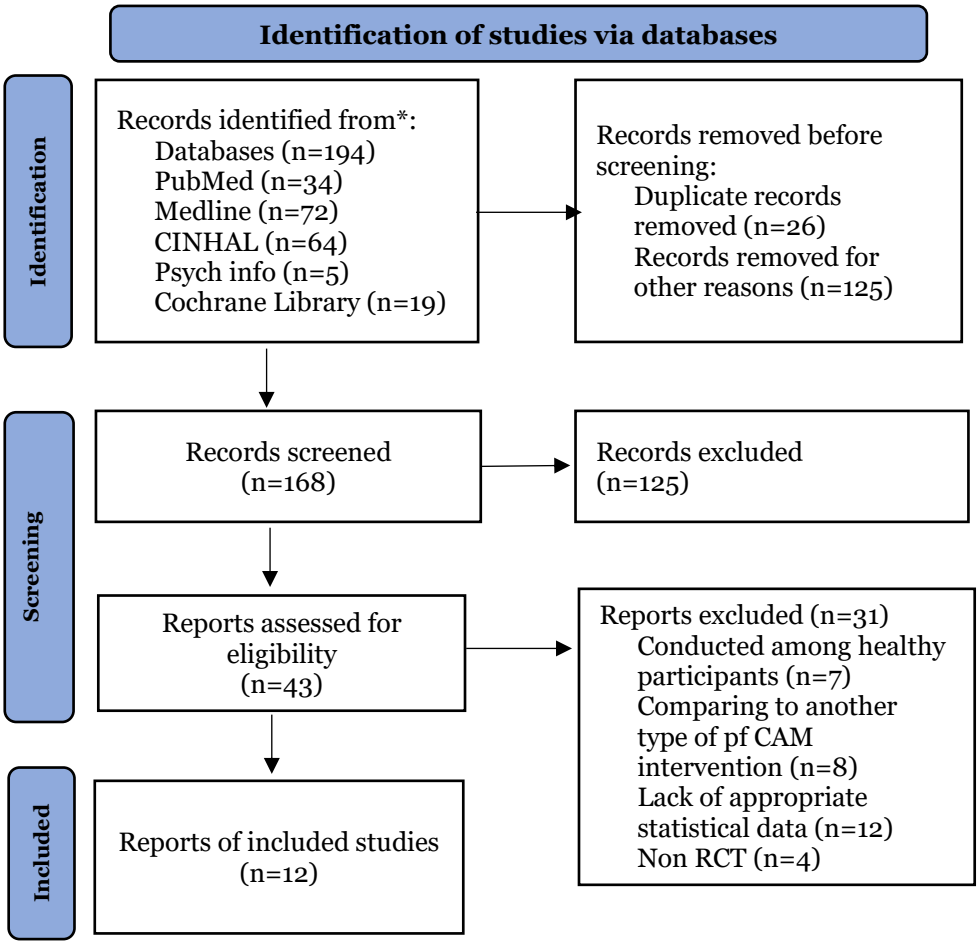


Figure 1. Study selection methodology

3.2 Risk of bias for the included studies

According to the risk of bias that was evaluated using the Cochrane Collaboration's software RevMan 5.4 (Figure 2), in general, the methodology of the included trials was less than ideal, with significant flaws (Figure 2a). Figure 2b illustrates the risk of bias summary of each study. In terms of the randomization process, 11 studies described the process of randomization and were assessed as having a low risk of bias, and one study as high risk of bias (W. L. Lee et al., 2017). The authors decided to include the high-risk study as including only the studies at low risk of bias may produce a result that is imprecise (Boutron et al., 2019). Four studies did not provide information about the allocation of concealment and were judged as having a high risk of bias (Cakmak et al., 2017; Lopez-Yufera et al., 2020; W. L. Lee et al., 2017; W. P. Lee et al., 2017), and one study was assessed as unclear bias (Hamidi & Ozturk, 2017). In addition, seven studies failed to blind the participants and investigators (Cakmak et al., 2017; Lopez-Yufera et al., 2020; Mackintosh et al., 2018; Tolunay et al., 2018; Wazzan et al., 2022; W. L. Lee et al., 2017; W. P.

Lee et al., 2017). In terms of detection bias, five studies were considered as high risk (Cakmak et al., 2017; Mackintosh et al., 2018; Tolunay et al., 2018; Wazzan et al., 2022; W. L. Lee et al., 2017), and the risk of bias was unclear for one study (Wu et al., 2017). The remaining six studies were evaluated as low risk of bias. For attrition bias, most of the studies were rated as low risk of bias, except for four studies that were judged as high risk of bias (Froutan et al., 2020; Schaal et al., 2021; Tolunay et al., 2018; W. L. Lee et al., 2017). In terms of reporting bias, all of the studies were assessed as low risk, except for three studies for which the risk of bias was not clear (Cakmak et al., 2017; Hamidi & Ozturk, 2017; W. L. Lee et al., 2017). Regarding the other bias, the studies by Lee et al. (2017) and Lopez-Yufera et al. (2020) were deemed high-risk since the participants have not been able to select their preferred genre of music for the intervention. Thus, it is possible that the effects of the music intervention were lessened.

3.3 Characteristics of the study

The total number of patients in all studies was 1,118, with sample sizes ranging from 38 to 200 for each study. A total of 554 patients were included in the music therapy groups, while 564 patients were enrolled in the control groups. The maximum mean age was 68.3 years, and the minimum mean age was 30 years. The study settings varied between inpatient and outpatient settings. Two studies played music in an intensive care unit (ICU) (Froutan et al., 2020; C. H. Lee et al., 2017), and three studies provided music in a preoperative room (Lopez-Yufera et al., 2020; Schaal et al., 2021; Wu et al., 2017). One study provided music in a cardiac ward (Cakmak et al., 2017), one study in an interventional room in an outpatient clinic (Hamidi & Ozturk, 2017), one study in a dental clinic (Wazzan et al., 2022), and one in a cast room (Tolunay et al., 2018). There was one study in a radiology department that provided meditative music during tomography scans (W. L. Lee et al., 2017). One study provided intraoperative music (Mackintosh et al., 2018), and the final study provided music in a post-anesthesia care unit (PACU) (W. P. Lee et al., 2017).

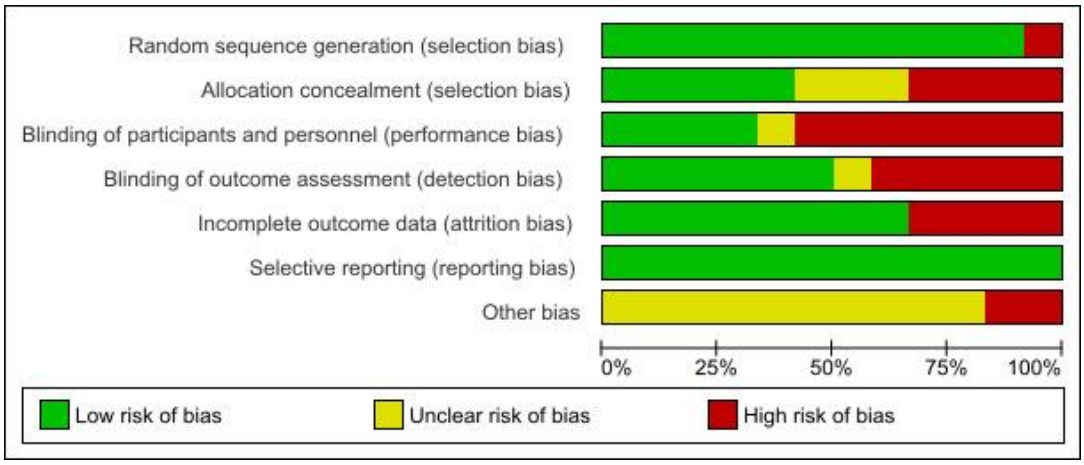
The study by Froutan et al. (2020) provided music during ICU hospitalization until day 6. The duration of the music intervention ranged from 10 to 30 minutes. Conversely, five studies (Cakmak et al., 2017; Hamidi & Ozturk, 2017; Mackintosh et al., 2018; Tolunay et al., 2018; Wazzan et al., 2022) reported that music was played throughout the procedure without specifying the total time of the procedure.

Various genres of music were played throughout the trials. C. H. Lee et al. (2017) used western classical music, Chinese classical music, music of natural sounds, and religious music based on the patients' preferences. Six types of soothing music (such as nature, piano, harp, and jazz) were used among the patients, according to W. P. Lee et al. (2017) and Wu et al. (2017) studies. Cakmak et al. (2017), Hamidi & Ozturk, (2017), and Tolunay et al. (2018) played popular, classical, and slow music or Turkish folk as the patients preferred. Mediative music was used in the W. L. Lee et al. (2017) study to enhance the relaxation feelings among patients who were waiting for Positron Emission Tomography (PET) scans. Relaxing music, as described by Froutan et al. (2020) and Lopez-Yufera et al. (2020), was used among patients with potentially malignant oral disorders and ICU patients. Wazzan et al. (2022) used regular soft music tracks, while Mackintosh et al. (2018) and Schaal et al. (2021) did not specify the music type.

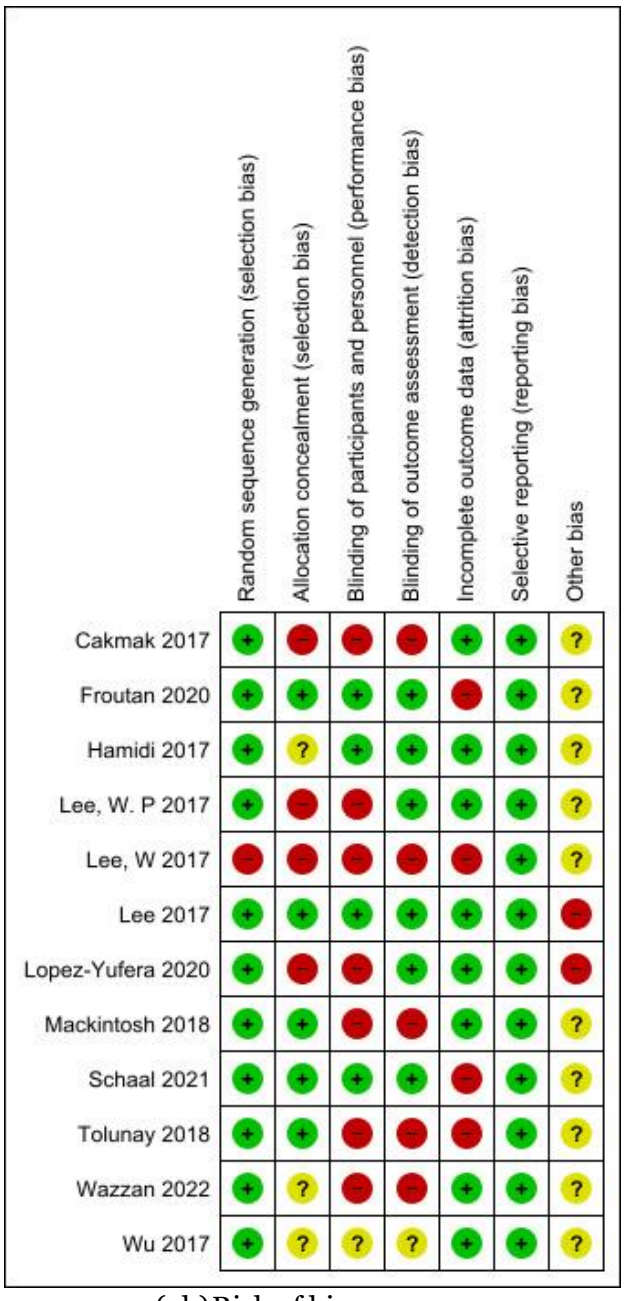
Four studies were carried out in Taiwan (C. H. Lee et al., 2017; Wu et al., 2017; W. L. Lee et al., 2017; W.P. Lee et al., 2017), three studies in Turkey (Cakmak et al., 2017; Hamidi & Ozturk, 2017; Tolunay et al., 2018), and one study in Spain (Lopez-Yufera et al., 2020), Iran (Froutan et al., 2020), Australia (Mackintosh et al., 2018), Germany (Schaal et al., 2021), and the United Arab Emirates (Wazzan et al., 2022) (Table 1).

3.4 The effect of music intervention on heart rate

In this analysis, data from various other subjective variables were pooled together using the standardized mean difference (*SMD*) statistic. The music intervention showed a significant and small to medium effect in decreasing heart rate (n=1118, *SMD*=-0.450, 95% *CI*=-8.86 to -0.31, p=0.04) when compared with the control group, with evidence of heterogeneity (p=0.00001, I^2=98%) (Figure 3). The heterogeneity was best resolved by excluding Wu et al. (2017), C. H. Lee et al. (2017), and Froutan et al. (2020). The results favored music therapy after exclusion (n=941, *SMD*=-1.56, 95% *CI*=-2.75 to -0.37, p=0.01), with p=0.68, and I^2=0% (Figure 4).



(2a) Risk of bias graph



(2b) Risk of bias summary

Figure 2. Risk of bias

3.5 The effect of music intervention on heart rate

In this analysis, data from various other subjective variables were pooled together using the standardized mean difference (SMD) statistic. The music intervention showed a significant and small to medium effect in decreasing heart rate (n=1118, SMD=-0.450, 95% CI=-8.86 to -0.31, p=0.04) when compared with the control group, with evidence of heterogeneity (p=0.00001, I^2=98%) (Figure 3). The heterogeneity was best resolved by excluding Wu et al. (2017), C. H. Lee et al. (2017), and Froutan et al. (2020). The results favored music therapy after exclusion (n=941, SMD=-1.56, 95% CI=-2.75 to -0.37, p=0.01), with p=0.68, and I^2=0% (Figure 4).

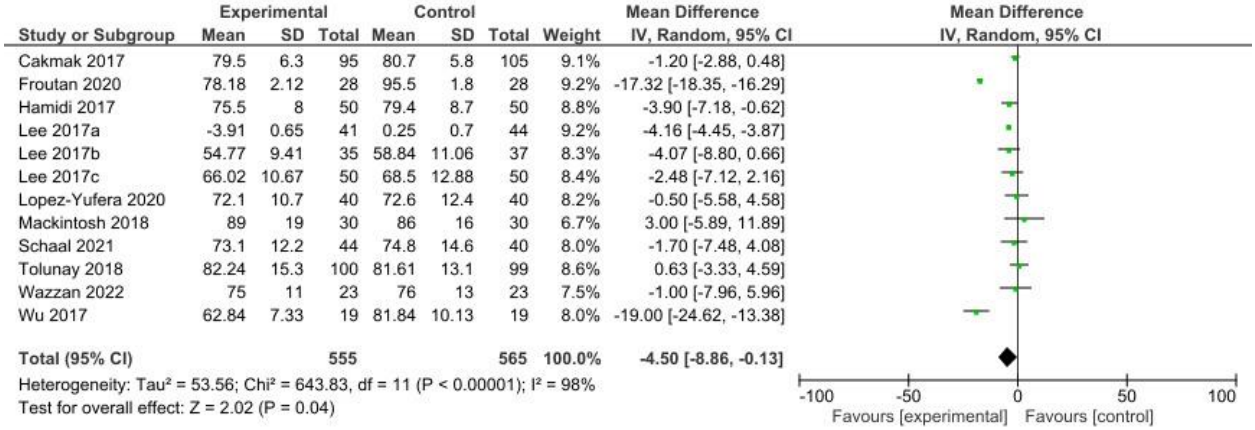


Figure 3. Mean difference in the effect of music on heart rates

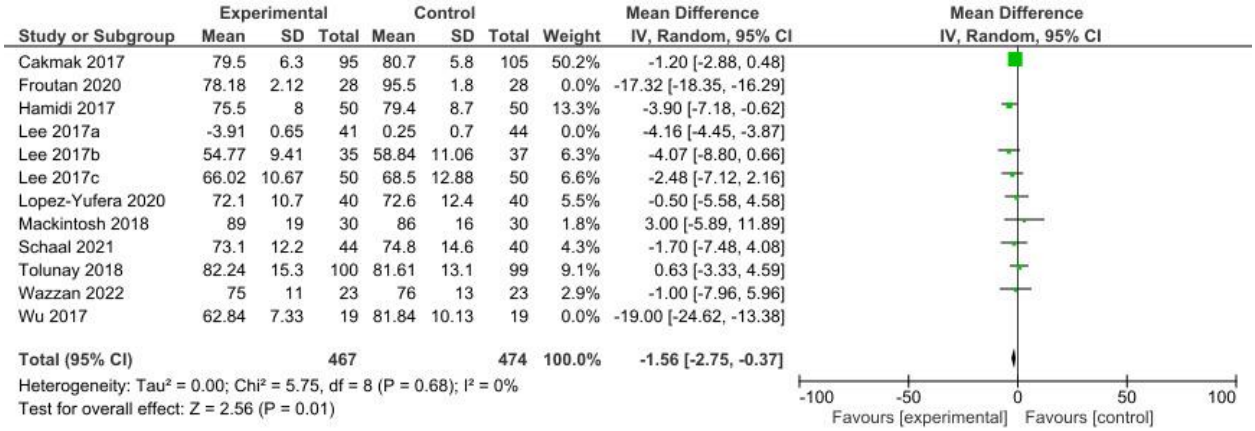


Figure 4. Mean difference after heterogeneity was resolved

4. Discussion

This meta-analysis of 1,118 participants in 12 RCTs aims to examine the effect of music therapy on heart rate among adult patients. The results revealed that the heart rates of the patients assigned to the music therapy groups decreased significantly with small to medium effect (SMD=-0.450) compared to the control group patients. This reflects the significant effect of music therapy, although this result shows high heterogeneity. The heterogeneity may be raised due to differences in the participants' diagnoses, characteristics, and perceptions of the populations based on their countries and study settings (inpatient or outpatient). Two studies were in an ICU setting, and three were in preoperative care units. There was one study in each of the following settings: an intraoperative setting, PACU, procedural room, dental clinic, cardiac unit, radiology department, and cast room. This conclusion regarding the effect of music therapy is consistent with what was reported previously by Loomba et al. (2012) and de Witte et al. (2020) in pooled analyses of 432 and 9,617 participants, respectively.

Music therapy is a complementary treatment for a wide range of medical disorders because its effects have the potential to promote whole-body coordination (Mojtabavi et al., 2020).

Listening to music enhances parasympathetic activities, as the parasympathetic system is the most active under restful conditions, which leads to a decrease in the heart rate (Gordan et al., 2015). According to Suhartini (2011), the human energy field receives oscillations produced by music, and numerous physiological reactions synchronize with or match the music's oscillations. In this aspect, patients believe the music intervention to be more effective and enjoyable.

The hospitalization process is a potential source of stress that may increase the risk of physiological complications. Stressed patients with an activated sympathetic nervous system may be predisposed to increased epinephrine secretion, which influences physiological functioning, including elevating the heart rate (Vaseghi & Shivkumar, 2008). Considering the individual studies, the greatest decrease in heart rate was obtained with 30 minutes of listening to music among patients undergoing awake craniotomy (-19.12 beats per minute in heart rate, 95% CI=-24.62 to -13.38) (Wu et al., 2017) followed by a study of Frountan et al. (2020) with reduction of 17. 32 beats per minute, among patients with traumatic brain injury. A less pronounced reduction in heart rate was found among adult patients with potentially malignant oral disorders who listened to relaxing music with headphones (Lopez-Yufera et al., 2020) (-0.50 beats per minute in heart rate, 95% CI=-5.58 to 4.58). Mir et al. (2021) used music among pre-hypertensive young adults and suggested that 30 minutes of music listening has a significant effect on reducing heart rates. This finding is in line with Wu et al. (2017) findings that suggest the length of music therapy affects heart rate reduction.

Considering other outcomes, various meta-analyses have shown the positive effects of music therapy on pain, depression, anxiety, and sleep quality (Li et al., 2022; Lin et al., 2020; Sorkpor et al., 2021). The overall results indicated that music therapy is an effective intervention that is relatively affordable, safe, and simple to administer. Our findings support the use of music therapy as an empirically supported intervention for lowering heart rates among adult patients. The mechanism by which music affects heart rate is not clear. However, its use can be justified, as the music appears to have the ability to reduce physiological arousal, which is elevated during times of stress (de Witte et al., 2020). Reduced physiological arousal is associated with reductions in heart rate. Music listening is a therapeutic strategy and relaxation technique that has the ability to modulate autonomic nervous system activity and decreases cortisol, adrenaline, and norepinephrine levels, hence regulating the heart rate (Bradt et al., 2015; McCrary & Altenmüller, 2021).

Ibn Sina (Avicenna) is one of the most significant physicians and philosophers of the Islamic age indicates that listening to music is one of the most efficient medical treatment methods, which proves the value of music therapy in medical treatment (Sidik et al., 2021). Although, to the best of our knowledge, music therapy has been overlooked and ignored throughout the Arab world, despite its numerous benefits. During our search and screening, only two studies were discovered that examined the effect of music therapy on patients undertaken by Luis et al. (2019) in the Aswan Heart Center in Egypt and Wazzan et al. (2022) in the Urgent Care Dental Department, the University of Sharjah Dental Hospital in the United Arab Emirates. The reason for ignoring music therapy in the Arab world can be justified as the disagreement and debate of being music permitted or prohibited (Alamer, 2015).

5. Implications and limitations

This meta-analysis demonstrates that music therapy is an effective intervention that can improve people's health, which opens the door for future research studies on the benefits of music therapy, particularly in the Arab world. However, this study has some limitations. First, the search was limited to studies conducted among adult patients. Including diverse populations, such as pediatric patients and healthy adults, might provide a more comprehensive view of the effects of music therapy on heart rates. Second, studies with significant selection and performance biases were also included, which may have resulted in an overestimation of the results. Finally, because the types and lengths of music therapy were so varied, how different music genres and durations affected patients' heart rates could not be determined.

6. Conclusion

This meta-analysis revealed that music therapy has a beneficial effect on heart rate reduction in patients with a range of diagnoses in a variety of hospital settings. This study recommends that

additional high-quality clinical trials in a variety of settings are required to prove music therapy's influence on heart rate.

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Author contribution

KA participated in the investigation, methodology, project administration, and roles/writing-original draft, and independently reviewed trials for meeting the inclusion criteria and extracted data. OGB supervised in writing, reviewing, and editing. AAl contributed to formal analysis, visualization, and software. AA independently reviewed trials for meeting inclusion criteria and extracted data. All authors discussed the results and contributed to the writing and editing of the manuscript.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix 1

Table 1. Included studies characteristics

Author (Publication year)	Country	Sample size per group	Mean age	Intervention	Duration of music listening	HR outcome
Cakmak et al. (2017)	Turkey	EG: 95 CG: 105	42.9	EG: listening to music during the shock wave lithotripsy session. CG: No music	Throughout the procedure	HR was significantly higher in patients who did not listen to music (p=0.0001)
Froutan et al. (2020)	Iran	EG: 28 CG: 28	EG: 42.46 CG: 40.32	EG: music therapy integrated with family recollection. CG: No music	twice a day for 15 minutes for 6 consecutive days	Significant decrease in heart rate for the patients in the intervention group as compared to the patients in the control group (p<0.0001)
Hamidi et al. (2017)	Turkey	EG: 50 CG: 50	EG: 46.5 CG: 48.1	EG: listening to music during the Percutaneous Nephrostomy Tube Placement. CG: No music	Throughout the procedure	Heart rates EG patients were significantly lower than CG patients (p=0.01)
C. H. Lee et al. (2017)	Taiwan	EG: 41 CG: 44	EG: 59.46 CG: 59.52	EG: listening to music through headphones. CG: No music	30 minutes	Heart rates EG patients were significantly lower than CG patients (p<.001)
W. L. Lee et al. (2017)	Taiwan	EG: 35 CG: 37	EG: 59.03 CG: 60.27	EG: listening to mediative music Positron Emission Tomography (PET) scans. CG: No music	30 minutes	Significant decrease in heart rate for the patients in the intervention group as compared to the patients in the control group (p<0.001)
W. P. Lee et al. (2017)	Taiwan	EG: 50 CG: 50	EG: 47.8 CG: 51.36	EG: patients listened to soothing music of their choice using mp3 player and over-ear headphones to reduce outside interference. CG: No music	30 minutes	Heart rate (t=2.61, p=0.012) decreased among intervention group
Lopez-Yufera et al. (2020)	Spain	EG: 40 CG: 40	68.3	EG: listening to relaxing music with headphones from an MP3 player and with access to the volume control. CG: resting in silence with headphones on but without music	10 minutes	Heart rates EG patients were significantly lower than CG patients (p<.001)

Table 1. Continued

Author (Publication year)	Country	Sample size per group	Mean age	Intervention	Duration of music listening	HR outcome
Mackintosh et al. (2018)	Australia	EG: 30 CG: 30	EG: 65 CG: 68	EG: Participants listened to the music via ear-bud headphones and the music was played during the entire duration of the pleural procedure and for an additional 10 minutes before and 10 minutes after the pleural procedure. CG: No music	Throughout the procedure and for an additional 10 minutes before and 10 minutes	Participants in the music group had reductions in heart rate (p=0.04).
Schaal et al. (2021)	Germany	EG: 44 CG: 40	EG: 56.1 CG: 57.2	EG: Participants listened to the music during port catheter placement. CG: No music	Throughout the procedure	Music group displayed a significant reduction in heart rate (p=0.035)
Tolunay et al. (2018)	Turkey	EG: 100 CG: 99	EG: 52.50 CG: 51.85	EG: listened to music during cast room procedures on normal speaking level (40–50 dB) with headsets covering the ear and minimizing noises from the environment. CG: No music	Throughout the procedure	No statistically significant difference was identified for the HR among both groups (p=0.939)
Wazzan et al. (2022)	United Arab Emirates	EG: 23 CG: 23	30	EG: The group was exposed to the music throughout the entire endodontic procedure. CG: No music	Throughout the procedure	No statistically significant difference was identified for the HR among both groups (p=0.74)
Wu et al. (2017)	Taiwan	EG: 19 CG: 19	40	EG: Patients were asked to choose their preference of music from 6 types of soothing music (Close to heartbeat) while are lying on the operating table. CG: No music	30 minutes	Music group displayed a significant reduction in heart rate (p<.001)

Notes. EG: experimental group; CG: control group

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ORIGINAL RESEARCH

Relationship between Nurses' Attitudes and Satisfaction with Bedside Shift Reports and Patient Safety Culture

Samara Jaber[1], Mirna Fawaz[1], Ahmad Rayan[2], Nisser Alhroub[3], Mohammad Suliman[4], Mohammed ALBashtawy[4], Rasmieh Al-Amer[5], Abdullah Alkhawaldeh[4]

[1]*Faculty of Health Sciences, Beirut Arab University, Beirut, Lebanon*
[2]*Faculty of Nursing, Zarqa University, Zarqa, Jordan*
[3]*Faculty of Nursing, Jerash University, Jerash, Jordan*
[4]*Princess Salma Faculty of Nursing, AL Al-Bayt University, Mafraq, Jordan*
[5]*Faculty of Nursing, Isra University, Amman, Jordan*

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Corresponding Author:
Abdullah Alkhawaldeh
Princess Salma Faculty of Nursing, AL Al-Bayt University, Mafraq, Jordan.
Email:
dr-abd@aabu.edu.jo.
abdo_752012@yahoo.com

Abstract

Background: A thoroughly standardized nurse bedside shift report, including effective communication, may improve nurses' satisfaction and patients' safety. However, a few studies were found that measure the relationships between nurses' attitudes and satisfaction with bedside shift reports and patient safety outcomes.
Purpose: This study aimed to measure nurses' attitudes and satisfaction with bedside shift reports and their relationships with patient safety culture.
Methods: A cross-sectional and descriptive study was conducted between May to August 2021 among 90 bedside nurses conveniently recruited from a public hospital in Lebanon. The Bedside Handover Report Staff Nurses' Satisfaction Survey and the Survey on Patient Safety (SOPS) were used to collect data. Data were analyzed using descriptive statistics such as mean and standard deviation and inferential statistics, i.e., Pearson correlation coefficient.
Results: The results showed that satisfaction scores were high in all the questions in the bedside shift reporting. The participants showed relatively positive attitudes towards bedside shift reports where all the statements recorded above-average mean values. The highest-ranking statement "bedside shift report is completed in a reasonable time" was recorded with a mean value of 3.35 (SD=0.87), while the lowest-ranking statement was "bedside shift report is relatively stress-free" with a mean value of 2.03 (SD=0.86). There were significant relationships between nurses' satisfaction with shift reports and some patient safety culture composites, such as between nurses' satisfaction with bedside shift reports and communication about errors and reporting of patient safety events ($p<0.05$) and between nurses' attitudes toward bedside shift reports and communication about errors ($p<0.001$)
Conclusion: Implementation of the bedside shift report improves nurses' levels of satisfaction, enhances positive attitudes toward work, and enhances patients' safety. Nursing leaders should encourage nurses to implement bedside handover reports in their hospitals.

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1. Introduction

Ineffective communication between healthcare professionals is one of the biggest causes of medical errors; thus, hospitals are working hard to improve to prevent medical errors and sentinel occurrences (Ayoub et al., 2021). The Joint Commission 2012 stated that ineffective hand-off endorsement is recognized as a critical patient safety problem in health care. It is estimated that 80% of serious medical errors involve miscommunication between caregivers during the transfer of patients (Joint Commission, 2012). Therefore, innovating and adopting a clear context of hand-off communication is important to protect patient safety.

Traditional shift report is a process performed by healthcare professionals to communicate information, mainly registered nurses, during the change of shifts and transfer of patients between floors and patient care units (Small & Fitzpatrick, 2017). This process can be done verbally, through writing, or by recording, but not at the bedside of the patient (Evans et al., 2012;

Maxson et al., 2012). On the other hand, the bedside hand-off shift report is a method of endorsement where communication takes place at the bedside with patients and family members.

Bedside shift report between nurses is an opportunity to involve patients and family members in their care. It also offers room for patients to participate in the decision-making process regarding their health (Small & Fitzpatrick, 2017). During bedside shift reports, the patients and their family can hear updates regarding the health status of the patients during the information exchange that takes place between nurses. They are also urged to ask questions, provide comments and make any suggestions they might have as the shift report process is taking place (Maxson et al., 2012; Reinbeck & Fitzsimons, 2013; Thomas & Donohue-Porter, 2012). The use of bedside shift reports enhances patient satisfaction, fosters teamwork, and improves nurse accountability and prioritizing at the start of the shift (Sherman et al., 2013).

A bedside shift report is considered a great opportunity for communication between the nurse and the patient and a better understanding of the patient's urgent needs and concerns. Nurses are better prepared and confident to discuss patient care issues with physicians and other health care providers immediately after the change-of-shift hand-off (Maxson et al., 2012). According to Novak and Fairchild (2012), the number of extra hours per nurse reduced dramatically after introducing a standard bedside report because the report required less time. By boosting the effectiveness of reports, increasing nurse culpability, promoting coordination among staff members, and increasing mentorship amongst nurses, the bedside report contributes to nurse satisfaction (Sand-Jecklin & Sherman, 2013).

Furthermore, the nursing bedside shift report covers all initiatives from the Joint Commission's 2017 Patient Safety Goals (Joint Commission, 2017). For example, the bedside shift report not only allows nurses to physically review their patients with a colleague but also allows patients to participate directly in the discussion of their treatment. According to a study conducted by Sand-Jecklin and Sherman (2014), patient falls at shift change, and medication errors were minimized after implementing bedside shift reports. The use of a bedside shift report has been found to increase patient safety and reduce adverse occurrences such as patient falls (Gregory et al., 2014; Tage et al., 2021).

The nurse shift report has been identified as one of the vulnerable communication points. Some studies indicated that patients should be involved during nurse bedside shift reports, and important things such as wounds, incisions, drains, or central lines should be carefully assessed (Shank, 2018). Therefore, a thoroughly standardized nurse bedside shift report, including effective communication, may improve nurses' satisfaction and patients' safety. However, few studies were conducted to measure the relationships between these variables. Also, there is no study in Lebanon conducted to measure the relationships between these variables. Accordingly, this study was conducted to measure nurses' attitudes and satisfaction with bedside shift reports and their relationships with patient safety culture.

2. Methods

2.1 Research design

A cross-sectional and descriptive research design was used in this study. This design enables the researcher to observe two or more variables at a time and is useful for describing a relationship between two or more variables (Howitt & Cramer, 2020).

2.2 Setting and samples

The setting for this research study was all nursing units practicing bedside shift reports on the medical and surgical floors at a public hospital located in Lebanon. The population of interest for this study were the registered nurses who have been implementing the bedside shift report for at least the past year. The inclusion criteria were: (1) nurses practicing bedside shift reports, (2) nurses working on the medical-surgical floors, (3) nurses with more than 6 months of experience (A minimum of 6-month experience was chosen to allow nurses sufficient time to minimize confounding of results with issues related to bedside shift reports. Meanwhile, nurses who were on a leave and did not deliver direct patient care were excluded. Convenience sampling was utilized to recruit the samples. The sample size was calculated using the Raosoft calculation website (Raosoft, 2004). Considering the population size of 111 nurses, the confidence level of 95%, and the margin of error of 0.05, a sample size of 87 is required. This study, however, included 90 nurses to meet the requirement for a representative sample.

2.3 Measurement and data collection

A demographic questionnaire, including the participant's age, gender, years of experience, and other characteristics were used. The Bedside Handover Report Staff Nurses' Satisfaction Survey was also utilized. This questionnaire is a 7-item Likert scale with scores ranging from 1 (strongly disagree) to 5 (strongly agree). The coefficient of reliability reported by a previous study was 0.80. This indicates that the tool is reliable to use for data collection (Principe, 2018).

A survey with eight questions based on previous research was used to assess nurses' attitudes toward bedside shift reports (Gadzama, 2017). The survey measures the importance of bedside shift reports and their effect on patient safety. The survey consisted of eight questions with a five-point Likert response format; the Likert responses ranged from 1 to 5, with 1 indicating strong disagreement and 5 indicating strong agreement. A previous study showed that the survey was reliable (Cronbach Alpha above 0.75 in all subscales) in measuring nurses' attitudes toward bedside shift reports (Gadzama, 2017).

The Survey on Patient Safety (SOPS) tool was employed to examine the patient safety culture at the respective hospital. Five composites were adopted from the original tool that covered various aspects of patient safety, namely: organizational learning—continuous improvement, leadership support for patient safety, communications about the error, reporting of patient safety events, patient safety rating, and background information (Nieva & Sorra, 2003). Previous studies showed good content validity (The scale-content validity index score yielded 0.80), and the reliability of the SOPS tool dimensions achieved acceptable levels of Cronbach α ($\alpha \geq 0.6$) (Najjar et al., 2013; Suliman et al., 2017). For this study, the questionnaire was piloted among nurses in the hospital who practiced bedside shift reports in order to test its reliability in collecting genuine data. After that, psychometric analysis was carried out to determine the coefficient of reliability "Cronbach alpha" of the questionnaire, which turned out to be higher than 0.75 in all subscales, thus reflecting the adequate use of this tool.

The data were collected by the researcher through a visit to the medical-surgical floors in the selected hospital. The researcher provided information about the aim, content, and duration of the study that was conducted and what nurses were required to do. Nurses responded to the provided questionnaires after explaining the exact way to properly answer the questions, respond to any concerns, and clarify any terms. Nurses received assurances that participation was voluntary and responses would be kept confidential. If they agreed to participate, they would be requested to complete the survey. The surveys were completely anonymous, and each nurse could decline participation without repercussions. The researcher gathered the completed surveys. Only the researcher had access to the password-protected computer with all the data.

2.4 Data analysis

The data collected from the surveys were entered into SPSS version 21. Descriptive statistics such as percentage, mean and standard deviation were used to describe nurses' characteristics and their attitudes and satisfaction with bedside shift report, and inferential statistics, i.e., the Pearson correlation coefficient was used to measure the relationships between nurses' attitude and satisfaction with bedside shift report and patient safety outcomes.

2.5 Ethical considerations

Ethical requirements were taken into consideration while conducting the study. Approval from the institutional review board (IRB) at Bellevue medical center (IRB No. ECO-R-180) and from the approached clinical sites was obtained. The anonymity and confidentiality of all study participants were maintained. Participants were sent a consent form with the purpose of the study, the means of data collection, and the benefits and possible harm. They were also informed that participation was completely voluntary and they had the right to withdraw from the study at any time without penalties.

3. Results

3.1 Sociodemographic characteristics

The study included 90 participants. The majority were females (68.9%), single (67.8%) and hold bachelor's degrees or their equivalent (77.8%). In addition, the participants were distributed across various shift durations; most participants (75.6%) worked during day shifts. It is also

noteworthy to mention that the majority of the participants were aged between 21-30 (72.3%) and had 1-10 years of experience (77.8%). The detailed results for the sociodemographic data are delineated in Table 1.

Table 1. Sociodemographic characteristics of the respondents

Characteristics	Frequency (f)	Percentage (%)
Gender		
Male	28	31.3
Female	62	68.9
Work Shift		
Day Shift	68	75.6
Night Shit	22	24.4
Educational Level		
Bachelor	70	77.8
Masters	20	22.2
Marital Status		
Single	61	67.8
Married	28	31.1
Divorced	1	1.1
Age		
21-30 years	65	72.3
31-40 years	19	21.0
More than 40 years	6	6.7
Years of experience		
1-10 years	70	77.8
11-20 years	20	22.2

3.2 Satisfaction with bedside shift report

The nurses who took part in this study answered the nursing satisfaction with the bedside shirt report questionnaire, which comprised seven statements scored on a Likert scale from 1 to 5. Descriptive analysis was carried out, and the results showed that the participants reported high satisfaction with beside shift reports where all the statements recorded mean values higher than 3. The highest-ranking element was the one stating that bed bedside shift report provides a comprehensive communication process between registered nurses (RNs) with a mean score of 3.31, while the least ranking statement was the statement indicating that a bedside shift report minimizes delays in patient care delivery with a mean score of 3.01 (SD=0.74) (see Table 2).

Table 2. Satisfaction with bedside shift report

Items	Minimum	Maximum	Mean	SD
1. RN provides up-to-date patient care information	00.00	04.00	03.29	0.74
2. Helps RNs to prioritize patient care activities	01.00	04.00	03.26	0.61
3. Provides time to verify patient care issues	00.00	04.00	03.16	0.92
4. Provides a comprehensive communication process between RNs	02.00	04.00	03.31	0.57
5. Ensures RN's accountability	01.00	04.00	03.26	0.66
6. Minimizes delays in patient care delivery	00.00	04.04	03.01	0.74
7. Satisfied with the bedside handover report process	00.00	04.00	03.03	0.85

3.3 Attitudes toward bedside shift report

A descriptive analysis was carried out, and the results showed that the participants reported relatively positive attitudes toward bedside shift reports, where all the statements recorded an

above-average mean value. For example, the highest-ranking statement, "Bedside shift report is completed in a reasonable time," was recorded with a mean value of 3.35 (SD=0.87), while the lowest-ranking statement was "bedside shift report is relatively stress-free" with a mean value of 2.03 (SD=0.86) but still reflective positive attitudes (Table 3).

Table 3. Attitudes toward bedside shift report

Items	Minimum	Maximum	Mean	SD
1. Bedside shift report is an effective means of communication	2.00	4.00	3.31	0.59
2. Bedside shift report helps identify changes in patient condition	0.00	4.00	3.21	0.77
3. Bedside shift report helps assure accountability	1.00	4.00	3.17	0.69
4. Bedside shift report promotes patient involvement in their care	2.00	4.00	3.26	0.57
5. Bedside shift report improves patient safety and quality of care	2.00	4.00	3.28	0.64
6. Bedside shift report is relatively stress-free	0.00	4.00	2.04	0.86
7. Bedside shift report is completed in a reasonable time	0.00	4.00	2.35	0.88
8. I feel that there are challenges with bedside shift report	1.00	4.00	3.03	0.71

3.4 Patient safety composites

The participants responded to the Hospital Survey on Patient Safety (SOPS). The elements of the survey were grouped into comprised five composites. Descriptive analysis was carried out, and the results showed that the nurses reported average levels of patient safety culture where a mean value of 2.8 was recorded on the level of the work environment composite, 3.31 on the level of leadership styles of nurse managers, which promote patient safety culture, 2.73 on the level of the communication composite, 3.12 on the level of reporting sentinel events and most importantly 1.95 which is a below-average value on the level of patient safety climate composite (Table 4).

Table 4. Patient safety composites

Patient Safety Composites	Minimum	Maximum	Mean	SD
1. Organizational learning—continuous improvement	0.00	4.33	2.80	0.57
2. Leadership support for patient safety	0.00	4.55	3.31	1.48
3. Communication about error	0.00	3.33	2.73	0.55
4. Reporting of patient safety events	0.00	4.00	3.12	0.70
5. Patient safety rating	0.00	4.45	1.95	0.71

3.5 The relationship between the study variables

Pearson correlation coefficients were carried out to determine if there were relationships between nurses' satisfaction and attitudes regarding bedside shift report total scores on the one hand and the patient safety composites on the other hand. The results of the analysis showed that there are significant relationships between the mentioned variables. For example, there are significant relationships between nurses' satisfaction with bedside shift reports and communication about errors and reporting of patient safety events ($p<0.05$), and between nurses' attitudes toward bedside shift reports and communication about errors ($p<0.001$). However, the analysis revealed a strong and positive relationship between the satisfaction of nurses and their attitudes towards bedside shift reports ($p<0.001$) (Table 5).

Table 5. Correlations between nurses' satisfaction and attitude toward bedside shift reports and safety culture composites

Variables	Value	A	B	C	D	E	F	G
Nurses' satisfaction with bedside shift report	R-value	1.00	0.77	-0.30	0.22	0.48	0.75	0.30
	P-value	-	0.00**	0.07	0.09	0.04*	0.01*	0.07
Nurses' attitudes regarding bedside shift report	R-value	0.77	1.00	-0.33	0.35	0.77	-0.35	-0.11
	P-value	0.00**	-	0.07	0.06	0.00**	0.06	0.11

Notes:
A=Nurses' satisfaction with bedside shift report; B=Nurses' attitudes regarding bedside shift report; C=Organizational learning—continuous improvement; D=Leadership support for patient safety, E=Communication about error; F=Reporting of patient safety events; G=Patient safety rating

4. Discussion

This study aimed to measure nurses' attitudes and satisfaction with bedside shift reports and their relationships with patient safety culture. The results showed that the nurses reported high satisfaction scores and positive attitudes toward the implementation of bedside shift reports. This is consistent with a study by Novak and Fairchild (2012), which assessed the effect of bedside shift reporting and the SBAR (Situation, Background, Assessment, Recommendation) method on communication and nurses' satisfaction and patient safety. The study discovered that bedside reporting financially impacts an organization because it reduces report times, improves nurse satisfaction, nurse retention, and patient and family satisfaction, and reduces healthcare errors Novak and Fairchild (2012). Our results were also consistent with another study that assessed the effect of the handover process on the performance indicators and job satisfaction of nurses (Thomas & Donahue-Porter, 2012). The study found that incoming nurses who have access to a comprehensive patient report are better prepared to offer safe and satisfying care. According to the study, the handover process, which allows incoming nurses to raise questions and clarify patient care issues with outgoing nurses, improves their ability to prioritize the care they must deliver (Thomas & Donahue-Porter, 2012).

The results in this study also resembled those of Evans et al. (2012), who looked at the implementation and outcomes of a bedside shift-to-shift nurse report. The study's goal was to find a solution to the problem of staff discontent with nurse-to-nurse reports and the inability to finish shifts on time. The study found that having a bedside handover report boosted nurse satisfaction, helped nurses prioritize their workflow, and reduced the time it took to complete the report. Greater nurse satisfaction was attained by obtaining a more detailed report without distractions. Patients' involvement in their care plan has also improved patient-centered care (Evans et al., 2012). Furthermore, bedside reporting has been demonstrated to increase patient involvement and satisfaction, improve nursing cooperation and responsibility, and improve provider communication efficacy (Urisman et al., 2018). By putting patients at the center of their care and allowing them to be active participants in their rehabilitation, nurses can have a beneficial impact on their patient's experiences. Other advantages include increased quality and safety, as well as teamwork and peer responsibility.

This study's findings are similarly consistent with Sand-Jecklin and Sherman's (2014) study, which attempted to measure the effects of a practice change on a bedside shift report. The study examined how nurses felt about the shift report procedure and how patients felt about nursing care. Patients saw an improvement in staff introductions, promoting patient involvement, exchanging vital information, and participation in a shift change conversation, according to the authors. The nursing staff valued the emphasis on patient safety and participation and discovered that communication at the bedside was more effective (Sand-Jecklin & Sherman, 2014).

Similarly, Jimmerson et al. (2021) found that a bedside shift report allows for face-to-face interaction with the patient, clarification and potential resolution of inaccurate information, introduction of the oncoming nurse, and a patient assessment during the report, allowing for visualization of the patient and the environment. Face-to-face reporting, on the other hand, allows the incoming nurse to do a safety check with the incoming nurse. Each nurse can then see the pumps, examine the working environment, inspect lines and devices, and so on. Overall,

healthcare practitioners must ensure patient safety and quality when providing care. Without the patients' collaboration, the verbal reports alone can impact safety if the information is incomplete or communicated inadequately because of distractions or interruptions.

The findings in this study also revealed that nurses reported excellent patient safety behaviors and culture once bedside shift reporting was implemented. This was supported by Maxson et al. (2012), which found that comprehending the care plan improved patient satisfaction significantly. In addition, accountability, boosting communication at shift changes, connecting with physicians, and reducing medical errors and prescription errors were all areas where nursing staff reported considerable improvements. This was also supported by another study, which found that allowing patients to be active participants in clarifying and correcting mistakes improved patient safety and satisfaction (Kullberg et al., 2018). They also stated that the collaboration with the nurses made them feel like their care was individualized and that their input was respected.

The bedside shift report procedure has a big influence on patient safety, but it also has a big impact on nurse satisfaction with communication, collaboration, and teamwork. This study is also consistent with several other articles that have assessed the importance of communication patterns and styles on the level of nursing performance and have proved that communication patterns like SBAR and exchanging patient information at the bedside were closely linked to nursing satisfaction (Jones et al., 2015; Melnyk & Fineout-Overholt, 2022). Furthermore, the findings of this study were congruent with those of Whitty et al. (2017), who investigated nurses' experiences and perspectives of bedside handover communication to improve patient care. The preliminary findings of the study stated that after implementing the process, nurses reported high performance and satisfaction in providing care to their patients, requiring a long-term evaluation to prove its success, whereas nurses reported high performance and satisfaction in delivering care to their patients due to clear task communication direction (Whitty et al., 2017).

Moreover, the present study also reported high rates of communication in the patient safety culture of the hospital. A study by Radtke (2013) that was conducted to improve communication between patients and nurses at discharge time showed an increase in patients' perceptions of continuity of care and satisfaction, thus enhancing patient quality of care and safety. Our results also showed that upon implementation of bedside shift reports, a significant positive relationship emerged between nurses' attitudes toward bedside shift reports and communication about errors.

5. Implications and limitations

The study implicates that this innovative handover strategy can be applied to other areas of practice and tested to see if patients are being satisfied. Also, it is possible to conduct more research to see how the interdisciplinary team could strengthen this procedure. The use of convenience sample was one of the study's limitations. Nurses were not stratified into different units, and different units might be disproportionally represented. Nurses in different units might have different perspectives due to different patient populations. Nurses recently shifted from traditional handover to bedside handover and are trained in both models. The bedside handover inter-shift report was a major change in behavior and nursing practice for a significant number of RNs. Their attitudes and ideas might change with time the longer they practice bedside handover. The major obstacle that might affect the process was discussing patient care in semi-private rooms. The fear of patient confidentiality violation as information about the patient and patient care issues discussed at the bedside might have negatively impacted the reported nursing satisfaction results.

6. Conclusion

The implementation of the bedside shift report improves nurses' levels of satisfaction and enhances positive attitudes toward work. In terms of patient safety, excellent communication among nurses during shift changes is critical to ensuring that patients receive safe, high-quality, and effective treatment. Thus, the bedside handover procedure impacts patient safety and nurse satisfaction in terms of communication, collaboration, and teamwork. The study's findings gave nurse managers and nursing leadership information and research they could use to start creating nursing bedside shift report recommendations tailored to their patient population. Also, the results of this study recommend the conduct of a further investigation into the nursing bedside shift report, particularly the process's adoption and sustainability.

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Author contribution

SJ, MF, AR, NA participated in the study conception and design. MS collected the data. MA, RA, and AA also participated in data analysis, and drafting of the article was done by MA, MS, SJ, and MF. All authors critically revised the manuscript.

Conflict of interest

None declared

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ORIGINAL RESEARCH

The Associated Factors of Quality of Life among Stroke Survivors: A Study in Indonesia

Fitria Handayani[1], Reni Sulung Utami[1], Chandra Bagus Ropyanto[1], Niken Safitri Dyan Kusumaningrum[1], Yuni Dwi Hastuti[1]

[1]*Department of Nursing, Faculty of Medicine, Universitas Diponegoro, Semarang, Indonesia*

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Corresponding Author:
Fitria Handayani
Nursing Department, Medical Faculty, Universitas Diponegoro, Indonesia
Email:
fitria.handayani@fk.undip.ac.id

Abstract

Background: The prevalence and burden of stroke are still high, especially in low and middle-income countries. Stroke affects the economy and physics related to the Quality of Life (QoL). Various QoL-associated factors, including sociodemographic, functional outcome, emotional, and cognitive function, were studied. However, there was very limited information about the QoL-associated factors among stroke survivors in Semarang, Indonesia.
Purpose: This study aimed to identify the QoL-associated factors among stroke survivors in Semarang, Indonesia.
Methods: This cross-sectional study was conducted in outpatient services and involved 57 ischemic stroke survivors using convenience sampling. Demographic and clinical information were obtained using medical records and questionnaires. The questionnaires were the Short Version of Specific Stroke Quality of Life (SS-QoL) to measure QoL, GRID-HAMD 17 to measure Post Stroke Depression (PSD), Mini-Mental Status Examination (MMSE) to measure cognitive impairment, Barthel–Index (BI) to measure functional outcome, Hamilton Anxiety Rating Scale (HAM-A) to measure anxiety, and Multidimensional Scale of Perceived Social Support (MSPSS) to measure social support. Linear regression was conducted in the model performance of QoL-associated factors.
Results: The stroke duration was 155(18) days, and 50.9% of participants were males. The linear regression showed that age (-.164 95% CI -.412 - .084), marital status (3.937 95% CI 1.010 - 6.864), functional outcome (.127 95% CI .013 - .241), PSD (-1.090 95% CI -2.144 - -.036), cognitive function (.308 95% CI -.482 - 1.098) and anxiety (-.408 95% CI -1.125 - .268) were QoL-predictors (p<.001, adjusted R2=52.1). It is assumed that age, marital status, functional outcome, PSD, cognition, and anxiety significantly predict the QoL among ischemic stroke survivors.
Conclusion: The QoL-associated factors were age, marital status, functional outcome, PSD, cognition, and anxiety. These associated factors of QoL should be considered as elements in formulating nursing interventions that aim to improve the good QoL among stroke survivors.

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1. Introduction

A stroke is a life-threatening cerebrovascular disease which affects the blood vessels that carry oxygen to the brain (Coupland et al., 2017). This disorder is one of the leading causes of long-term disability and mortality globally (Donkor, 2018). The burden of stroke has significantly increased over the world in recent decades due to aging and population growth, as well as the increased frequency of modifiable stroke risk factors, particularly in low- and middle-income nations (Katan & Luft, 2018). Stroke has an impact on cognitive function (Tang et al., 2018), depression (Mohammed et al., 2019), and motor function and imbalance (Hayes et al., 2016). More than 50% of stroke survivors were chronically impaired, which can seriously affect social and economic factors and the overall quality of life (Donkor, 2018; Hyuk et al., 2016).

The World Health Organization (WHO) defines the quality of life (QOL) as an individual's perception of their position in life concerning their expectations, standards, goals, and concerns in the context of the value systems and culture in which they live (World Health Organization [WHO], 2020). It is multidimensional and comprises objective and subjective evaluations of physical, material, social, emotional, and developmental activities of well-being (Felce & Perry, 1995). When assessing the effectiveness of stroke management, consideration is given to the

health-related QoL of stroke patients since it reflects the survivors' subjective opinions (Hyuk et al., 2016; Numminen et al., 2016). Although there has been progress in our understanding of stroke's quality of life, stroke is still viewed as an illness with various problems (Donkor, 2018).

Furthermore, consideration must be explicitly given to the QoL-associated factors. Several studies have mentioned the factors that can affect the quality of life, such as age, motor function (Hyuk et al., 2016; Ramos-Lima et al., 2018), cognitive function (Lee, 2018), and psychological aspects (Katona et al., 2015). Age and maturity can impact a person's capacity to adjust to the obstacles faced in undergoing stroke therapy (Norlander et al., 2018). Furthermore, motor disturbances in stroke survivors can affect their ability to carry out daily activities. The ability of survivors to carry out daily tasks (ADL) can also be hampered by emotional alterations such as fear and hopelessness (Ezema et al., 2019; Handayani et al., 2021). When individuals are incapable of performing their daily activities, their quality of life is compromised (Kim et al., 2014). In addition, cognitive impairment also reduces the quality of life for stroke survivors as they are unable to solve problems that arise in everyday life (Fitri & Fithrie, 2020).

However, in Indonesia, there was a limited investigation of QoL predictors. The latest study revealed that disability is related to the quality of life among stroke patients (Arief-Sulistyono et al., 2022). Moreover, the quality of life of post-stroke patients is directly affected by marital status, employment status, family support, and functional disorders (Zamzam et al., 2020). We hypothesize that among people who have have a stroke, each of these factors is related to the quality of life. Therefore, research on the factors associated with the quality of life of stroke survivors in Indonesia is crucial. These associated factors can be used as elements for nursing intervention formulation to improve stroke survivors' quality of life. Accordingly, this study was conducted to identify the QoL-associated factors among stroke survivors in Semarang, Indonesia.

2. Methods

2.1 Research design

This study used a correlational research design with a cross-sectional approach. This approach was undertaken all at once to collect data from stroke survivors (Loiselle et al., 2011).

2.2 Setting and samples

This study was conducted in a public hospital in Semarang, Indonesia between January and March 2020. In the previous study of QoL-associated factors in Turkey (Em et al., 2015), the effect size was 0.42. The minimum sample that can be achieved using G power analysis is 48 samples, with a power of 0.8, a significance level of 0.05, and 6 independence variables. A total of 57 patients from 98 who presented with an ischemic stroke met the inclusion criteria and were conveniently included in this study. The inclusion criteria were patients diagnosed with ischemic stroke, admitted to outpatient hospital services, aged 18–80 years old, had no aphasia, and MMSE score was ≥17. Stroke survivors with hearing impairments were excluded from the study. The researchers obtained the demographic data through an appointment at the outreach hospital services. Candidates who were recognized as a hemorrhaging transformation from the time of recruiting till data collection were dropped. The diagnosis of acute ischemic stroke is determined by clinical investigations and computed tomography of the brain based on the 2013 American Heart Association (AHA) guidelines (Sacco et al., 2013). The neurologist signed the diagnosis authentication.

2.3 Measurement and data collection

The data on PSD was assessed using the GRID-HAMD 17 questionnaire, which consists of 17 questions (Williams et al., 2008). GRID-HAMD 17 provides interview guidelines for establishing the validity of patient-reported outcomes during data collection (Patrick et al., 2011). Patients with scores of ≤ 7 were classified to have no PSD, 8-13 have moderate PSD, 18-23 have severe PSD, and ≥ 24 have very severe PSD. The reliability test of this instrument among stroke survivors in Indonesia yielded a Cronbach's alpha coefficient of 0.78 (Handayani et al., 2021).

Cognitive function was evaluated using MMSE in the Indonesia version, which consists of six subscales: orientation, registration, attention, calculation, recall, and language. Those subscales were used to determine the severity of cognitive impairment and to classify patients based on their clinical level of cognitive impairment (Handayani et al., 2021). In addition, the researchers

examines the cognitive function of the patients using MMSE by questioning and instructing them (Folstein et al., 1975).

To evaluate functional outcomes, the Barthel Index (BI) was employed (Mohoney & Barthel, 1965). The range of category include: scores of >90 independent, 61-90 mildly dependent, 41-60 moderately dependent, 21-40 severely dependent, and ≤20 totally dependent. Inter-rater observation between two data collectors was used to evaluate the reliability of this tool. Two observers observed and measured Barthel Index among ten ischemic stroke survivors at separate times. The obtained Kappa value was .001.

The Short Version of the SS-QOL 12 item (SSQ-12) was used to identify the QoL, which includes self-care, mobility, upper extremity, language, vision, work, thinking, family roles, social roles, personality, mood, and energy (Post et al., 2011). The questionnaire's validity and reliability were tested on 30 stroke patients. The test validity results show that all question items were valid, with validity scores ranging from 0.393 to 0.717 (r>0,30), while the reliability test indicated a Cronbach Alpha (α) of 0.882 (Dharma, 2015).

The Hamilton Anxiety Scale (HAM-A) was used to assess anxiety (Maier et al., 1988). This questionnaire was translated into the Indonesian language by a qualified translator and nursing specialist. Face validity was performed to ensure that every HAMA statement was rigorous. Thirty stroke patients were utilized to examine the instrument's validity and reliability. All question items were valid, according to the test validity findings, which ranged from 0.479 to 0.940 (r>0,30). Meanwhile, Cronbach Alpha (α) of 0.95 was found in the reliability test.

2.4 Data analysis

This study aimed to identify the QoL-associated factors. The percentage sum of participants' sociodemographic data, such as gender, income, marital status, education, family type, and comorbidities, was provided. The Shapiro-Wilk test was used to assess the homogeneity of age, cognitive, PSD, anxiety, functional outcome, and QoL. Age and day of onset were expressed as a mean or median, range, standard deviation, or Inter-Quartile Range (IQR). Cognitive, functional outcome, PSD, and HAMA were categorized and reported as percentages. The linear regression method was utilized in multivariate analysis, and the significance threshold was set at 0.05. IBM-SPSS version 23.0 was used for all statistical analyses.

2.5 Ethical considerations

Ethical clearance was obtained legally from the Ethics and Health Research Committee of Tugurejo Hospital (Number 123/KEPK.EC/VIII/2019). The trained investigators explained the research purpose and the principle of confidentiality. Informed consent was obtained from the patients. No personal identifiers were collected to protect the participants' anonymity and the data's confidentiality.

3. Results

3.1 Characteristic of the respondents

As shown in Table 1, the results of this study showed that the period after onset was 155(18) days. The demography also showed that the male and female populations are nearly equal, with only a 1.8% difference. Most respondents are married, graduated from elementary school, and have a low income. Despite a 3.5% difference, respondents who live with extended families outnumber those who live with nuclear families. Hypertension is the most prevalent comorbidity among respondents, over three times that of diabetes and high cholesterol level. Most respondents experienced mild anxiety (98,2%) and did not have PSD (82,5%). Almost half of the respondents were independent. Dependent respondents were primarily in the mild category, followed by total dependent respondents. Furthermore, 40.4% of respondents had cognitive impairment (Table 1).

3.2 Associated factors of QoL

The regression model showed that age (-.164 95% CI -.412 - .084), marital status (3.937 95% CI 1.010 - 6.864), functional outcome (.127 95% CI .013 - .241), PSD (-1.090 95% CI -2.144 - .036), cognitive (.308 95% CI -.482 - 1.098) and anxiety (-.408 95% CI -1.125 - .268) were the associated factors of QoL (p<.001, adjusted R2=52.1) (Table 2).

Table 1. Characteristics of ischemic stroke survivors (n=57)

	Frequency (f)	Percentage (%)
Onset after stroke (mean(SD), years)	155(18)	
Age (mean(SD), days)	59.7(11.1)	
Min	36	
Max	81	
Sex		
Female	28	(49.1)
Male	29	(50.9%)
Status		
Married	32	(56.1 %)
Single	11	(19.3%)
Widow/ widower	14	(24.6%)
Education		
Elementary School	39	(68.4 %)
Senior High School	10	(17.5 %)
University	8	(14.0 %)
Income		
Low	43	(75.4 %)
Middle	11	(19.3 %)
High	3	(5.3 %)
Type of family		
Core family	23	(40.4 %)
Extended family	25	(43.9 %)
Aged Family	6	(10.5 %)
Kin Network	2	(3.5 %)
Dyad family	0	0
Living Alone	1	(1.8 %)
Employment		
Not Employ	41	(71.9 %)
Employ	16	(28.1 %)
Diabetes Mellitus		
Not	43	(75.4 %)
Yes	14	(24.6 %)
Hypertension		
Not	21	(36.8 %)
Yes	36	(63.2 %)
Cholesterol		
Not	43	(75.4 %)
Yes	14	(24.6 %)
PSD	Median 3, IQR 4 Min – Max 2-14	
No PSD	47	(82.5 %)
Mild	9	(15.8 %)
Moderate	1	(1.8 %)
Severe	0	0
Anxiety	Median 4, IQR 4 Min – Max 1-22	
Mild	56	(98.2 %)
Mild to moderate	1	(1.8 %)
Severe	0	0
Functional Outcome	Median 85, IQR 55 Min – Max 5 -100	
Independent	26	(45.6 %)
Mild Dependent	13	(22.8 %)
Moderate	4	(7.0 %)
Severe	4	(7.0 %)
Total	10	(17.5 %)
Cognitive	Median 27, IQR 11 Min – Max 17 -30	
Normal	34	(59.6 %)
Impairment	23	(40.4 %)

Table 2. The associated factors of QoL of respondents

Variable	B	Sig	95 % CI	
			Upper	Lower
Constant	30.588	.017		
Age	-.164	.191	-.412	.084
Marital Status	3.937	.009	1.010	6.864
Functional Outcome	.127	.029	.013	.241
Anxiety	-.428	.223	-1.125	.268
Post Stroke Depression	-1.090	.043	-2.144	-.036
Cognitive Function	.308	.437	-.482	1.098

Note: $p<.001$, adjusted $R^2 = 52.1$

4. Discussion

This study aimed to identify QoL-associated factors among ischemic stroke survivors. The results discovered that age, marital status, functional outcome, PSD, cognitive function, and anxiety were associated factors of QoL among stroke survivors.

Age is associated with the QoL of stroke survivors. This finding is supported by previous studies, which found a favorable correlation between age and QoL (De Bruijn et al., 2015; Salehi et al., 2019). Old age predicts QoL deterioration one year after the stroke (Boudokhane et al., 2021). Age and maturity can impact a person's capacity to adjust to the obstacles faced in undergoing stroke therapy (Norlander et al., 2018). Other researchers discovered that age did not affect QoL, although younger people have a greater quality of life (Liu et al., 2019; Ramos-Lima et al., 2018). Furthermore, other studies imply that age is a 'global' construct that may be associated with disability and severity in terms of QoL (Wang & Langhammer, 2018).

The study's findings also confirmed that marital status correlates with QoL among stroke survivors. This result is consistent with earlier research indicating that marital status is a risk factor for the quality of life in elder stroke patients (Chaleoykitti et al., 2020). Another study found that dyads of stroke survivors had similar degrees of physiological pain, emotional role, and mental health (Persson et al., 2017). However, married people are marginally more satisfied in life than separated people, divorced or widowed people, and single people. This indicates that the emotional and social aspects of partner living are critical to subjective well-being (Yeoh et al., 2019).

The present study also confirmed the hypothesis that functional outcome is associated with QoL. Previous studies also found that functional activity is associated with QoL (Ahmed et al., 2020; Owolabi, 2013; Vincent-Onabajo et al., 2015) and disability predicts QoL deterioration one year after the stroke (Boudokhane et al., 2021). Meanwhile, motoric impairment at admission predicted the Health-Related Quality of Life (HRQoL) at 3 and 12 months after onset in mobility, self-care, and routine activities dimensions, but not significant in the HRQoL index (Yeoh et al., 2018). Being functionally independent may give stroke survivors a positive outlook on the future (Vincent-Onabajo et al., 2015).

Furthermore, based on the present study's findings, PSD is associated with QoL. A qualitative study of stroke survivors with post-stroke depression discovered that the disease led them to a grey shadow of existence, confinement, and the discovery of themselves as new persons (Kouwenhoven et al., 2012). A previous study found that depression predicts QoL deterioration one year after a stroke (Boudokhane et al., 2021). Another study also found that improved Health-Related Quality of Life (HR-QoL) is associated with less depression (Visser et al., 2015). Depression had several implications. Five years after onset, stroke survivors with depression six months after onset had lower QoL (Kielbergerova et al., 2015), and depression influenced stroke recurrence (Yuan et al., 2012). Stroke survivors with low QoL would have a 2.32 times higher death risk than stroke survivors with excellent QoL (Kielbergerova et al., 2015). It is believed that patients with depression will affect functional recovery (Matsuzaki et al., 2015) when functional dependency influences the QoL (Ahmed et al., 2020).

According to the findings of the study, anxiety predicts QoL. The emergence of anxiety is related to the health consequences, evolution and fear of worsening illness, changes in financial status, and need for care. This is revealed in severe anxiety (Baumann et al., 2014). Furthermore, some research has revealed that the nervous feelings caused by worries (such as recurring illness

attacks, falling, and returning to work) following disease attacks may impact everyday living (Campbell Burton et al., 2013). Another study also discovered that anxiety and depression are related to QoL (Em et al., 2015; Kielbergerova et al., 2015; Liu et al., 2019). According to a review and meta-analysis, anxiety was frequent during the first year following the stroke. Anxiety influenced QoL and predicted depression (Rafsten et al., 2018). A previous study stated that even young patients with mild ischemic stroke experienced depression and anxiety disorders even after long-term follow-up, which affected QoL. Anxiety is expected to have an influence on QoL for one year or longer following a stroke (De Bruijn et al., 2015). Another previous study, however, found that anxiety predicts QoL in hemorrhagic stroke instead of depression in the year following the stroke (Zhu & Jiang, 2019). It is conveyed that depression showed less stability and persistence than anxiety, especially in the first stage after stroke (Morris et al., 2013).

Lastly, this study also found that cognitive function is associated with QoL Prior studies discovered a link between cognitive performance and QoL in elderly stroke patients (Lee, 2018), and cognitive abnormalities had been identified as risk factors for QoL (Ahmed et al., 2020). Moreover, cognitive function, particularly attention and visuospatial ability, is strongly associated with post-stroke quality of life (Cumming et al., 2014). Post-stroke cognitive abnormalities were largely documented in executive function, memory, language, and processing speed (Terroni et al., 2012). These abnormalities (executive function, memory, language, and processing speed) will impact daily activities (ADL). A prior study stated that early cognitive impairment was linked to a greater probability of disability and poor ADL activities (Li et al., 2020). The functional activity was then used to predict QoL (Ahmed et al., 2020; Boudokhane et al., 2021; Carod-Artal et al., 2009; Owolabi, 2013; Vvincent-Onabajo et al., 2015). This demonstrated that cognitive impairment will impact daily living and that they will be unable to achieve a satisfactory QoL.

5. Implication and limitations

The present study provides insight on the factors associated with the quality of life among patients with ischemic stroke in Semarang, Indonesia, including age, marital status, functional outcome, PSD, cognitive function, and anxiety. These results may implicate the nursing practices in caring for patients with stroke. The QoL-associated factors as identified in this study can be used as elements for nursing interventions to improve the quality of life of stroke survivors. This study, however, has limitations. Severe cognitive impairment was excluded from the research. On the other hand, the cognitive function has a major impact on QoL. Thus, the findings of this study cannot be generalized among ischemic stroke, which has serious cognitive function impairment.

6. Conclusion

Age, marital status, functional outcome, PSD, cognitive function, and anxiety are associated with QoL among stroke survivors. These associated factors of QoL can be considered as the elements in formulating nursing interventions for patients with stroke. Regarding the limitation, it is necessary to study factors related to QoL in stroke survivors with severe cognitive impairment.

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Author contribution

All authors (FH, NSDK, RSU, CBR, and YDH) contributed substantially to the study's conceptualization, including the formulation of the goal. FH developed the methodology and curated the data. The manuscript was written, reviewed, and edited by FH, NSD, and RSU. CBR and YDH were involved in project management. All authors approved the final manuscript

Conflict of interest

There are none to declare.

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ORIGINAL RESEARCH

Non-comorbid Respiratory Factor and Work of Breathing in Pediatric COVID-19 Patient: How is Their Synergistic Correlation with the Level of Care?

Defi Efendi[1,2], Maria Dyah Kurniasari[3], Mega Hasanul Huda[4,5], Raudha Ilmi Farid[2], Yohanes Andy Rias[6], Yogi Prawira[7], Nina Dwi Putri[7], Ayuni Rizka Utami[1], Titik Ambar Asmarini[1,8], Pande Lilik Lestari[9], Pricilia Mais[10], Abram Babakal[10]

[1]*Department of Pediatric Nursing, Faculty of Nursing, Universitas Indonesia, Depok, West Java, Indonesia*
[2]*Neonatal Intensive Care Unit, Universitas Indonesia Hospital, Depok, West Java, Indonesia*
[3]*Department of Nursing, Faculty of Medicine and Health Science, Universitas Kristen Satya Wacana, Salatiga City Indonesia*
[4]*Institut Kesehatan Prima Nusantara Bukit Tinggi Sumatera Barat, Bukittinggi, West Sumatra*
[5]*Research and Development Center Hermina Hospital Group, Jakarta, Indonesia*
[6]*Faculty of Health and Medicine, Institut Ilmu Kesehatan Bhakti Wiyata Kediri, Kediri, Indonesia*
[7]*Department of Pediatrics, Dr. Cipto Mangunkusumo National Central Hospital, Faculty of Medicine, Univeristas Indonesia, Jakarta, Indonesia*
[8]*National Central of Army Hospital Gatot Soebroto, Central Jakarta, Indonesia*
[9]*Sanglah National Hospital, Denpasar, Bali Indonesia*
[10]*Prof. dr. R. D. Kandou National Hospital, Malalayang Satu Barat, North Sulawesi, Indonesia*

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Corresponding Author:
Defi Efendi
Department of Pediatric Nursing, Faculty of Nursing, Universitas Indonesia, Depok, West Java
Email: defiefendi@ui.ac.id

Abstract

Background: Work of breathing (WOB) and non-comorbidities factors in the respiratory system are the two probable findings in pediatric COVID-19 patients. However, the association of those factors with level of care was not well reported.
Purpose: This study aimed to identify the relation between potential predictors including comorbidity, low nutritional fulfillment, infectious disease, shock, cough, O2 saturation reduction, abnormal blood gas analysis and sore throat with the level of care among pediatric COVID-19 patients. We also analyzed the synergistic correlation of non-comorbidities factors in the respiratory system and work of breathing to predict level of care in pediatric COVID-19 patients.
Methods: A cross-sectional study was conducted in the six referral hospitals from July to September 2020 in four provinces in Indonesia. An observation checklist was used to collect data from the medical records of pediatric patients with COVID-19, including medical diagnosis, demographic, and clinical manifestation. This study included 423 participants aged from 0 to 18. The multivariate logistic regression was performed to test the adjusted odds ratios (AORs) with the 95% confidence intervals (CIs) of the association between WOB, non-comorbid respiratory, and level of care. Moreover, dummy variables (2x2) were made to analyze synergistic correlation of non-comorbid respiratory disease and WOB. The AOR with the 95% CIs was applied in the association between the complication of non-comorbid respiratory diseases and high work of breathing with level of care among pediatric patients with COVID-19.
Results: Results showed that age, presence of comorbidity, nutritional fulfillment, infectious disease, shock, work of breathing, O2 saturation reduction, abnormal blood gas analysis, sore throat, and convulsive meningeal consciousness were significantly associated with the level of care (p<0.05). Pediatric patients with non-comorbid respiratory and increased work of breathing had a 15.59 times higher risk of requiring PICU care level (p<0.01). Meanwhile, pediatric patients who experienced both non-comorbid respiratory and increased work of breathing had a 5.76 times risk of requiring an intermediate level of care (p<0.05), and 9.32 times higher risk of requiring a PICU level of care (p<.05).
Conclusion: It was found that both non-comorbid respiratory and increased WOB had a significant relationship with the level of care for pediatric patients with COVID-19. Nurse should take into account those clinical findings to increase the awareness in monitoring clinical deterioration in pediatric COVID-19 patients.

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1. Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) occurred in China, spreading to most countries and causing over 1,600,000 deaths globally (World Health Organization, 2020b). As the pandemic extends to low-middle income countries, there are rising concerns about the risk of severe coronavirus disease 2019 (COVID-19) in populations with high comorbidity prevalence, the effects on health and economies, and current health systems' capacity (Hopman et al., 2020). In particular, this threat was highly evident in Indonesia, where the prevalence of COVID-19 is estimated to be around 643,508, with a mortality rate of 3.0%. Interestingly, it further reported that 10.4% were pediatric patients with a mortality rate of 1.7 (Task Force for the Acceleration of Handling COVID-19, 2020). Moreover, during this pandemic, COVID-19 led to death in different age groups of pediatrics (Chang et al., 2020). A retrospective study revealed that the proportion of severe or critically ill cases was 7.3% of those aged 1-5 years and 4.2% for those aged 6-15 years (Dong et al., 2020). Consequently, the rising cases in pediatric may demand urgent attention. Pathak et al. (2020) triggered investigations that culminated in the establishment of the clinical characteristics regarding the comorbidity, severe or critical care urgently needs to be undertaken. This evidence highlights that the severe ill of COVID 19 among pediatric patients is a serious public health problem, particularly in Indonesia.

In term of severe illness of COVID-19 among pediatric patients, the investigation of the level of care that predicts disease might be of great benefit for healthcare professionals to accurately triage patients to mitigate mortality (Marin et al., 2020). Nurses and medical doctors are the frontline health care providers involved in triage and sorting patients with COVID-19 based on a history of the disease incidence. They can also use a case overview and approach from WHO's ABCDE (Airway, Breathing, Circulation, Disability, and Exposure) history (Gupta et al., 2021). In fact, children are mainly affected by infectious diseases, especially COVID-19, with many sign symptoms and a history of illness. However, these conditions have significantly increased the complexity and difficulty of preview and triage care.

Consequently, this has made the infection a substantial challenge for hospital outpatient triage staff (Zhang et al., 2020). No clinical study has investigated the triage care among children with COVID-19 in Indonesia. Thus, early preview triage care of suspected COVID-19 in children requires to examine, especially in Indonesia. Children with COVID-19 can be heterogeneous, with the most common clinical signs and symptoms such as sore throat, cough, fever, and headaches (Chang et al., 2020). Moreover, the critical disease usually with severe pneumonia, respiratory distress, had oxygen concentration less than 92%, autoinflammatory shock, and a high level of work of breathing (WOB) (Pathak et al., 2020; Sankar et al., 2020).

Among those heterogeneity signs and symptoms as well as the co-occurrence diseases, the high level of WOB is crucial for manifestations of acute respiratory failure. An elevated WOB score >4 was associated with increased severity of intubation and hypoxemia (Apigo et al., 2020). Hypoxemia was also independently associated with mortality in patients with COVID-19. Thus, due to the direct effects of COVID-19 that dictate the overall outcome, sensitive measures in the lungs or respiratory function changes would be reasonably reflect the outcome (Marin et al., 2020). These conditions have significantly increased the complexity of triage care (Zhang et al., 2020). However, no study has investigated the relationship between respiratory function and level of care in children with COVID-19, particularly Indonesians. Therefore, to address the gap, it is crucial to assess the factor of WOB in predicting the level of care among pediatric patients with COVID-19.

Fascinatingly, a systematic review study on COVID-19 describes that children with comorbidities is at a greater risk of severe COVID-19 and associated with a 2.81-fold increase in mortality compared with those who are without comorbidities (Tsankov et al., 2021). Previous studies report diabetes, hypertension, cardiovascular disease, Chronic Obstruction Pulmonary Disease (COPD), malignancy, immune-compromised state, obesity, sickle cell disease, chronic liver or kidney disease, thalassemia, cerebrovascular disease, co-existing infection from various sources were calculated as comorbid factor in pediatric population (CDC, 2020; Sanyaolu et al., 2020; Zhou et al., 2020). Children with comorbidities will be at an escalated risk for critical care and mortality rate during infection (Jain et al., 2020; Tsankov et al., 2021; World Health Organization (WHO), 2020a). Numerous clinical conditions such as diabetes, hypertension, cardiovascular disease, Chronic Obstruction Pulmonary Disease (COPD), chronic liver or kidney

disease, which have been classified as comorbid factors, have been well reported in pediatric population (CDC, 2020; Sanyaolu et al., 2020; Zhou et al., 2020). However, association among the presence of other co-occurrence diseases that is not categorized as comorbid diseases such as Acute Tonsillopharyngitis, Acute respiratory distress syndrome (ARDS), Acute Respiratory Infection, Community-Acquired Pneumonia (CAP) and the increased WOB were not clearly understood. Remarkably, other clinical findings which may be classified as non-comorbid factors in new COVID-19 cases continue to develop. Thus, assessing those factors on further pediatric COVID-19 patient conditions are urgently needed. To the best of our knowledge, no study has highlighted the character and risk factors related to level of care with non-comorbidities and clinical symptoms, especially WOB of children patients in Indonesia. Thus, this study aimed to identify the synergistic correlation of non-comorbidities factors in the respiratory system and WOB with the pediatric level of care in the COVID-19 unit. The synergistic correlation in this study is intended to analyze the interaction of non-comorbid respiratory factor and WOB with the level of care among pediatric patients with COVID-19.

2. Methods

2.1 Research design

A cross-sectional study was conducted in six referral hospitals from July to September 2020. Four provinces encompassed Jakarta, West Java, North Sulawesi, and Bali, with the highest confirmed case among provinces in Indonesia, were chosen. Figure 1 describes the participant's flowchart. Pediatric with mild case was assign as the control group, and those who were cared in the intermediate and intensive care level were the case group.

2.2 Setting and samples

The sample size was estimated using G-Power 3.1 software (El Maniani et al., 2016). The sample size was calculated by employing the effect size of the study based on a previous study with an effect size of 4.89 (Prata-Barbosa et al., 2020) for the level of care among patients with COVID-19. This previous study estimated the determinant factor of invasive mechanical ventilation in the PICU unit. The potential confounding factors were also considered, thus an alpha level (α) = (0.001) was utilized to lowered type I error and 80% power (1-ß) in a two-sided z-test (Cohen, 1988). The minimum sample size needed was 379 and considering an estimated 10% incompletion rate, a total of 423 participants were recruited for this study.

The study was conducted in six COVID-19 referral hospitals to ensure high variety in the pediatric level of care. The actual samples taken in this study using consecutive sampling were a secondary data of medical records with inclusion criteria: medical records of children aged ≤18 years; suspected (suspected) or confirmed (positive) COVID-19. As for the exclusion criteria, medical records suffering from data insufficiency were excluded from the study.

Participants were diagnosed with COVID-19 based on the WHO guidelines (World Health Organization, 2020). For simplicity's sake, the case definition used by the National Clinical Research Center for Child Health, Zhejiang University School of Medicine, whereby the case was classified as (1) suspected or probable case, and (2) confirmed case (Chen et al., 2020).

2.3 Measurement and data collection

A structured paper-based questionnaire was used to collect data from the medical records of pediatric patients in the six COVID-19 referral hospitals, Indonesia. Each questionnaire includes three section: (1) demographic data; (2) clinical manifestation; (3) existing diseases, and (4) level of care. The questionnaire was developed through a trial phase in three hospitals, to ensure the questionnaire was easy to understand by data collectors in each centre (Kouame, 2010). Before collecting data, nursing staffs from each centre were trained to use the questionaries. Existing data were tabulated by the research coordinator from each centre into a Google form sent to the principal investigator. Definition for major variables is described below.

2.3.1 COVID-19 status and level of care

COVID-19 status was determined by collecting samples using a real-time reverse-transcriptase polymerase-chain-reaction test (RTPCR) (Dong et al., 2020; Zimmermann & Curtis, 2020). To collect RTPCR sample, health care staffs were trained by the Ministry of Health Republic of Indonesia to ensure the quality of specimens meet a highly quality standard.

Ward level is usually associated with the level of patient illness severity (Garland et al., 2016). In terms of pediatric COVID-19 severity, it was classified as follows: asymptomatic infection, mild disease, moderate disease, severe disease, and critical illness (Buonsenso et al., 2020; The National Health and Health Commission of & China, 2020). The three types of ward level in line with the COVID-19 severity illness were used as follows: (a) isolation for clients with asymptomatic and mild disease, (b) intermediate level for moderate disease, and (c) intensive isolation for severe and critically ill cases (Carlotti et al., 2020; Mostafa et al., 2020).

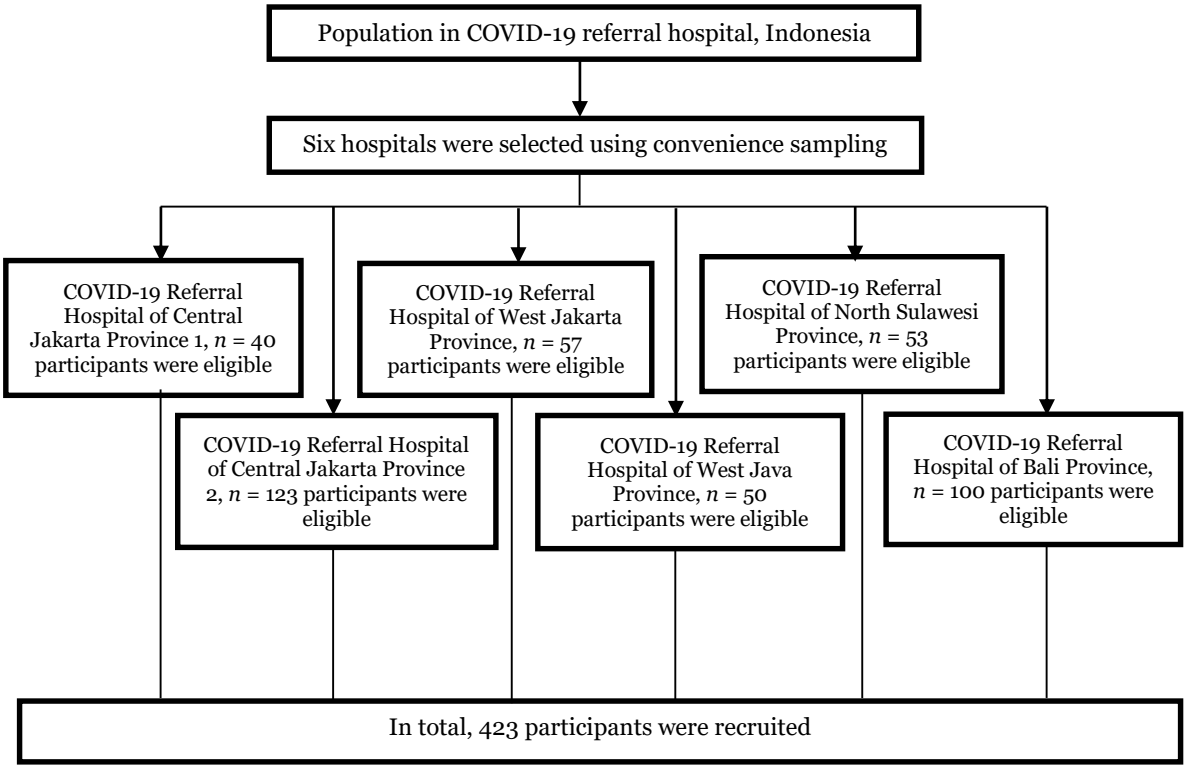

Figure 1. Flowchart of participants' recruitment

2.3.2 Demographic characteristics

The age classification was based on Ritchie (2020), divided into 0-9 years and 10-19 years. In addition, it is necessary to add subgroups to the classification of infants aged 0-1 year because the study found that severe COVID-19 cases in children aged ≤1 year are more likely admitted to ICU compared to the older (Bellino et al., 2020)

2.3.3 Presence of comorbid factors

Comorbidity is defined as the co-occurrence of more than one disorder in the same individual (Gulbech Ording & Toft Sørensen, 2013). Currently, there is no agreement on how to describe comorbidity in COVID-19; therefore, data on diabetes, hypertension, cardiovascular disease, Chronic Obstruction Pulmonary Disease (COPD), chronic liver or kidney disease, malignancy, immune-compromised state, obesity (body mass index (BMI) of 30 or higher, sickle cell disease, thalassemia, cerebrovascular disease, Co-existing infection (HIV, sepsis) from various sources were calculated (CDC, 2020; Sanyaolu et al., 2020; Zhou et al., 2020).

In this study, some patients have other respiratory system diseases beyond the list of comorbidities explained above. These diseases are classified as Non-Comorbid Respiratory Disease which includes Acute Tonsillopharyngitis, Acute respiratory distress syndrome (ARDS), Acute Respiratory Infection, Community-Acquired Pneumonia (CAP), pneumonia, bronchopneumonia, sinusitis, laryngomalacia, pharyngomalacia, mediastinal mass, acute adenolmphangitis, laryngeal granuloma, Healthcare-Associated Pneumonia (HCAP), subglottic stenosis, allergic rhinitis, respiratory failure, mastoiditis.

2.3.4 Clinical symptoms

Several studies have reported numerous clinical characteristics of pediatric patients with COVID-19 including: asymptomatic (Cai et al., 2020; Choi et al., 2020), fever (Cai et al., 2020; T. Chang et al., 2020), rhinorrhea (Hoang et al., 2020; Soltani et al., 2020), nasal congestion (Soltani et al., 2020), myalgia (Derespina et al., 2020; Hoang et al., 2020), fatigue (Hoang et al., 2020; Zimmermann & Curtis, s2020), sore throat (Soltani et al., 2020), shortness of breath, dyspnea (Derespina et al., 2020; Zimmermann & Curtis, 2020), abdominal pain (Cai et al., 2020; Choi et al., 2020), diarrhea (Hoang et al., 2020; Soltani et al., 2020), vomiting (Cai et al., 2020; Derespina et al., 2020), nausea, (Chang et al., 2020; Derespina et al., 2020), dizziness (Chang et al., 2020; Hong et al., 2020), poor feeding (Zimmermann & Curtis, 2020), and convulsion (Cai et al., 2020).

Work of breathing (WOB) has been defined as an effort to meet the body's ventilatory demand. In spontaneous breathing, it will represent by respiratory muscles work (Muñoz et al., 2019). Increased breathing definition commonly referred to as respiratory distress (Tulaimat et al., 2014). In this study, increased WOB was noted encompassed dyspnea, tachypnea, rhonchi, rales, grunting, chest wall retraction, nasal flaring, subcostal retraction, head bobbing, and paradox breathing (McCool D, 2012). One criterion above found in the patient, would be classified as an increase in WOB.

2.4 Data analysis

The X^2 test was used to analyze the distributions of participant characteristics. Continuous data for instances age has been categorized based on Our World in Data (Roser et al., 2020). The logistic regression analysis was utilized to examine the unadjusted (ORs) with the 95% confidence intervals (CIs) of the association between work of breathing, non-comorbid respiratory with the level of care among pediatric patients with COVID-19. The multivariate logistic regression test was performed to test the adjusted odds ratios (AORs) with the 95% confidence intervals (CIs) of the association between WOB, non-comorbid respiratory with level of care among pediatric with COVID-19 and controlling the covariates including no symptom, sore throat, seizures, abnormal blood gases, decreased oxygen saturation, shock, low nutritional fulfillment, and age.

Further, the synergistic correlation of WOB and non-comorbid respiratory was analyzed after creating four dummy variables for the following four (2x2) (Knol et al., 2007; Kurniasari et al., 2021). The adjusted odds ratio with the 95% confidence intervals (CIs) was applied in the association between the complication of non-comorbid respiratory diseases and high WOB with the level of care among pediatric with COVID-19. The covariates for cough, no symptoms, sore throat, seizures, abnormal blood gases, decreased oxygen saturation, shock, low nutritional fulfillment, and age were controlled, using p-value of <0.05, which was considered statistically significant. All statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) ver. 25.0 (Chicago, IL, USA).

2.5 Ethical considerations

The research protocol has been reviewed and approved by the Ethics Committee of the Faculty of Nursing, Universitas Indonesia (SK-266/UN2.F12.D1.2.1/ETIK 2020) and Faculty of Medicine Universitas Indonesia (No. KET-1000/UN2.F1/ETIK/PPM.00.02/2020) and conformed to the provisions of the Declaration of Helsinki.

3. Results

3.1 Sociodemographic characteristics and health status of participants

In total, 423 participants were included with age ranged from 0 to 18 years old. The participants were divided based on the level of care during hospitalization. Among 423 participants, most of them received the level of care in the ward. The majority of them (n=113) were >29 days ~ ≤12 months old, were boys (n=240). Most of the participants had no presence of infection disease (n=348) and a fever (n=264) (Table 1). Table 1 also provides bivariate analysis to select the potential variable that included in multivariate analysis.

Table 1. Sociodemographic characteristics and health status based on level of care (n=423)

Characteristics	Level of care			Total	*p*- value
	Ward (n=282) *n* (%)	Intermediate (n=89) *n* (%)	Critical (n=52) *n* (%)		
Age					
0 ~ ≤29 days old	4 (1.4)	0 (0)	5 (9.6)	9 (2.1)	0.01
>29 days ~ ≤12 months old	66 (23.4)	25 (28.1)	22 (42.3)	113 (26.7)	
>12 months ~ ≤3 years old	60 (21.3)	26 (29.2)	6 (11.5)	92 (21.7)	
>3 ~ ≤5 years old	30 (10.6)	8 (9)	4 (7.7)	42 (9.9)	
>5 ~ ≤12 years old	66 (23.4)	16 (18)	9 (17.3)	91 (21.5)	
>12 ~ ≤ 18 years old	56 (19.5)	14 (15.7)	6 (11.5)	76 (18)	
Gender					
Girl	121 (42.90)	40 (44.90)	22 (42.30)	183 (43.30)	0.93
Boy	161 (57.10)	49 (55.10)	30 (57.70)	240 (56.70)	
Covid status					0.31
Suspect	235 (83.3)	78 (87.6)	47 (90.4)	360 (85.1)	
Positive	47 (16.7)	11 (12.4)	5 (9.6)	63 (14.9)	
Presence of comorbidity					
No	115 (40.8)	19 (21.3)	10 (19.2)	144 (34)	0.001
Yes	167 (59.2)	70 (78.7)	42 (80.8)	279 (66)	
Low nutritional fulfillment					
No	255 (90.4)	66 (74.2)	44 (84.6)	365 (86.3)	0.000
Yes	27 (9.6)	23 (25.8)	8 (15.4)	58 (13.7)	
Congenital cardiac					0.09
No	277 (98.2)	84 (94.4)	49 (94.2)	410 (96.9)	
Yes	5 (1.8)	5 (5.6)	3 (5.8)	13 (3.1)	
COPD					
No	170 (60.3)	43 (48.3)	26 (50)	239 (56.5)	0.08
Yes	112 (39.7)	46 (51.7)	26 (50)	184 (43.5)	
Total non-comorbidity					
No	118 (41.88)	28 (31.5)	16 (30.8)	163 (38.3)	0.61
1 disease	112 (43.3)	42 (47.2)	19 (36.5)	183 (43.3)	
2 diseases	31 (11)	15 (16.9)	15 (28.8)	61 (14.4)	
3 diseases	11 (3.9)	4 (4.5)	2 (3.8)	17 (4)	
Infectious disease					
No	225 (79.8)	72 (80.9)	51 (98.1)	348 (82.3)	0.006
Yes	57 (20.2)	17 (19.1)	1 (1.9)	75 (17.7)	
Neurologic disease					
No	276 (98.2)	89 (100)	50 (96.2)	415 (98.3)	0.21
Yes	5 (1.8)	0 (0.0)	2 (3.8)	7 (1.7)	
Fever					
No	110 (39)	27 (30.3)	22 (42.3)	159 (37.6)	0.26
Yes	172 (61)	62 (69.7)	30 (57.7)	264 (62.4)	
Hematemesis, melena, petechia					
No	275 (97.5)	86 (96.6)	51 (98.1)	412 (97.4)	0.85
Yes	7 (2.5)	3 (3.4)	1 (1.9)	11 (2.6)	
Pain					
No	264 (93.6)	86 (96.6)	51 (98.1)	401 (94.6)	0.28
Yes	18 (6.4)	3 (3.4)	1 (1.9)	22 (5.2)	
Hemodynamic disorder					
No	250 (88.7)	81 (91)	50 (96.2)	381 (90.1)	0.23
Yes	32 (11.3)	8 (9)	2 (3.8)	42 (9.9)	
Shock					
No	267 (94.70)	83 (93.30)	36 (69.20)	386 (91.30)	<0.00
Yes	15 (5.30)	6 (6.70)	16 (30.80)	37 (8.70)	
Airway clearance					
No	161 (57.1)	39 (43.8)	25 (48.1)	225 (53.2)	0.07
Yes	121 (42.9)	50 (56.2)	27 (51.9)	198 (46.8)	

Table 1. Continued

Characteristics	Level of care			Total	*p*- value
	Ward (n=282) *n* (%)	Intermediate (n=89) *n* (%)	Critical (n=52) *n* (%)		
Cough					
No	139 (49.30)	43 (48.30)	36 (69.2)	218 (51.5)	0.02
Yes	143 (50.70)	46 (51.70)	16 (30.8)	205 (48.5)	
Work of breathing					
No	213 (75.5)	49 (55.1)	14 (26.9)	276 (65.2)	<0.00
Yes	69 (24.5)	40 (44.9)	38 (73.1)	147 (34.8)	
O_2 saturation reduction					
No	281 (99.6)	86 (96.6)	47 (90.4)	414 (97.9)	<0.00
Yes	1 (0.4)	3 (3.4)	5 (9.6)	9 (2.1)	
Abnormal blood gas analysis					
No	282 (100)	85 (95.5)	48 (92.3)	415 (98.1)	0.000
Yes	0 (0.00)	4 (4.5)	4 (7.7)	8 (1.9)	
Sore throat					
No	265 (94.00)	88 (98.90)	52 (100)	405 (95.70)	0.03
Yes	17 (6.00)	1 (1.10)	0 (0.00)	18 (4.30)	
Nasal congestion					
No	253 (89.7)	81 (91)	48 (92.3)	382 (90.3)	0.82
Yes	29 (10.3)	8 (9)	4 (7.7)	41 (9.7)	
Pharyngeal erythema					
No	279 (98.9)	88 (98.9)	52 (100)	419 (99.1)	0.75
Yes	3 (1.1)	1 (0.2)	0 (0)	4 (0.9)	
Diarrhea					
No	165 (58.5)	53 (59.6)	31 (59.6)	249 (58.9)	0.97
Yes	117 (41.5)	36 (40.4)	21 (40.4)	175 (41.1)	
Seizures					
No	267 (94.7)	85 (95.5)	40 (76.9)	392 (92.7)	0.000
Yes	15 (5.3)	4 (4.5)	12 (23.1)	31 (7.3)	
Non-comorbid respiratory					
No	173 (61.3)	42 (47.2)	25 (48.1)	240 (56.7)	0.02
Yes	109 (38.7)	47 (52.8)	27 (51.9)	183 (43.3)	

3.2 The association between the major determinant factors with the level of care

Results of the univariate analysis revealed that age, presence of comorbidity, nutritional fulfillment, infectious disease, shock, cough, work of breathing, O2 saturation reduction, abnormal blood gas analysis, sore throat, seizures and non-comorbid respiratory were significantly associated with the level of care ($p<0.05$) (Table 1). All the significant variables were included into the model using multiple linear regression models. The adjusted β coefficients and 95% CIs of the level of care are presented in Table 2. Participants with work of breathing were more likely to admit to intensive care compared to those who did not present work of breathing after adjustment the covariate and less likely to admit in the low level of care (inward). Additionally, the participants who had non-comorbid respiratory complications were more likely to receive intermediate as well as intensive care compared to those who did not have a non-comorbid respiratory complication. However, after adjusting the covariate, the association was no longer significant (Table 2).

3.3 Synergistic correlation of non-comorbid respiratory complication and work of breathing with the level of care

Table 3 shows the synergistic effect of non-comorbid respiratory complication and WOB among pediatric patients. Participants with the presence of both non-comorbid respiratory complication and WOB had synergistically significant to admit the intermediate and intensive level of care compared to those who did not present the symptoms. However, those who present the WOB without non-comorbid respiratory are more likely to admit the intensive care (Table 3).

Table 2. The major determinant factor of the level of careamong pediatric patients with COVID-19 (n=423)

Characteristic	Ward care		Intermediate care		Intensive care	
	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Work of Breathing						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.26 (0.17-0.40)** *p*=0.003	0.35 (0.22-0.57)** *p*=0.002	1.73 (1.07-2.79)* *p*=0.024	1.47 (0.87-2.49) *p*=0.545	6.52 (3.39-12.52)** *p*=0.003	9.82 (3.96-24.37)** *p*=0.004
Non-comorbid respiratory						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.75 (1.165-2.63)** *p*=0.005	0.76 (0.47-1.23) *p*=0.642	0.61 (0.38-0.98)* *p*=0.042	1.28 (0.76-2.16) *p*=0.705	0.67 (0.37-1.20) *p*=0.896	1.29 (0.61-2.71) *p*=0.353

Notes:
n: Total number of participants; %: Percent.
The OR was calculated with a binary logistic regression test.
The AOR was calculated by a multiple logistic regression test and adjusted for cough, no symptoms, sore throat, seizures, abnormal blood gases, decreased oxygen saturation, shock, low nutritional fulfillment age.
* Indicates a significant difference in values between groups at $p<0.05$.
** Indicates a significant difference in values between groups at $p<0.01$

Table 3. Synergistic correlation of non-comorbid respiratory complication and work of breathing on level of care among pediatric patient with COVID-19 (n=423)

Characteristic	Ward care		Intermediate care		Intensive care	
	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Without Non-comorbid respiratory and normal WOB	1.00	1.00	1.00	1.00	1.00	1.00
Non-comorbid respiratory and normal WOB	0.90 (0.49-1.65) *p*-value: .512	0.98 (0.51~1.91) *p*-value: .645	1. 03 (0.52-2.01) *p*-value: .802	0.92 (0.56~1.87) *p*-value: .921	1.31 (0.42-4.03) *p*-value: .465	1.22 (0.29~5.08) *p*-value: .704
Without Non-comorbid respiratory and increase WOB	0.27 (0.14-0.53) *p*-value: .345	0.38 (0.18-0.78) *p*-value: .832	0.95 (0.41-2.23) *p*-value: .032	0.74 (0.30-1.81) *p* value: .832	10.55 (4.28-25.97)* *p* value: .032	15.59 (5.11-47.00)** *p* value: .008
Non-comorbid respiratory and increase WOB	0.24 (0.14-0.41) *p*-value: .489	0.29 (0.16~0.54) *p*-value: .642	2.20 (1.25-3.85)* *p*-value: .045	1.92 (1.01~3.63)* *p*-value: .021	5.76 (2.54-13.08)* *p*-value: .022	9.32 (3.04~28.53)* *p*-value: .028

Notes:
n: Total number of participants; %: Percent.
The OR was calculated with a binary logistic regression test.
The AOR was calculated by a multiple logistic regression test and adjusted for cough, no symptoms, sore throat, seizures, abnormal blood gases, decreased oxygen saturation, shock, low nutritional fulfillment, and age.
* Indicates a significant difference in values between groups at $p<0.05$.
** Indicates a significant difference in values between groups at $p<0.01$.

4. Discussion

This study aimed to identify the synergistic association of non-comorbidities factors in the respiratory system and work of breathing (WOB) with the level of care of pediatric COVID-19 patient. This study found that both non-comorbid respiratory and increased WOB had a significant relationship with the level of care for pediatric patients with COVID-19. Data showed

pediatric patients with no non-comorbid respiratory and increased WOB had a 15.59 times higher risk of requiring PICU care level (p<0.01). These results indicate the highest risk of the overall results of this study. Meanwhile, pediatric patients who experienced both non-comorbid respiratory and increased WOB had a 5.76 times risk of requiring an intermediate level of care (p<0.05), and a 9.32 times higher risk of requiring a PICU level of care (p<0.05).

Patients with high-level WOB were more likely to admit intensive care after adjusting covariate. Based on this study, it was found that pediatric patients with increased WOB had 15.59 times higher risk of requiring intensive care levels. Where the increase in WOB is in line with the increase in the need for respiratory support. These results are in line with the study conducted by Shekerdemian et al. (2020) which found that 48 children with COVID-19 admitted to participating PICUs presented with respiratory symptoms (Shekerdemian et al., 2020). However, these results are in contrast to data from a study conducted by Swann et al., (2020), in which children admitted to critical care were more likely to have presented other clinical signs with diarrhea, conjunctivitis, and altered consciousness/confusion (Swann et al., 2020).

Pediatric patients with non-comorbid respiratory alone were not significantly related to the level of care. This is in line with a study conducted by Chen (2021) which examined respiratory tract infection which is one of the non-comorbid respiratory diseases in children during the COVID-19 pandemic. This study revealed that 73% of pediatric patients were 11% admitted to the ICU. Whereas adult patients who required ICU were likely higher than pediatric (19%) (Chen et al., 2021). Non-comorbid respiratory infections are common in COVID-19 patients in children. Of all research respondents, 56.7% had non-comorbid respiratory. Moreover, acute respiratory infections, ARDS, and pneumonia are among the most common manifestations of COVID-19 in children. This is in line with a study by Souza et al. (2020) which conducted research from a systematic review and metanalysis data from 38 studies (1124 cases) about the clinical manifestation of children with COVID-19 and found that 145 children (36.9%) were diagnosed with pneumonia and 43 children (10.9%) with upper airway infect were reported. Reduced lymphocyte count was reported in 12.9% of cases (Souza et al., 2020).

Pediatric COVID patients with increased WOB and without respiratory comorbidities showed significant correlate to the intensive care admission. In adults, the most common cause of ICU admission is an acute hypoxemic respiratory failure with or without severe hypercapnia due to acute respiratory distress syndrome (ARDS; 60-70%), followed by shock (30%), myocardial dysfunction (20-30%), and acute kidney injury (AKI; 10-30%) (Sun et al., 2020). Meanwhile, about 65-70% of children require treatment in the PICU, 40-60% of vasoactive drugs, and 15-25% require mechanical ventilation. (Gupta et al., 2021). Reports from China state that it takes an average of 8 days for dyspnea to develop and 9 days for pneumonia/pneumonitis to develop (Huang et al., 2020).

Other studies in line with this finding found that among the 66 symptomatic admitted children, 55% required respiratory support, and 17% required critical care. A total of 40 admitted patients had chest radiographs performed on admission, of which 25 (63%) had abnormal findings. Five out of 39 (13%) admitted patients tested with a respiratory pathogen panel had coinfection with an additional respiratory tract virus (Graff et al., 2021). However, a study conducted by Götzinger et al. (2020) found that significant risk factors for requiring ICU admission in multivariate analyses were being younger than one month, male sex, pre-existing medical conditions, and presence of lower respiratory tract infection signs or symptoms at presentation.

COVID-19 patients in children with non-comorbid respiratory and increased WOB synergistically significant with intermediate and intensive care. COVID-19 patients in children who experience both non-comorbid respiratory and increased WOB can occur in some patients with ARDS, pneumonia, or non-comorbid respiratory diseases that can interfere with the respiratory system and have manifestations of increased WOB. In a previous study comparing the main causes of adult and pediatric COVID-19 patients requiring intensive care, it was found that all the adults were admitted to intensive care due to ARDS (Girona-Alarcon et al., 2021).

Another study suggested that the main cause of adult COVID-19 patients requiring intensive care was multi-organ dysfunction syndrome (MODS) with ARDS (67%). Of the ICU admissions, 71% required mechanical ventilation, 35% vasoactive support, 17% renal replacement therapy, and 11% ECMO. Meanwhile, in pediatrics with COVID-19, the high-risk

pediatric population includes children with underlying conditions such as broncho-pulmonary hypoplasia, airway/lung anomalies, severe malnutrition, and congenital heart disease (Yang et al., 2020). This is in line with our findings. Moreover, our study provides more information regarding synergistic correlation of WOB and non-comorbid in the respiratory system.

5. Implications and limitations

Though non-comorbid respiratory has never been reported affecting the severity of pediatric patients with COVID-19, our study highlights its presence together with increased WOB, and this condition would likely increase the risk of the higher level of care. This study showed that nurses and doctors can perform more accurate triage of the patient's condition through a comprehensive assessment, one of which is through increased WOB. Accurate mapping of the level of care can also be useful in increasing the effectiveness and efficiency of patient care while in the hospital and impacting patient outcomes. Our existing data were taken from six COVID-19 referral in four provinces which may sufficiently represent COVID-19 cases in the Indonesian pediatric population. This study had several strengths, but it also had some limitations. Our study did not assess the biological marker of the diseases mechanism which is important to examine its relationship with the level of care among COVID-19 patients. Thus, further research involving the complex mechanism including biological aspect is highly recommended. Also, although our data represent the level of care among COVID-19 patients across Indonesia in a time, however, follow-up data in the longer time is also recommended to examine the outcome of patients during hospitalization.

6. Conclusion

In conclusion, it was found that both non-comorbid respiratory and increased WOB had a significant relationship with the level of care for pediatric patients with COVID-19. In particular, an increase in breathing is one of the most important clinical signs in increasing the level of care for pediatric patients with COVID-19. However, the existence of non-comorbid respiratory did not correlate significantly with a higher risk of level of care. These results suggest the crucial role of the pediatric nurse in detecting the increased work of breathing in pediatric COVID-19 admitted to the hospital.

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Author contribution

DE: Conceptualization, Methodology, Validation, Investigation, Resource, Data Curation, Supervision, Writing - Original Draft, and Writing - Review & Editing; MDK: Conceptualization, analyzed the data, data curation, and wrote the first draft of the manuscript; MHH: Conceptualization, analyzed the data, data curation, and Writing Original Draft; RIF: Investigation, Resource, Writing - Original Draft, and Writing - Review & Editing; YAR: Conceptualization, analyzed the data, data curation, and Writing Original Draft; YP: Conceptualization, methodology, and validation; NDP: Conceptualization, methodology, and validation; DW : Writing-Review and Editing; ARU: Conceptualization, and investigation; TAA: Conceptualization, and investigation; NC: Investigation; PLL: Investigation; AB: Investigation; PM: Investigation.

Conflict of interest

The authors declare no conflict of interest.

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ORIGINAL RESEARCH

The Effect of Pelvic Rocking Exercise with a Birth Ball and SP6 Acupressure on Duration of the First and Second Stage of Labor

Karningsih Karningsih[1], Dwi Purwanti[2], Fauziah Yulfitria[1], Gita Nirmala Sari[1], Een Nuraenah[1]

[1] *Department of Midwifery, Polytechnic of Health of Jakarta III, Ministry of Health, Jakarta, Indonesia*
[2]*Department of Midwifery, Polytechnic of Health, Ministry of Health Surabaya, Surabaya, Indonesia*

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Corresponding Author:
Karningsih Karningsih
Department of Midwifery, Polytechnic of Health of Jakarta III, Ministry of Health, Jakarta, Indonesia
Email: karningsihsudiro@gmail.com

Abstract

Background: Long duration of labor increases the pain that a mother experiences. Several non-pharmacological methods, such as pelvic rocking exercises and SP6 acupressure, have been discovered to reduce pain and accelerate labor duration. It needs to be clarified which of the two methods is more effective.
Purpose: This study aimed to assess the effectiveness of pelvic rocking exercise with a birth ball and SP6 acupressure in shortening the duration of the active phase in the first and the second stage of labor.
Methods: This study used a quasi-experimental design involving 64 mothers in the first stage of normal delivery who were recruited using propensity score matching sampling. The participants were divided into two intervention groups (the pelvic rocking exercise with a birth ball and SP6 acupressure). Each respondent in the two intervention groups was monitored for progress of labor during the active phase in the first stage using a partograph starting from cervical dilatation of 4 cm to 10 cm. The duration of the second stage was assessed by calculating the length of time from cervical dilatation of 10 cm to the delivery of the entire baby. The Mann-Whitney U test was performed to assess the difference between the two interventions in the two stages of labor assessed.
Results: There was a difference in the duration of labor in the first stage (p=0.00) and the second stage (p=0.001) between the groups given the pelvic rocking exercise with a birth ball and the SP6 acupressure. The pelvic rocking exercise with a birth ball was found to be more effective in shortening the duration of the active phase in the first stage (Mean rank=19.83) and the second stage of labor (Mean rank=24.56) compared to SP6 acupressure (Mean rank of the first stage=45.17 and Mean rank of the second stage=40.44).
Conclusion: The pelvic rocking exercise was found to be more effective compared to SP6 acupressure in shortening the duration of the active phase in the first and the second stage of labor. Pelvic rocking exercise can be implemented to help accelerate labor duration so that mothers can feel more comfortable during the labor.

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1. Introduction

Understanding normal and natural childbirth is highly important for every woman during childbearing. In natural childbirth, women can decide the birth process that they want (Bringedal & Aune, 2019). However, some women are afraid of natural childbirth due to the pain and the long time of waiting until the baby is delivered (Abdollahpour & Motaghi, 2019). Childbirth is a spontaneous process of expelling the baby naturally without any interventions on the condition (Yousefzadeh et al., 2016). In addition, vaginal delivery is cost-effective, requires a short duration of treatment, and has a low risk of bleeding and infection and the newborn (Sultan et al., 2020; Walsh et al., 2013; Zakerihamidi et al., 2015).

However, the increasing trend in a cesarean section has continued in the last few decades, from 6.7% in 1990 to 19.1% in 2014 (Wyatt et al., 2021). This indicates that there has been a decrease in normal vaginal delivery in recent years (Bhandary, 2017; Borem et al., 2020). The increase in the average trend of cesarean sections also occurred in Indonesia, from 2% in 1991 to 16% in 2012 (Wyatt et al., 2021). Even though most of the causes of cesarean sections were due to obstetric complications, the concern about excessive pain during delivery and inability to wait for normal delivery, which usually takes quite a long time, also caused an increase in cesarean

sections in those times (Sungkar & Basrowi, 2020; Sungkar et al., 2019). Due to the discomfort women experience during the first stage of the active phase of labor and the long process of the second stage of labor, many pregnant women choose to have a cesarean section without a plan or a medical reason (Sungkar & Basrowi, 2020; Zaky, 2016). Cesarean section has a negative impact compared to vaginal delivery, which includes respiratory problems in neonates, the risk of having a hysterectomy and placenta accreta in subsequent deliveries, and longer hospitalization time (Câmara et al., 2016).

In recent years, many methods of non-pharmacological therapy as alternative therapies have been developed to be used by mothers during labor (Aswitami & Septiani, 2020; Novelia et al., 2019; Osório et al., 2014; Yeung et al., 2019). The utilization of non-pharmacological methods in the labor process, such as reducing pain, accelerating the descent of the lowest part of the fetus, and accelerating cervical dilatation, has been widely practiced (Aswitami & Septiani, 2020; Calik & Komurcu, 2014; Novelia et al., 2019). Research on types of non-pharmacological methods that reduce labor pain, accelerate cervical dilatation, and increase uterine contractions is classified as doing the pelvic rocking exercise (Zaky, 2016; Farrag, 2018), and acupressure (Hulya & Ceber, 2020).

The pelvic rocking exercise with a birth ball is an effective way to relax the pelvic area by expanding the size of the pelvic cavity, keeping the mother in an upright position that increases the chance of opening the cervix and stimulates the baby to descend into the pelvic inlet (Grenvik et al., 2021; Mathew et al., 2012; Ulfa, 2021; Zaky, 2016). This exercise is done by rocking the pelvis over a ball and slowly swinging the hips back and forth, to the right and left, and in a circle. Midwives have taught pregnant women how to use a birth ball during the antenatal period and encouraged mothers to practice it during the active phase of the first stage of labor (Grenvik et al., 2021; Ulfa, 2021; Zaky, 2016). A quasi-experimental study in Egypt found that the group using a birth ball during the first stage of labor showed improvements in cervical dilatation and accelerated descent of the fetal head, thus shortening the time between the first and the second stage of labor (Mathew et al., 2012).

On the other side, SP6 acupressure is a traditional Chinese therapy that uses hands to massage certain body parts at acupuncture points. SP6 acupressure is administered by specially trained midwives or maternity nurses (Mollart et al., 2015; Hulya & Ceber, 2020). SP6 acupressure can help accelerate labor and overcome some problems around female reproductive organ disorders (Najafi et al., 2018; Wong et al., 2010). The previous study showed that the duration of the active labor was significantly shorter ($p<0.001$) in the group receiving acupressure than the control group, and there was also an alleviation in the labor pain (Calik & Komurcu, 2014). Furthermore, a meta-analysis of 10 RCTs studies stated that acupressure could significantly ease the pain during the first stage of labor (Raana & Fan, 2020), and another study of RCTs stated that SP6 acupressure significantly shortened the duration of the first stage of labor in the intervention group compared to the group without intervention (Hulya & Ceber, 2020).

Both types of non-pharmacological methods in the childbirth process have proven to help alleviate labor pain and shorten delivery time. Therefore, it is necessary to evaluate which method is more effective in shortening the duration of labor in the active phase of the first and second stages of labor. There has been no research that compares these two types of interventions, so the findings of this study are expected to be applicable as the basis for determining the more effective interventions for mothers in the first stage of the active phase of labor. Accordingly, this study aimed to assess the difference in the effectiveness of the pelvic rocking exercise with a birth ball and SP6 acupressure on the duration of the first stage of the active phase and the second stage of the birth process.

2. Methods

2.1 Research design

This study used a quasi-experimental method with a two-group comparison design. This study compared two different interventions in two groups of mothers during the first stage of labor who were present in the delivery room of a maternity home during the period of the study (6 months) with regular uterine contractions. The first group consisted of mothers who were given a pelvic rocking exercise with a birth ball and the second group consisted of mothers who were given SP6 acupressure.

2.2 Setting and samples

This study was conducted in a maternity clinic in Depok, West Java, Indonesia. The number of samples was calculated out using a formula for comparing two groups for a quasi-experimental study (Charan & Biswas, 2013), which obtained 32 mothers for the group that was given the pelvic rocking exercise with a birth ball and 32 mothers for the group that underwent SP6 acupressure. The sampling method was conducted using a propensity score matching technique in which each group was selected based on the characteristics relevant to both groups (White & Sabarwal, 2014). The characteristics that were matched in this study were pregnant women with ≥37 weeks of gestation, currently in the early active phase of the first stage of labor with cervical dilatation of 4-5 cm, the presentation of the lowest part of the fetus was the head, intact membranes, no complications of pregnancy and childbirth, mother and fetus were in good condition. Mothers with multiple pregnancies, the interpretation of fetal weight is ≥4000 g or <2500 g, and diagnosed with cephalopelvic disproportion were not considered.

As mentioned earlier, the sample selection was done using the propensity score matching technique, which took all the existing samples during the research period and was not done randomly. Determination of which mothers go into which group was done by drawing lots. Mothers who got an odd number joined the pelvic rocking exercise group, and those who got an even number went to the SP6 acupressure group. The respondents were selected when they were in comfortable condition and did not have uterine contractions. The participants selected with this method had given their consent and had been informed about the intervention that would be carried out during the antenatal period. They have also understood the impacts of both types of intervention.

2.3 Intervention

The intervention group with the pelvic rocking exercise using a birth ball was accompanied by a midwife who had been trained in facilitating mothers to do this exercise. The mother performed this exercise during the active phase in the first stage of labor when the cervical dilatation was 4 to 8 cm in or outside uterine contractions. This exercise was done for 10-20 minutes per session every hour until cervical dilatation was 8 cm. Assessment of cervical dilatation was also carried out by a midwife who facilitated the exercise. Meanwhile, the other intervention group was given SP6 acupressure by a trained midwife. The midwife gave the mother a massage or pressure when cervical dilatation reached 4 cm to 8 cm. The process of applying pressure to SP6 acupressure points was taken place for 3-5 minutes at the time of uterine contractions until the cervix dilated to 8 cm. SP6 acupuncture points are acupuncture areas on the body located on the shins on the inside of the ankles, 4 fingers above the medial malleolus behind the posterior tibia, known as Sanyinjiao points (Akbarzadeh et al., 2013; Najafi et al., 2018). Assessment of cervical dilatation was also carried out by the same midwife.

2.4 Measurement and data collection

Each respondent in the two intervention groups was monitored for labor progress during the active phase in the first stage using a partograph starting from cervical dilatation of 4 cm to 10 cm. In addition, the condition of the mother and the fetus was also assessed and monitored by a partograph. The duration of the second stage was assessed by calculating the length of time from cervical dilatation of 10 cm to the delivery of the entire baby. For primiparity, the duration of the normal active phase of the first stage of labor is 3.3-6.8 hours, and the second stage of labor is 44-106 minutes. As for multiparity, the average duration of the first stage of the active phase is 1.5-3.5 hours, and the duration of the second stage is 18-46 minutes (Chen et al., 2018; Hildingsson et al., 2015).

2.5 Data analysis

Characteristics of respondents are presented in proportions. The difference test for each proportion was carried out using the Chi-square test. Data normality testing was conducted using the Kolmogorov-Smirnov test. It aimed to determine the type of test to be used. From the results of the Kolmogorov-Smirnov test, it was found that the data was not normally distributed (p-value <0.05). To find out the difference between the effectiveness of the Pelvic Rocking Exercise and SP6 Acupressure on the duration of active phase in the first stage and the second stage of labor, a Mann-Whitney U test was conducted. This test was used as a non-parametric test to compare the

outcomes of two independent groups. A non-parametric test is used when the outcomes are not normally distributed, and the samples are small. The significant difference was assessed from $p<0.05$. All data were analyzed using SPSS 21 (IBM® SPSS® Statistics 21).

2.6 Ethical considerations

This research was approved by the Health Research Ethics Committee of the Faculty of Medicine, Muhammadiyah University of Jakarta with a reference number 104/PE/KE/FKK-UMJ/VI/2021. All selected respondents showed their agreement to participate in this study by signing the informed consent. They were informed about the activities of the study and agreed to go either with the pelvic rocking exercise or SP6 acupressure. All respondents have the right to withdraw their consent at any time and leave the process of study.

3. Results

3.1 Demographic characteristics of the respondents

Table 1 describes the characteristics of 64 participants who were divided into two intervention groups. Based on Table 1, the intervention group that was given the pelvic rocking exercise using a birth ball has the following characteristics: 91% had completed at least senior high school, 97% were aged 20-35 years old, 59% had primiparity, and 50% were Javanese. Meanwhile, in the intervention group that was given SP6 acupressure, it was found that 91% had completed senior secondary education, 91% were 20-35 years old, 59% were multiparous, and 50% were Javanese. The significant difference in the proportion of respondents' characteristics based on the duration of the first stage of labor was education and parity ($p=0.05$). Meanwhile, none of the respondent characteristics were associated with the duration of the second stage of labor ($p>0.05$).

Table 1. Respondents' characteristics

Characteristics	Intervention Groups				p-value for 1st stage of labor*	p-value for 2nd stage of labor*
	Pelvic rocking exercise with a birth ball (n=32)		Acupressure SP6 (n=32)			
	f	%	f	%		
Education						
≥ Senior high school	32	100	29	91		
≤ Junior high school	0	0	3	9	0.03	0.78
Age (year)						
20 – 35	31	97	29	91		
<20 and >35	1	3	3	9	0.75	0.06
Parity						
Multiparity	13	41	19	59		
Primiparity	19	59	13	41	0.01	0.36
Ethnic						
Betawi	0	0	3	9		
Java	16	50	16	50		
Sundae	6	19	7	22		
Minang	7	22	1	3		
Melayu	2	6	1	3		
Others	1	3	4	13	0.24	0.11

*Chi-square test: $p<0.05$ was considered as a statistically significant difference

3.2 Duration of active phase in the first stage and second stages of labor

Based on Table 2, during the active phase in the first stage of labor, each intervention provided a different duration from 4-5 cm to complete cervical dilatation. Based on the table, the majority of respondents given the pelvic rocking exercise with a birth ball intervention passed the first stage of labor within 3 hours (53.1%) (Mean=2.92), while in the acupressure group, it lasted for 6 hours (37.5%) (Mean=5.14). Most respondents in the intervention group with the pelvic rocking exercise passed the second stage of labor within 20 minutes (31.2%) (Mean=18.16), while respondents in the acupressure oup was 21.9% at a duration of 15 to 25 minutes (Mean=24.91).

Table 2. The duration of the active phase of the first stage and second stage of labor in both intervention groups

Parameters	Pelvic rocking exercise with a birth ball		SP6- acupressure	
	f	%	f	%
Duration of first stage of active phase (hour)				
1.5	1	3.1	0	0.0
2	5	15.6	0	0.0
2.25	1	3.1	0	0.0
2.5	2	6.2	1	3.1
2.75	1	3.1	0	0.0
3	17	53.1	4	14.5
3.5	0	0.0	2	6.2
4	4	12.5	6	18.1
5	1	3.1	1	3.1
5.25	0	0.0	1	3.1
5.5	0	0.0	1	3.1
6	0	0.0	12	37.5
6.25	0	0.0	1	3.1
6.5	0	0.0	1	3.1
9	0	0.0	1	3.1
9.5	0	0.0	1	3.1
Total Number	32	100	32	100
Mean	2.92		5.14	
Duration of second stage of labor (minutes)				
10	9	28.1	0	0.0
13	2	6.2	0	0.0
15	5	15.6	7	21.9
17	0	0.0	1	3.1
20	10	31.2	5	15.6
22	1	3.1	0	0.0
23	1	3.1	2	6.2
25	1	3.1	7	21.9
30	0	0.0	2	6.2
32	0	0.0	1	3.1
33	0	0.0	1	3.1
34	0	0.0	1	3.1
35	0	0.0	2	6.2
40	3	9.4	2	6.2
45	0	0.0	1	3.1
Total Number	32	100	32	100
Mean	18.16		24.91	

3.3 Differences in duration of active phase in the first stage of labor of respondents

Based on Table 3, the mean duration of the active phase in the first stage in the intervention group that was given the pelvic rocking exercise with a birth ball was 2.92 hours. In comparison, the group with the intervention of SP6 acupressure appeared to have a longer duration (Mean= 5.14 hours). Table 3 shows that the mean rank of the pelvic rocking exercise with a birth ball group was 19.83, while the mean rank of the SP6 acupressure group was 45.17. There was a significant difference regarding the duration of the active phase in the first stage of labor between the intervention group given the pelvic rocking exercise, and the intervention group given SP6 acupressure (p=0.000; p<0.05).

In addition, based on Table 3, there was a difference in the duration of the second stage of labor between the intervention group performing the pelvic rocking exercise and the intervention group that was given acupressure (p=0.001). The group with the pelvic rocking exercise had a mean rank of 24.56, while the group that was given acupressure had a mean rank of 40.44.

Table 3. Differences in the duration of first stage of active phase and second stage of labor in the respondents from each intervention group

Score category		Intervention group	
		Pelvic rocking exercise with a birth ball	SP6-acupressure
Duration of the first stage of labor in the active phase (hour)	Mean	2.92	5.14
	Median	3.0	5.75
	Minimum score	1.50	2.50
	Maximum score	5	9.50
	Mean Rank	19.83	45.17
	Sum of Rank	634.50	1,445.50
	P-value	<0.001*	
Duration of the second stage of labor (minutes)	Mean	18.16	24.91
	Median	17.50	25.00
	Minimum score	10	15
	Maximum score	40	45
	Mean Rank	24.56	40.44
	Sum of Rank	40.44	1,294.00
	P-value	0.001*	

*p<0.05 was considered a significant difference

4. Discussion

This study aimed to examine the effectiveness of the pelvic rocking exercise with a birth ball and SP6 acupressure in shortening the duration of the active phase in the first and the second stage of labor. In this study, the average duration of the active phase in the first stage of labor was shorter in the intervention group that performed the pelvic rocking exercise with a birth ball compared to the group with SP6 acupressure intervention. The pelvic rocking exercise with a birth ball was more effective in shortening the active phase in the first labor stage than the SP6 acupressure. The duration of the first and the second stage of labor gives quite a lot of meaning to all childbearing mothers. The long duration in the first and the second stage of labor gives various feelings of anxiety and trauma to face the next labor process due to the pain that will continue until the labor process (Akbarzadeh et al., 2013).

This study showed that the duration of the active phase in the first stage, either with the pelvic rocking exercise or with SP6 acupressure intervention, was shorter compared to the duration of normal labor in the active phase. This result is in line with a study by Neal et al. (2010), where the average duration in the active phase in the first stage of normal labor was 6-13 hours. Furthermore, the result of this study showed that the pelvic rocking exercise was more effective in reducing the duration of the active phase in the first stage of labor compared to SP6 acupressure. It was also consistent with a quasi-experimental study in Alexandria involving 80 pregnant women, which found that the pelvic rocking exercise was effective in accelerating cervical dilatation and the descent of the lowest part of the fetus (Zaky, 2016). In addition, one of the systematic reviews and meta-analysis studies of 5 RCTs research stated that there was a significant association between the use of birth balls during the first stage of labor and the reduction of the duration of the active phase in the first stage of labor (Makvandi et al., 2019). The use of birth balls was effective when the mother was in an upright position and moved her pelvis freely following gravity. This activity will help accelerate the descent of the fetal head and increase uterine contraction (Makvandi et al., 2019; Delgado et al., 2019). In accordance with the result of one systematic review of randomized and semi-randomized trials from the Cochrane Library, the upright position was the best position for mothers in the first stage of labor, which was 1 hour 20 minutes faster than other positions (Lawrence et al., 2013).

On the other hand, this study also found that giving SP6 acupressure during the active phase in the first stage of labor also shortened the duration of this phase compared to the duration of the first stage in normal labor (Neal et al., 2010; Hildingsson et al., 2015). However, compared to the pelvic rocking exercise performed by pregnant mothers, the effectiveness of SP6 acupressure was lower. SP6 acupressure can increase uterine contractions due to applying pressure on SP6 acupressure points and increase energy density in the uterus which intensifies muscle activities and concentration of oxytocin (Akbarzadeh et al., 2013). Several previous RCTs studies also revealed that pressing SP6 acupressure points could shorten the first stage of labor (Akbarzadeh

et al., 2013; Hulya & Ceber, 2020; Yesilcicek Calik & Komurcu, 2014). The result of this study was consistent with a meta-analysis of 16 research articles examining the impact of acupressure on the duration of labor and pain, which found that there was a reduction in the length of the first stage among pregnant women who received SP6 acupressure (ORs=-99, CIs=-1.39,-0.39) (Najafi et al., 2018). In addition, another meta-analysis study using 13 research articles on the effect of acupressure on labor, 10 articles discussing its impact on the active phase in the first stage of labor, found that acupressure reduced the length of time of labor compared to the group not given acupressure (p<0.001), although the results of this meta-analysis did not explain the type of acupuncture applied (Makvandi et al., 2016).

In our study, pregnant mothers who performed the pelvic rocking exercise with a birth ball during the active phase in the first stage of labor until complete cervical dilatation passed the second stage with a shorter duration than pregnant mothers who underwent SP6 acupressure during the first stage of labor. Previous studies have been conducted separately and have yet to compare these two types of interventions (Hulya & Ceber, 2020; Makvandi et al., 2016; Makvandi et al., 2019; Sheishaa et al., 2019). The pelvic rocking exercise with a birth ball could help accelerate the descent of the lowest part of the fetus along with an increase in uterine contraction due to the mother's position that was adjusted to gravity and pelvic movements (Delgado et al., 2019; Makvandi et al., 2019; Mathew et al., 2012). Several previous studies found that there was an increase in uterine contraction and accelerated descent of the fetal head by doing the pelvic rocking exercise with a birth ball during the first stage of labor (Kwan et al., 2011; Wang & Lu, 2020), thus shortening the duration of the second stage because the head was already on the pelvic floor. The short delivery time passed will help the mother be more comfortable and avoid more prolonged pain (Sharifipour et al., 2022). Meanwhile, uterine contraction did increase among pregnant women who received SP6 acupressure, but it did not directly affect the descent of the baby's head in the mother's pelvic cavity. Applying pressure to SP6 acupressure points would stimulate an increase in uterine contraction that would accelerate cervical dilatation and speed up the labor; however, it did not directly affect the acceleration of the descent of the fetal head in the pelvic cavity (Najafi et al., 2018). Even so, a quasi-experimental study on 150 primiparous mothers in Iran stated that the pressure applied to SP6 acupressure points could significantly shorten the length of the first stage of labor but not the second stage (Akbarzadeh et al., 2013)

5. Implications and limitations

This study has important implications in that the results are helpful for midwives, maternity nurses, or other healthcare workers to determine the more effective intervention according to the mother's condition in the first active stage of labor. In addition, training pregnant women during the gestation period on how to do pelvic rocking exercises is essential so that they can do well when they enter labor. This study has several strengths, including the fact that this research is a quasi-experimental study that used reasonably strict criteria to select the samples so that respondent bias can be reduced. However, some limitations of this study should be noted. Several factors that can affect labor pain need to be considered, such as the role of the closest person during the delivery process, which affects the mother's psychological condition in the first and the second stages of labor. In addition, it is necessary to increase the number of samples to strengthen the results statistically.

6. Conclusion

In conclusion, this study found that the two methods applied (the pelvic rocking exercise with a birth ball and SP6 acupressure) during the first stage of the active phase and the second stage of labor showed to be effective in shortening the duration of the active phase in the first and the second stage of labor. However, the pelvic rocking exercise with a birth ball was more effective than the SP6 acupressure that was given in the same period. The pelvic rocking exercise is easy to do (mother can use her own strength) and it does not require a midwife's special skills to intervene compared to SP6 acupressure in the context of shortening the duration of the first and the second stage of labor. Using a more effective method will reduce the length of labor and the time of experiencing labor pain, and the mother will be more comfortable.

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Author contribution

KN was involved in the conceptualization and research design, interpreted the results, wrote the original draft of the manuscript and revised the manuscript. DW conceptualized and designed this research, interpreted the results, reviewed and revised the manuscript. FZ performed data analysis and interpreted the results, reviewed and revised the manuscript. GT performed data analysis (software), interpreted the results, reviewed and revised the manuscript. EN performed data analysis, reviewed and revised the manuscript. All authors have approved the final manuscript and agree on all that has been done.

Conflict of interest

The authors have no financial relationships relevant to this article to declare. All authors have no conflicts of interest to disclose.

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ORIGINAL RESEARCH

Perceived Stress, Sexual and Marital Satisfaction among Married Healthcare Workers in Nigeria

Matthew Idowu Olatubi[1], Olamide Olayinka[2], Olufemi Oyebanji Oyediran[3], Grace Oluwaranti Ademuyiwa[1], Taiwo Omotayo Dosunmu[1]

[1]*Department of Nursing Science, Bowen University, Iwo, Osun State, Nigeria*
[2]*Lifeworth Health Maintenance Organisation, Oluyole Estate Extension, Ibadan, Oyo State, Nigeria*
[3]*Department of Nursing Science, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria*

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Corresponding Author:
Matthew Idowu Olatubi
Department of Nursing Science, Bowen University, Iwo, Osun State, Nigeria
Email: omoolatubi@gmail.com

Abstract

Background: Marital and sexual satisfaction are essential for conjugal bliss and harmony. However, stress in the workplace can influence sexual and marital satisfaction of couples. There is dearth of information about level of sexual and marital satisfaction among healthcare workers in Nigeria, as well as the connections between stress, sexual and marital satisfaction among healthcare workers.
Purpose: This study assessed inter-relationship between perceived stress, sexual and marital satisfaction among married healthcare workers.
Methods: This descriptive cross-sectional study adopted a quantitative approach among 150 consented healthcare workers recruited using a simple random sampling technique. Instruments for data collection included the Perceived Stress Scale, Enrich Marital Satisfaction questionnaire and Pinney Sexual Satisfaction Inventory. The Pearson correlation was used to ascertain relationships and linear regression was done to predict influence of one variable on the other.
Results: Perceived level of stress of the healthcare workers was low [16.9(0.001)] and mean sexual satisfaction (SS) was poor [78.93(23.68)]. Also, 49.3% were found to be the dissatisfied maritally. Perceived stress showed a positive correlation with marital satisfaction (MS) (r=0.48, p<0.01). However, stress negatively correlated with participants' SS with partners (r=-0.51, p<0.01). Similarly, general SS positively correlated with MS (r=0.32, p<0.01). Predictors of MS included perceived stress (β=0.614, p=0.01), age differences with spouse (β=0.30, p=0.01), number of children (β=-0.24, p=0.01), and family type (β=-0.21, p=0.05).
Conclusion: Only half of the participants in this study are maritally satisfied. Marital satisfaction increases with sexual satisfaction. Stress is correlated with reduced sexual satisfaction of the participant, and as number of children increases, marital satisfaction reduces. Couples should be encouraged to give birth to moderate number of children to improve marital satisfaction.

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1. Introduction

Marital satisfaction (MS) implies enjoyable mentality in husband and wife relationship in various aspects of their marriage (Pourakbaran et al., 2015). It depends on a number of factors, including communication with partner, love, spousal support, religiosity, stress and sexual satisfaction (SS) (Ghaibi et al., 2022; Khan & Aftab, 2013; Malm et al., 2022; Rostami et al., 2013). Satisfaction in one's marriage or primary relationship is an essential factor in overall happiness. Marital satisfaction is influenced by SS and level of stress exposed to (Maroufizadeh et al., 2019; Mashoufi et al., 2022). Similarly, SS is a predictor of MS (Renanita & Setiawan, 2018). This implies that positive and highly significant relationship had been found to exist between SS and MS (Fallah et al., 2018; Takbiri et al., 2017; Ziaee et al., 2014). Therefore, couples who are sexually satisfied are more likely to be maritally satisfied and vice-versa. Marital satisfaction on the other hand positively predicts job satisfaction (Fallahnejad et al., 2016; Tampieri, 2022) and increases job performances. Likewise, MS significantly predicts job commitment among nurses (Akinnawo et al., 2019). Health workers' job performances and commitment will ultimately influence patients/clients' satisfaction. On the other hand, stress play a major role in sexual and marital satisfaction among couples (Maroufizadeh et al., 2019).

Stress can emanate from different aspects of life endeavors. However, healthcare workers are exposed to high level of stress on daily basis (Faremi et al., 2019; Olatubi & Ogunfowokan, 2020) as a result of their work. Scholars had documented negative significant relationship between marital adjustment and stress among married nurses (Maroufizadeh et al., 2019; Zarei & Fooladvand, 2019). Perceived stress had also been documented as a predictor of MS (Işık & Kaya, 2022; Maroufizadeh et al., 2019). Likewise, most women perceived their level of stress to have an inverse relationship with their partner's MS (Maroufizadeh et al., 2019). However, men did not conceive perceived stress to have significant effect on their partner's MS (Maroufizadeh et al., 2019). Women married to men with higher perceived stress were more probable to have worse MS (Maroufizadeh et al., 2019).

Renanita and Setiawan (2018) assessed predictors of MS among working and non-working wives; they established that sexual intimacy, financial relations and communication were found to influence marital satisfaction among working wives, while only financial relations and communication influences marital satisfaction among non-working wives. In a study among women that conceive through assisted reproductive technology, marital satisfaction was found to affect quality of life positively (Kayabaşi & Sözbir, 2020). Likewise, in another study among nurses, it was reported that attachment style of nurses predict marital satisfaction among them (Azizi & Beyranvand, 2018).

Womenfolk whose spouses have high level of perceived stress are more probable to have worse MS (Maroufizadeh et al., 2019). Similarly, women with higher level of education are reported to be more satisfied martially compared to those with lower education level (Ziaee et al., 2014). Although, SS influences MS, a number of factors had also been found to influence SS. Scholars had documented that, self-esteem, women's level of education, stress, spouse's education, husband's employment status and family income levels are positive predictors of SS (Jamali et al., 2018; Taghani et al., 2019). As women's age and duration of marriage increases, SS reduces (Palha-Fernandes et al., 2019; Shahhosseini et al., 2014). Also, working-class women and those with age differences less than 10 years with their spouses have greater SS (Shahhosseini et al., 2014).

Poor to moderate level of MS had been documented among difference categories of health workers (Fallah et al., 2018; Fallahnejad et al., 2016; Ghaibi et al., 2022; Ha & Ha, 2019; Taghani et al., 2019). In Nigeria, Odinaka et al. (2018) documented that four in every ten women in low-risk population of southwestern Nigeria are sexually dissatisfied. Although literature exists on the connections between stress, SS and MS among different population in other climes, there is sparse literature on the connections between stress, SS and MS among any population in Nigeria, and on the level of sexual and MS among healthcare workers in the country. Several scholars had documented high level of stress among healthcare workers in Nigeria (Faremi et al., 2019; Olatubi & Ogunfowokan, 2020) and establishing its effect on different aspects of healthcare workers' life, but little had been documented about its effects on sexual and marital satisfaction. Therefore, this study aimed to present level of stress and inter-relationship between perceived stress, sexual and marital satisfaction among married healthcare workers.

2. Methods

2.1 Research design

This study adopted a quantitative approach using descriptive cross-sectional design to assess perceived stress, sexual and marital satisfaction among healthcare workers.

2.2 Setting and samples

The study was carried out between January and April 2022 in a religious-organisation owned teaching hospital in southwestern Nigeria. Sample size of 161 healthcare workers was calculated using Taro Yamane's (Yamane, 1973) formula. Participants were enrolled using simple random sampling technique. They were selected using the hospital nominal roll. In all, one hundred and fifty (150) healthcare workers consented and participated in the study. Only healthcare professional that have one (1) year of experience were included in the study and only nurses, doctors, physiotherapists, laboratory scientists/technician pharmacists, nurse assistants/ward orderly and pharmacy technicians participated in the study. Those that were in one form of leave or the other during the period of data collection and administrative staff of the hospital were excluded from the study.

2.3 Measurement and data collection

All participants in this study completed a socio-demographic form, perceived stress scale (PSS), enrich marital satisfaction (EMS) questionnaire and Pinney sexual satisfaction inventory (PSSI). The socio-demographic form consists of 10 items and it assessed the sociodemographic characteristics of the participants including age, age difference with spouse, number of children, length of marriage, religion, highest educational attainment and family type.

2.3.1 Perceived Stress Scale (PSS)

The PSS (Chan & La Greca, 2020) was used in its original format to assess perceived stress among the healthcare workers in this study. It is a 10-item 5-point Likert type scale of "Never" – 0; "Almost never" – 1; "Sometimes" – 2; "Fairly often" – 3; and "Very often" – 4. The total obtainable mark is "0-40". High scores imply high level of perceived stress while low scores suggest low level of perceived stress. Participants perceived level of stress was categorized into "Low" (score less than 50% of the total score - score "0 – 19"); "Moderate" (score between 50 and 69% of the total score ie "20 – 27'); and "High" (score 70% and above of the total score – "28 – 40"). The scale has a documented Cronbach alpha reliability coefficient score of 0.82 - 0.83 (Andreou et al., 2011; Siqueira Reis et al., 2010; Trujillo & González-Cabrera, 2007). In this study, the PSS has a Cronbach coefficient score of 0.96. The scale is therefore adjudged reliable.

2.3.2 Pinney Sexual Satisfaction Inventory (PSSI)

Healthcare workers sexual satisfaction in this study was assessed using PSSI (Pinney et al., 1987). The scale consists of 24 items and it is rated on a 7-point Likert scale of "Strongly agreed" – 1 to "Strongly disagreed" – 7). The scale was used in its original format in English, it is subdivided into two. The first section consists of fourteen (14) items that assessed general sexual satisfaction and are scored in reverse order. The second part consist of ten (10) items that assessed participant's sexual satisfaction with partner. The scale has an overall score of 24 to 168. High scores represent good sexual satisfaction while low scores imply low/weak sexual satisfaction. The scores were further categorized into "sexually dissatisfied" (17-83) and "sexually satisfied" (84-168) using the median score (84). Also, the part that assessed sexual satisfaction with partner was further grouped into "sexually dissatisfied with partner" (10-29) and "sexually satisfied with partner" (30-70) using the median score (30). The scale has an overall Cronbach alpha coefficient score of 0.92 (Pinney et al., 1987).

Data was collected by two of the researchers who staff of the college of health sciences situated within the hospital premises. Unit nominal rolls of the staff was used to determine the sample frame. Prospective participants were visited in their various wards and unit and the purpose of the study was explained to them in details.

2.3.3 Enrich Marital Satisfaction (EMS) Questionnaire

Marital satisfaction was measured using EMS questionnaire (Fowers & Olson, 1993). The scale was used in its original format. It is a 15-item questionnaire containing the Idealistic Distortion Scale (IDS) (5 items) and Marital Satisfaction scales (MSS) (10 items). Total score range from "15 to 75". Each item in the scale is rated on a 5-point Likert- type scale of "Strongly disagree" – 1; "Moderately disagree" – 2; "Neither agree nor disagree" – 3; "Moderately agree" – 4; and "Strongly agree" – 5. Six of the items on the scale (2, 5, 8,9,12 and 14) are graded in the reverse order. The EMS scores were derived by first adding up scores on the MSS and IDS separately. This score was then corrected on the basis of the person's IDS (Fowers & Olson, 1993). Marital satisfaction was categorized into maritally dissatisfied and maritally satisfied using the median score (34.56). The scale has a documented Cronbach alpha reliability coefficient of between 0.77 – 0.95 (Maroufizadeh et al., 2019; Masoumi et al., 2016; Rostami et al., 2013).

2.4 Data analysis

Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 22. Frequencies, percentages and mean were used to describe the data. Pearson correlation was used to test relationship between perceived stress and sexual satisfaction, perceived stress and marital satisfaction; and sexual satisfaction and marital satisfaction. Linear Regression was done to

predict the influence of one variable on the other. Level of significance was set at $p<0.05$ using confidence level of 95%.

2.5 Ethical considerations

The ethical board and the management of the Bowen University Teaching, Hospital, Ogbomosho, Oyo State, Nigeria approved the study (BUTH/REC-355). Data was collected by one of the authors. Informed consent was gained from all study participants. Confidentiality of all information retrieved, was ensured at every stage of the study. Participants were informed of their right to withdraw from the study at any stage without any consequence. No injury was inflicted on any of the study participants in the course of the study. Participation was voluntary.

3. Results

3.1 Demographic characteristics of the participants

As presented in Table 1, demographic characteristics of the participants in the study showed that there are more female healthcare workers in the study (59.3%). Majority of the healthcare workers in the study (54.7%) have less than five year age difference with their spouse. Results from the study further showed that more than half (52.0%) of the participants had spent between five to ten years in their marriage. An overwhelming majority (75.3%) are in monogamous family relationships while 24.7% are in polygamous family relationships.

Table 1. Sociodemographic characteristics of the participants

Characteristics	Frequency (f)	Percentage (%)
Gender		
Male	61	40.7
Female	89	59.3
Age in years		
21-30	31	20.7
31-40	54	36.0
41-50	38	25.3
51 and above	27	18.0
Age difference of spouse		
Below 5 year	82	54.7
5 to 10 years	63	42.0
More than 10 years	5	3.3
Number of children		
Nil	14	9.3
1	23	15.3
2	43	28.7
3 and above	70	46.7
Length of marriage		
Less than five years	55	36.7
Five to ten years	78	52.0
Above ten years	17	11.3
Religion		
Christianity	109	72.7
Islam	41	27.3
Education attainment		
No formal education	15	10.0
Primary level education	23	15.3
Secondary level education	11	7.3
Tertiary level education	101	67.3
Family type		
Monogamous	113	75.3
Polygamous	37	24.7

3.2 Perceived stress among the participants

Perceived stress among the participants showed that feeling nervous [2.18(1.31)]; becoming angry that things happening are outside the participants' control [1.95(1.38)]; and being upset because of things that happened unexpectedly were the most often experienced phenomenon among the participants. The mean perceived stress score among married health workers that participated in the study was found to be 16.99(0.001) (Table 2).

Table 2. Perceived stress experienced by the participants

In the previous month,	Mean (SD)
Have been troubled as a result of something that unexpectedly happened	1.78(1.3)
Have felt incapable to control the essential things in life	1.59(1.39)
Have felt stressed or nervous	2.18(1.31)
Have felt confident of my capacity to take care of my personal problems.	1.54(1.35)
I felt things were going the way I want it.	1.53(1.14)
Have felt I couldn't deal with stuffs that I had to do.	1.76(1.29)
Was able to control frustration in my life.	1.33(1.23)
Half felt I am on top of what are I am doing.	1.73(1.35)
Have been angry due to occurrences that I couldn't control.	1.95(1.38)
Have felt that difficulties were stacking up so great that I couldn't overcome.	1.59(1.32)
Total	16.99(0.001

Furthermore, this study also found that more than half of the participants (58.0%) perceived their level of stress to be low; 23.3% - moderate and 18.7% - high (Figure 1).

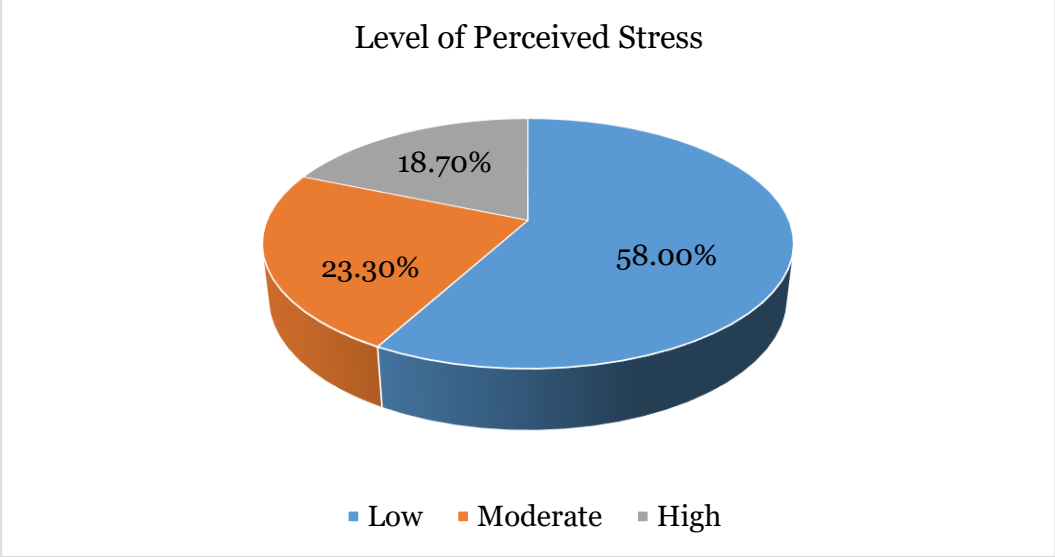

Figure 1. Level of perceived stress among the participants

3.3 Sexual satisfaction among the participants

As shown in Table 3, sexual satisfaction among the participants in this study revealed that in the general sexual satisfaction domain "feeling that nothing is lacking in my sexual life" scored highest [3.32(2.17)]. The least was observed to be "generally, satisfied with sex life" [2.93(2.01)]. In the area of satisfaction with partner, more participants wish their partner(s) were more patient with them [3.69(1.97)]. Results also showed that fewer participants wish their partner(s) show more love and care during sexual intercourse [3.33(2.13)] and their partner(s) show more affection through foreplay [3.37(2.08)]. The mean general sexual satisfaction score of the participants in the study was found to be 43.59(20.06) and satisfaction with partner 35.35(19.44) with overall mean sexual satisfaction score of 78.93(23.68) (Table 3).

Table 3. Sexual satisfaction among the participants

Statements	Mean(SD)
My sex life lacks nothing.	3.32(2.17)
Satisfied that during lovemaking, my physical need were met completely	3.05(2.04)
I am satisfied sexually on a general note.	2.93(2.01)
The amount of time my partner and I spent together after sexual intercourse is satisfying.	3.03(1.99)
The amount of time my partner and I spent together during sexual intercourse is satisfying.	3.14(1.96)
The foreplay involved during lovemaking is satisfying	3.13(1.92)
The impulsiveness of my lovemaking is satisfying	3.19(1.88)
The frequency of which I engage sexual intercourse is satisfying	3.08(1.98)
The quality of time my partner and I spent together after sexual intercourse is satisfying.	3.00(1.99)
My capacity to enjoy sex is satisfying.	2.99(1.95)
The importance my partner place on sexual intercourse is satisfying.	3.15(1.90)
I am contented with my capability to make my physical desires known during sexual intercourse.	3.20(1.94)
The time of the day I make love with my partner is satisfying.	3.21(1.96)
The rate at which I reach orgasm is satisfying.	3.17(1.94)
I desire my spouse show more love and care during intercourse	3.33(2.13)
I desire my spouse is more romantic during sexual intercourse.	3.57(2.00)
I desire my spouse is more affectionate through foreplay.	3.37(2.08)
I desire my spouse could make me feel more good-looking	3.51(2.11)
I desire I my spouse is a better lover.	3.53(2.20)
I desire my spouse is more thoughtful of my physical needs during sexual intercourse.	3.66(1.99)
I desire there could be better open communication of what my partner want during sexual intercourse to me.	3.42(2.08)
I desire my partner is more patients during sexual intercourse.	3.69(1.97)
I desire when I make love, I was less reticent.	3.64(2.11)
I desire my partner instigated sex intercourse more often	3.63(2.00)
General SS mean score	43.59(26.06)
Sexual satisfaction with partner mean score	35.35(19.44)
Overall SS mean score	78.93(23.68)

Further results also showed that 50.0% of the married health workers that participated in the study are sexually satisfied with their partner, and 48.7% were sexually satisfied (Figure 2).

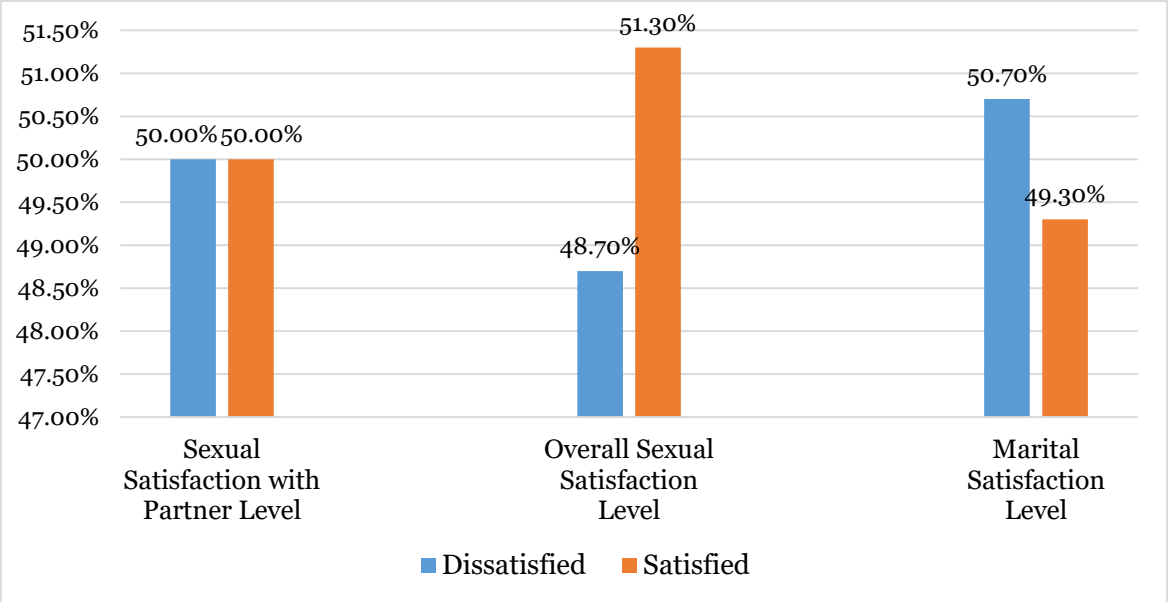

Figure 2. Level of marital and sexual satisfaction among participants

3.4 Marital satisfaction among the participants

Marital satisfaction of the married health workers in this study as shown in Table 4 revealed that the mean IDS score is 16.88(4.31) with MSS score of 30.61(3.70) and EMS score 37.56(9.96). The most satisfied with aspect of marital life among the participants was found to be equalitarian of role [3.68(1.37)]. This is followed by conflictual resolution [3.61(1.34)] and leisure activities [3.56(1.35)]. On the other hand, the least satisfied with was found to be in the areas of communication [2.34(1.34)] and personal issues [2.37(1.32)]. Furthermore, about half 76 (49.3%) of the participants were maritally satisfied (Figure 2).

Table 4. Marital satisfaction of participants

Components	Mean(SD)
Personality Issues	2.37(1.32)
Equalitarian Role	3.68(1.37)
Communication	2.34(1.34)
Conflict Resolution	3.61(1.34)
Financial Management	2.75(1.39)
Leisure Activities	3.56(1.35)
Sexual Relationship	3.48(1.34)
Children and Marriage	2.61(1.47)
Family and Friends	2.75(1.49)
Religious Orientation	3.47(1.44)
Mean ID Score	16.88(4.31)
Mean MS Score	30.61(3.70)
Mean Enrich Marital Sexual Satisfaction Score	37.56(9.96)

3.5 Relationships among perceived stress, sexual satisfaction and marital satisfaction

As shown in Table 5, level of stress experienced by the healthcare workers in this study has a strong negative significant correlation with Idealistic Distortion score (r=-0.74, p<0.01) and a moderate positive correlation with overall EMS score (r=0.48, p<0.01). Also, stress positively correlated with general sexual satisfaction of the participants (r=0.85, p<0.01) and negatively correlated with participants' SS with partners (r=-0.51, p<0.01). Similarly, general sexual satisfaction slightly has positive correlation with MS (r=0.32, p<0.01).

Table 5. Correlation analysis among stress, sexual satisfaction and marital satisfaction

Variables	1	2	3	4	5	6
PSS (1)	1					
IDS (2)	-0.74**	1				
MSS (3)	-0.02	0.4**	1			
EMS (4)	0.48**	-0.24**	0.78**	1		
General Sexual Satisfaction (5)	0.85**	-0.86	-0.24**	0.32**	1	
Sexual Satisfaction with Partner (6)	-0.51**	0.41**	0.08	-0.18*	-0.49**	1

** Significance at 0.01; * Significance at 0.05

Furthermore, the multiple regression results showed that level of stress (β=0.614, p=0.01); age differences with spouse (β=0.30, p=0.01); number of children (β=-0.24, p=0.01); and family type (β=-0.21, p=0.05) are predictors of MS among the healthcare workers (Table 6).

4. Discussion

This study assessed inter-relationship between perceived stress, sexual and marital satisfaction among married healthcare workers in Nigeria. Findings showed marital satisfaction increases with sexual satisfaction and level of stress. However, sexual satisfaction reduces with increase is stress level. Also, findings showed low level of perceived stress among health workers that participated in this study with only about one in every five experiencing high level of stress. The general SS and SS with partners were found to be moderate. Although majority felt they would have preferred if there are more sexually satisfied by their partner. Conversely, about half of the health care workers in the study were maritally dissatisfied.

Table 6. Regression analysis showing predictors of marital satisfaction among respondents

Dependent Variable: Marital satisfaction R^2=0.31	Coefficient	S.E	t	p-value	95% CI	
PSS	0.61	0.13	4.12	0.001	0.29	0.82
General sexual satisfaction	-0.23	0.06	-1.39	0.67	-0.21	0.04
Sexual Satisfaction with partner	0.12	0.04	1.42	0.16	-0.02	0.15
Age	-0.17	0.98	-1.76	0.08	-3.65	0.22
Age differences with partner	0.30	1.68	3.14	0.01	1.96	8.62
Number of children	-0.24	0.93	-2.54	0.01	-4.22	-0.53
Length of marriage	0.07	1.39	0.74	0.46	-1.72	3.78
Religion	0.08	1.85	1.03	0.31	-1.76	5.57
Level of education	-0.03	0.91	-0.27	0.78	-2.05	1.55
Family type	-0.21	0.91	-1.98	0.05	-9.58	-0.01
Constant	33.73	5.95	5.67	0.001	21.98	45.49

Scholars had documented high level of stress among different categories of health care workers in Nigeria (Onigbogi & Banerjee, 2019), nurses (Ezenwaji et al., 2019; Faremi et al., 2019); and doctors (Akinsulore et al., 2020; Ogunsuji et al., 2019) and others (Fasiku et al., 2022). Conversely, our findings showed that most of the healthcare workers in this study perceived their stress level to be low with mean stress level similar to what was documented by Azimian et al. among nurses in Iran (Azimian et al., 2017) and Baker and Alshehri among nurses in Saudi Arabia (Baker & Alshehri, 2020). The difference in the findings of this study and previous studies in Nigeria might be due to the fact that this study was conducted in a private hospital as against public hospitals in those previous studies. This is probably because the patient flow of private hospitals is lower compared to public hospitals in Nigeria.

This study showed that one in every five health workers still perceived their level of stress to be high. Although this is lower than what had been documented among healthcare workers in Nigeria previously, it is still high and needs urgent attention to abate different negative consequences of stress. This implies that a good number of healthcare workers experienced high level of stress. This may be associated with pressure from work due to inadequate equipment and workload (Faremi et al., 2019; Ingwu et al., 2018; Olatubi & Ogunfowokan, 2020; Umoe et al., 2020).

Sexual satisfaction is an important factor in marital bliss and stability (Karimi et al., 2019). Finding from the study showed that although most of the healthcare workers in the study are satisfied with the times of day that they have sexual intercourse with their partner. Conversely, they were not satisfied with their capacity to enjoy sex and they are generally dissatisfied with their sex life. This corroborates the submission of Ariguzo and colleagues in a study among married couples in Ogun State Nigeria that sexual instigation does not influence sexual satisfaction (Ariguzo et al., 2019). Also, findings showed that healthcare workers in this study are not satisfied with their sex life corroborating findings of previous study among female nurses in China (Ji et al., 2017). Findings also showed that many participants felt that their partners were not patient enough with them during sexual intercourse. This will in no small way affect their sexual satisfaction.

The least satisfied with aspect of sexual satisfaction were those directly related to sexual intercourse. Frequency of initiation of sexual intercourse was also pointed out by many of the participants as what they are not satisfied with. Our findings showed that many of the participants felt their partners initiate sex too often. Also, sexual satisfaction is influenced by ability to explore and try new idea and practices. However, in this study most participants believed that they were confined in exploring and trying new styles when it comes to sexual intercourse. Summarily only about half of the participants in this study were sexually satisfied which is congruent with submissions of Zegeye et al. in their study among married women in Northern Ethiopia (Zegeye et al., 2020).

The most satisfied with aspect of marital life among the healthcare workers in the study was found to be equalitarian of role and conflictual resolution. This showed that participants in this study are satisfied with role distribution and handling in their family. Conflict is an inevitable part of every marriage (Renanita & Setiawan, 2018). It is therefore important that conflicts are promptly and appropriately resolved to guarantee marital satisfaction. Our findings showed that

that healthcare workers in the study are satisfied with strategies adopted in resolving conflict in their families.

Healthcare workers in this study were less satisfied in the area of communication and personal issues. Effective communication is one of the essential ingredient of a good relationship in marriage (Renanita & Setiawan, 2018). Similarly, a good interpersonal relationship can promote good mental health in both partners (Luong et al., 2011). Our findings therefore implies that participants opined that they did not understand their spouse or their spouse did not understand them which is the purpose of communication (Olson et al., 2008). Summarily, findings showed that only half of the participants were maritally satisfied (Azimian et al., 2017; Odinka et al., 2018; Omran et al., 2015; Rajabi, 2010; Zandipour & Momeni, 2011). Previous study among secondary school teachers in Nigeria showed higher level of marital satisfaction compared to participants in our study (Ofovwe et al., 2013). Although our study did not establish relationship between shift duty and marital satisfaction, the difference in our study and the study among the secondary school teacher might be due to shift/call nature of the work of health professionals. Though, job demand had been documented not to have influenced marital satisfaction (Omolayo et al., 2013).

Findings revealed positive significant correlation between level of perceived stress and marital satisfaction. This negates the inverse relationship that had been documented in the literature (Maroufizadeh et al., 2019). The reason for the difference in the findings of this study and the previous study might be due to generally low level of stress that was reported among participants in this study. This study also showed that as level of perceived stress of the healthcare workers in the study increases, their sexual satisfaction with spouse reduces. This further confirms stress as inhibitors of sexual satisfaction among partners (Jamali et al., 2018; Tavares et al., 2019). This is not unexpected because sexual well-being which is an important predictor of sexual satisfaction is affected by stress (Tavares et al., 2019). As reported by other scholars, findings showed positive correlations between sexual and marital satisfaction (Fallah et al., 2018; Ziaee et al., 2014). This implies that as sexual satisfaction between partners increase, marital satisfaction will also increase. It is therefore important to promote increased sexual satisfaction among healthcare workers to promote marital bliss.

This study also showed that predictors of marital satisfaction were found to be perceived stress (Maroufizadeh et al., 2019); age difference with spouse (Izadi-avanji et al., 2020); number of children (Ghahremani et al., 2021) and family type. As level of perceived stress increases, the level of marital satisfaction of the healthcare workers in the study increases. People who are in marital relationship with older partners in this study have more marital bliss compared to those whose age difference with their spouse is small. However, our findings showed that as number of children in the marriage relationship increases, level of marital satisfaction reduces. Therefore, partners should limit their number of children to promote more marital bliss.

5. Implications and limitations

Stress is part of every work endeavor. Although perceived stress by the participants in this study was found to be low, it influences their sexual satisfaction with their spouse. Our findings imply that stress from work can influence satisfaction of healthcare workers in their intimate relationship. It is important to reduce level of stress that healthcare workers are exposed in order to improve their sexual and marital satisfaction. This may ultimately result in job satisfaction with resultant improvement in the quality of care that they render to the client. Nursing profession account for the largest percentage of healthcare workforce and it is dominated by female. Also, it had been documented to be one of the most stressful profession in the healthcare team. Therefore, level of stress that nurses are exposed to should be reduced to promote sexual satisfaction and marital bliss among them. Lastly, occupational health nurses have a role to play in developing interventions and programme that can assist health workers in effectively managing their stress to promote marital bliss. Our study is purely correlational in nature; it is therefore difficult to absolutely establish the causal relationship between stress, sexual and marital satisfaction.

6. Conclusion

Sexual satisfaction among participants in the study was found to be moderate. Marital satisfaction increases with sexual satisfaction. Stress correlated with reduces sexual satisfaction of the participant. This study also showed that most of the healthcare workers in the study are not

satisfied with the level of communication in their marital relationship. Overall, only half of the participants were satisfied maritally. Predictably, as sexual satisfaction increases, marital satisfaction also increases. People married to partners with higher age differences were more maritally satisfied compared to those with close age differences. Also, as number of children increases, marital satisfaction reduces among the participants. Couples should be encouraged to give birth to moderate number of children to improve sexual satisfaction. Couples should also be encouraged to improve their communication skill to foster better marital bliss. Similarly, stress management strategies should be put in place in workplace to reduce level of stress experienced by healthcare workers. Future studies should be designed to be able to establish this. Also, future studies should be designed to cut across a number of hospitals across different regions in Nigeria.

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Author contribution

MIO and OO conceived the study, participated in review of literature, data collection and analysis. OOO, GOA and TOD participated in review of literature and data collection. All authors participated in the write up of the manuscript and approved the final draft.

Conflict of interest

No conflict of interest was declared.

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ORIGINAL RESEARCH

Individual Characteristics, Adherence, and Barriers to Medication Adherence of Hypertensive Patients at the Indonesia - Timor Leste Border

Pius A. L. Berek[1,2], Bambang Budi Siswanto[3,4], Dewi Irawati[5], Wisnu Jatmiko[6]

[1]*Doctoral Program of Nursing, Faculty of Nursing, Universitas Indonesia, Indonesia*
[2]*Nursing Program at Universitas Timor, Atambua Campus, Atambua, East Nusa Tenggara, Indonesia*
[3]*Department of Cardiology and Cardiovascular, Faculty of Medicine, Universitas Indonesia, Indonesia*
[4]*National Cardiovascular Center - Harapan Kita Hospital, Jakarta, Indonesia*
[5]*Departmen of Medical-Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Indonesia*
[6]*Faculty of Computer Science, Universitas Indonesia, Indonesia*

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Corresponding Author:
Pius Almindu Leki Berek
Doctoral Program of Nursing, Faculty of Nursing, Universitas Indonesia, Indonesia
Email:
francisdomin2018@gmail.com

Abstract

Background: Until the last decade, the incidence of hypertension has increased sharply. It has been reported that individuals with hypertension show a low level of adherence to their therapy management. Moreover, there has been no previous research evaluating individual characteristics, adherence, and barriers to medication adherence among people with hypertension at the border of Indonesia and Timor Leste.
Purpose: This study aimed to identify individual characteristics, adherence, and barriers to medication adherence among hypertensive patients.
Methods: A total of 112 hypertensive patients recruited using a quota sampling method at the border of Indonesia and Timor Leste participated in this cross-sectional study. Data were collected using the Hill-Bone Questionnaire to identify adherence and the Adherence Barrier Questionnaire (ABQ) to identify barriers to medication adherence. Individual characteristics were also collected. To confirm the hypertension condition at the time of data collection, measurements of blood pressure were retaken. Descriptive statistics and Chi-square analysis were used for data analysis.
Results: The average of systolic blood pressure was 163.85(18.24) mmHg, and the diastolic blood pressure was 99.30(11.57) mmHg. The Chi-square test showed that education and occupation had a significant relationship with adherence (p<0.05) and barriers to medication adherence (p=0.000). Meanwhile, other characteristics, including age, gender, and marital status, were not significantly related to adherence (p>0.05) and barriers to medication adherence (p>0.05).
Conclusion: There is a relationship between education and occupation with adherence and barriers to medication adherence, but there is no relationship when viewed from such individual characteristics as age, gender, and marital status. Further research is needed to identify effective educational methods to increase the knowledge, motivation, and self-efficacy of hypertensive patients to improve blood pressure control.

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1. Introduction

Hypertension (HTN) is a global health problem that requires long-term management and therapy (Berek et al., 2021; Ernawati et al., 2020). More than 20% of the world's population has hypertension, which most often leads individuals to cardiovascular diseases (CVDs) and various complications such as stroke, kidney failure, disability, and even premature death (Jahan et al., 2020). As a major modifiable risk factor for CVDs, hypertension accounts for approximately 45% of the global CVD morbidity and mortality (Zeng et al., 2020). Eighty percent of this burden occurs in low- and middle-income countries.

Awareness of the disease and its prevention and treatment in low- and middle-income countries remains poor compared to that in developed countries (Tsadik et al., 2020). Most hypertensive patients who were aware of HTN received medical treatment (90.5%), but only

37.6% of those receiving medical treatment had their blood pressure (BP) controlled (<140/<90 mmHg) with the rate being higher in urban (39.6%) than in rural (32.4%) communities (Lamelas et al., 2019). Despite the availability of adequate amounts of HTN treatment, less than 25% of the patients treated for HTN achieved optimal blood pressure, and only 8% had awareness of the treatment (Tsadik et al., 2020). The Basic Health Research in Indonesia showed that HTN has increased; in 2013, it was 25.8%, and in 2018, it was 34.1%, whereas in East Nusa Tenggara, the prevalence of hypertension was 23.3%, and in Belu Regency, it was 25.9% (Riskesdas, 2018). This condition requires efforts to reduce the incidence of hypertension to avoid the various unexpected complications.

Major efforts such as early detection, treatment, and control of HTN are considered inadequate in many high-income countries, whereas in low-income countries, awareness of HTN is generally low, making the situation even worse (Khanam et al., 2014). As reported in India, there were 56% of people with HTN whose BP was not in control. The determinants of uncontrolled BP include overweight, obesity, and disease severity, while the determinants that support BP control are low salt consumption and family support (Mon et al., 2022). Therefore, adequate adherence or compliance is needed to enable the control of patient's BP according to the target.

Adherence is defined as a circumstance in which a person follows a rule that is related to the company's behavior and adherence to its rule (Nascimento et al., 2021). Patients receiving medication need to understand that medications are critical to achieving BP control (Tsadik et al., 2020). In Venezuela, only 4.5% of treated patients had good BP control (González-Rivas et al., 2016). It was also reported from Bangladesh that among the elderly hypertensive patients taking medication, only 10% were well controlled (Paul et al., 2021). Based on the Riskesdas report in Indonesia, 45.6% of hypertensive patients did not comply with antihypertensive medication (Riskesdas, 2018).

Barriers to adherence or poor adherence has been identified as the main cause of failure to control HTN (Iqbal et al., 2021). Poor adherence to antihypertensive treatment is a significant cardiovascular risk factor. This is frequently left unnoticed since HTN rarely shows specific symptoms (Geevar et al., 2022; Berek & Afiyanti, 2020). Poor adherence to antihypertensive therapy and self-management can increase the risk of stroke in people with hypertension (Xu et al., 2017). The most important goal for adequate HTN control is adherence to daily therapy and long-term therapy (Dobrynina et al., 2022; Berek & Orte, 2022).

Individual characteristics that can increase the risk of hypertension include older age, low education level, family history of hypertension, overweight/obese status, and consumption of sweet foods >3 (three) times/week (Nisa et al., 2022). Multiple factors including patients' beliefs about health, illness, and treatment contribute to antihypertensive medication adherence therapy Tsadik et al., 2020). Understanding patient's beliefs about medication adherence is fundamental because HTN is silent and asymptomatic. Patients might have misperceptions pertaining to HTN, its severity, and the significance of its management. Socioeconomic status (poverty), low level of education, unemployment, lack of effective family/social support, and forgetfulness are also associated with adherence (Nascimento et al., 2021; Tsadik et al., 2020). The patients' illness representations also have a direct influence on adherence to treatment (Tsadik et al., 2020). Although a previous study has recognized the importance of compliance with HTN in Atambua, it was limited to a small number of patients taken from one health center which only described the demographics (Baso et al., 2019). Independent factors, including individual characteristics of people with HTN that can affect adherence and barriers to adherence, are barely studied at the Indonesia - Timor Leste border. In other areas in Indonesia, there were various reports regarding adherence and barriers to adherence to treatment and management of hypertension. In urban areas, the adherence tends to be high and barriers to adherence are relatively low, whereas in rural areas, on the contrary, adherence is low and barriers to adherence are high (Alfian et al., 2020).

Efforts to prevent and control HTN begin with increasing public awareness and changing to a healthier lifestyle. Such strategic efforts as the healthy community movement (Germas) and the Healthy Indonesia program based on a family approach (PIS-PK) have been excellently launched, but they have yet to be able to suppress the incidence of hypertension. The result of a study in Bengkulu regarding Germas behavior in adults indicates that there is no intention to perform Germas, there is a lack of awareness of the importance of Germas, and Germas

behavior/actions remain lacking (Ilahi, 2021). The same situation also occurred at the border of Indonesia and Timor Leste, thus making these efforts having been unable to reduce the incidence of hypertension. Baso et al., (2019) identified the adherence of hypertensive patients in Atambua, but it was only limited to the adherence in one public health center with a small sample size. No similar research was found in the border areas of Indonesia - Timor Leste that examined hypertension management practices as well as adherence and barriers to medication adherence associated with the characteristics of people with hypertension at the border between the two countries. Therefore, a more in-depth study in this topic is required. This study aimed to identify the individual characteristics, adherence, and barriers to medication adherence of the hypertensive patients at the border of Atambua East Nusa Tenggara (Indonesia) and Timor Leste.

2. Methods

2.1 Research design

This was a cross-sectional study that explored the correlation between individual characteristics and adherence and barriers to medication adherence of the hypertensive patients at the border of Indonesia and Timor Leste.

2.2 Setting and samples

This study was conducted among the people living with hypertension at the border of Indonesia (6 public health centers) and Timor Leste (3 public health centers) between November 2021 and February 2022. The samples were recruited using a quota sampling method with the inclusion criteria being >18 years old, having a history of hypertension (>140/90 mmHg) for more than 5 years, not being in a critical period, and having the ability to communicate in Indonesian. The exclusion criteria were pregnant women and hypertensive patients with mental disorders and severe physical conditions. One hundred and twelve respondents completed the data collection forms. Research assistants provided explanations regarding the aims and objectives of the research. People with HTN who met the inclusion criteria were led to complete the available Google form. The determination of the sample size employed the Lemeshow formula. By using a degree of confidence (Z) of 95%, the proportion of the population (P) of 50% and the distance in both directions (d) of 10%, a sample of 96 people is obtained. After adding 10% in anticipation of the possibility of dropping out, the minimum sample is 106 people. In this study, there were 112 respondents who completed the questionnaire. All respondents were taken for further analysis as there were no drop outs.

2.3 Measurement and data collection

The research data were collected through a Google form containing the Hill-Bone questionnaire (adherence) and the Adherence Barrier Questionnaire (ABQ) (barriers to medication adherence). Each questionnaire had been tested for validity and reliability. The Indonesian version of the Hill-Bone questionnaire had been translated and tested for validity and reliability using the forward and backward translation methods by health experts with Indonesian and English language competencies (Fauziah, 2019). The validity test was 0.845. The Hill-Bone questionnaire reliability test was conducted on 30 hypertensive patients. The results showed a Cronbach's alpha value of 0.742 in the study. It was declared reliable and therefore could be used (Fauziah, 2019). The questionnaire consisted of 11 items with two factors related to medication adherence and one factor for salt intake. The answers were rated on a 4-point Likert scale, ranging from "always" (4) to "never" (1). The total score was classified into two levels based on the mean as a cut-off point for adherence (>mean) and non-adherence (<mean).

The Adherence Barriers Questionary (ABQ) is used to measure the adherence barriers for people with hypertension; it has been developed in English by Muller et al. since 2015 (Müller et al., 2015). This questionnaire was translated into Indonesian in 2019 (Putri, 2019). The translation used the forward-backward translation method performed by health experts who were fluent in Indonesian and English. Both experts had checked the content validity of the Indonesian version. The reliability test of the ABQ questionnaire was conducted on 30 hypertensive patients. The results showed that the Cronbach's alpha value was 0.685 and the validity test score was 0.709. It was declared reliable to be used (Putri, 2021). It consisted of 16

questions with four answer options rated on 4-point Likert scale including strongly disagree (4), disagree (3), agree (2), and strongly agree (1) (Putri, 2019). The total score was classified into two levels based on the mean as a cutoff point of have no barriers (<mean) and yes, have barriers (>mean). The individual characteristics were comprised of age, gender, marital status, occupation, education level, and family history of HTN as risk factors. The categories of assessment of individual characteristics in this study were as follows: age was categorized into late adolescence (17-25), early adult (26-35), late adult (36-45), early elderly (46-55), late elderly (56-65), and senior (>65); gender consisted of male (1) and female (2); education level comprised none (1), elementary school (2), junior high school (3), senior high school (4), and university (5); marital status was divided into married (1), single (2), and widow/widower (3); and occupation consisted of civil servant/soldier/police (1), retired (2), private (3), farmer (4), housewife (5), unemployed (6), and student (7).

The data were collected using the Google form for one time only. The research assistants had identified people with HTN based on their medical records at the community health center "by name by address". The activities carried out by the research assistants were home visits. As this research was conducted during the COVID-19 pandemic, during the home visit, the research assistants and respondents continued to maintain health protocols. The respondent's BP was documented on the Google form as the systolic and diastolic BP. All participants with a history of hypertension who met the inclusion criteria and agreed to be involved in the study were given a Google form link to complete. Ethical aspects were still considered by ticking the section containing approval. The last BP was filled out by the research assistants themselves. After that, the research assistants guided these people with HTN to answer the questions in the prepared questionnaire. During the completion of the questionnaire, the research assistants only completed the data based on what the patients said without any correction or intervention. If they found obstacles, they were guided by the researchers and research assistants. The process of filling out the Google form took approximately 20 minutes per participant. No data were lost from this study.

The research assistants were the people in charge of the non-communicable disease program at the community health center and knew the patients by their names and addresses, so the data collection was carried out door to door to complete the predetermined quota sampling. Blood pressure measurements were carried out by the research assistants at the patient's home according to the operational standards. Every patient whose BP was above 140/90 mmHg met the study inclusion criteria.

Hypertensive patients from Timor Leste were fluent in Indonesian. They were accompanied by some research assistants (nurses) from Timor Leste who also understood Indonesian. The patients with HTN who met the inclusion criteria received an explanation of the benefits and objectives of the study. After agreement from the patients to be research respondents, the research assistants read the questions to the respondents according to the questionnaire on the Google form. The research assistants filled out the answers from the respondents on the available Google form. In this case, the research assistants filled out the Google form according to the respondent's answer without any coercion or intervention. The demographic data, including the age, gender, education level, occupation, and marital status, were filled in according to the instructions on the Google form.

2.4 Data analysis

The data obtained from the questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS) program, version 25. The continuous variables were presented in mean and standard deviation. The categorical variables were expressed as numbers and percentages. The relationship between each variable in this study was analyzed by a Chi-square analysis. Data is considered statistically significant if it has a p-value <0.05.

2.5 Ethical considerations

Before the study was undertaken, the ethics committee approval was granted (Decision No.: Ket-221/UN2.F12.D1.2.1/PPM.00.02/2021) and permission was received from the National Unity Body and Politics of Belu Regency, East Nusa Tenggara Province where the study was conducted. The researcher was assisted by four research assistants, who were the people in charge of the non-communicable disease program at the community health center. The research

assistants selected the patients according to the inclusion criteria, and then they explained the benefits and objectives of the study. Hypertensive patients were informed of the purpose of the study. Every hypertensive patient who agreed to participate in the study proceeded to answer through the Google form. Patients who agreed to be the respondents in this study filled out the valid and reliable Indonesian version of the Hill-Bone and ABQ questionnaires.

3. Results

3.1 Characteristics of the participants

In the current study, 67.86% participants come from Indonesia. The participants had an average age of 53.93 years (SD=11.44) with a slight female dominance (51.8%). The majority were married (58.6%), completed university (32.1%), and were housewives (28.6%). The detailed information on the individual characteristics of the participants is described in Table 1.

Table 1. Individual characteristics of participants (n=112)

Variable	Freequency (f)	Percentage (%)
Country		
Indonesia	76	67.86
Timor Leste	36	32.14
Age		
17-25 (late adolescence)	2	1.8
26-35 (early adult)	5	4.5
36-45 (late adult)	18	16.1
46-55 (early elderly)	35	31.3
56-65 (late elderly)	35	31.3
>65 (senior)	17	15.2
Gender		
Male	54	48.2
Female	58	51.8
Education		
None	15	13.4
Elementary school	16	14.3
Junior high school	14	12.5
Senior high school	31	27.7
University	36	32.1
Marital Status		
Married	34	58.6
Single	5	8.6
Widow/Widower	19	32.8
Occupation		
Civil servant/soldier/police officer	29	25.9
Retired	7	6.3
Private employee/entrepreneur	17	15.2
Farmer	11	9.8
Housewife	32	28.6
Unemployed	14	12.5
University student	2	1.8

3.2 Blood pressure level of the participants

As shown in Table 2, only 1.78% of the participants have controlled sBP and 5.36% have controlled dBP at the target level. The overall mean of sBP is 162.85 mmHg (SD=18.24) and dBP is 99.30 mmHg (SD=11.57), suggesting poorly controlled BP. Moreover, there are 98.22% patients having sBP of more than 130 mmHg, and 94.64% have dBP of more than 90 mmHg or above.

Table 2. Blood pressure level of the hypertensive patients (n=112)

Variable	Mean (SD)	f	%
Overall systolic blood pressure (mmHg)	162.85 (18.24)	112	100
Overall diastolic blood pressure (mmHg)	99.30 (11.57)	112	100
Controlled systolic blood pressure (<130)		2	1.78
90 – 120		1	0.89
121 – 129		1	0.89
Uncontrolled systolic blood pressure (≥130)		110	98.22
130 – 139		5	4.47
140 – 210		105	93.75
Controlled diastolic blood pressure (<85)		6	5.36
60 – 80		6	5.36
81 – 84		0	0
Uncontrolled diastolic blood pressure (≥85)		106	94.64
85 – 89		2	1.78
90 – 120		104	92.86

SD: Standard Deviation

3.3 Correlation between individual characteristics and adherence and barriers to medication adherence of the hypertensive patients

As shown in Table 3, education (p=0.004) and occupation (p=0.003) have a significant correlation with adherence of the hypertensive patients. On the hand, the findings show that education (p=0.000) and occupation (p=0.000) have a significant correlation with barriers to medication adherence of the hypertensive patients.

Table 3. Correlation between individual characteristics and adherence and barriers to medication adherence of the hypertensive patients at the border of Indonesia and Timor Leste (n=112)

Variables (independent and dependent)	Adherence			Barriers to Adherence		
	No Adherence (n=63) n (%)	Adherence (n=49) n(%)	p-value	No Barriers (n=57) n(%)	Barriers (n=55) n(%)	p-value
Age						
17-25 (late adolescence)	0 (0.00)	2 (100)	0.302	2 (100)	0 (0.0)	0.534
26-35 (early adult)	1 (20.0)	4 (80.0)		4 (80.0)	1 (20.0)	
36-45 (late adult)	5 (27.8)	13 (72.2)		9 (50.0)	9 (50.0)	
46-55 (early elderly)	16 (45.7)	19 (54.3)		18 (51.4)	17 (48.6)	
56-65 (late elderly)	18 (51.4)	17 (48.6)		16 (45.7)	19 (54.3)	
>65 (senior)	9 (52.9)	8 (47.1)		8 (47.1)	9 (52.9)	
Gender						
Male	23 (42.6)	31 (57.4)	0.913	28 (51.9)	26 (48.1)	0.995
Female	26 (44.8)	32 (55.2)		29 (50.0)	29 (50.0)	
Education Level						
None	10 (66.7)	5 (33.3)	0.004*	6 (40.0)	9 (60.0)	0.000*
Elementary school	8 (50.0)	8 (50.0)		7 (43.8)	9 (56.3)	
Junior high school	4 (28.6)	10 (71.4)		11 (78.6)	3 (21.4)	
Senior high school	6 (19.4)	25 (80.6)		24 (77.4)	7 (22.6)	
University	21 (58.3)	15 (41.7)		9 (25.0)	27 (75.0)	
Marital Status						
Married	39 (43.8)	50 (56.2)	0.520	42 (47.2)	47 (52.8)	0.141
Single	3 (30.0)	7 (70.0)		8 (80.0)	2 (20.0)	
Widow/Widower	7 (53.8)	6 (46.2)		7 (53.8)	6 (46.2)	
Occupation						
Civil servant/ soldier/ police officer	19 (65.5)	10 (34.5)	0.003*	6 (20.7)	23 (79.3)	0.000*

Table 3. Continued

Variables (independent and dependent)	Adherence			Barriers to Adherence		
	No Adherence (n=63) n (%)	Adherence (n=49) n(%)	p-value	No Barriers (n=57) n(%)	Barriers (n=55) n(%)	p-value
Retired	2 (28.6)	5 (71.4)		6 (85.7)	1 (14.3)	
Private employee/ entrepreneur	3 (17.6)	14 (82.4)		13 (76.5)	4 (23.5)	
Farmer	7 (63.6)	4 (36.4)		3 (27.3)	8 (72.7)	
Housewife	9 (28.1)	23 (71.9)		21 (65.6)	11 (34.4)	
Unemployed	9 (64.3)	5 (35.7)		6 (42.9)	8 (57.1)	
Student	0 (0.0)	2 (200)		2 (100)	0 (0.0)	

4. Discussion

This study was designed to determine individual characteristics, adherence, and barriers to medication adherence of the hypertensive patients at the border of Indonesia and Timor Leste. The results show that the BP control rate is extremely low.

The results showed that almost half of the respondents indicated non-adherence to treatment and experienced adherence barriers in hypertension treatment. Likewise, from these data, it can be seen that almost all of the respondents had uncontrolled blood pressure. The results of this study are in accordance with research conducted in Myanmar where respondents in the study also showed low awareness of hypertension sufferers to carry out blood pressure control (Mon et al., 2022). The low awareness of people who are at risk of hypertension to control blood pressure is caused by several factors, including not feeling symptoms by sufferers, unavailability of affordable health facilities, and low public knowledge about the disease (Naryati & Priyono, 2022; O'Donnell et al., 2021).

Patients' ability regarding adherence and adherence barriers to BP control may vary for each individual depending on education and occupation. Our findings showed that the majority of the respondents did not complete primary school, and most of them did not comply with BP control. Many hypertensive patients at the Indonesia-Timor Leste border are not aware of their condition because there are no symptoms, so they do not routinely control their BP. This is in line with the condition of HTN which is known as the silent killer (Mensah, 2019). Patients seek health care only if there are complaints. It is possible that people with HTN at the Indonesia - Timor Leste border still focus on meeting their daily basic needs, which make them neglect their high blood pressure. There has not been a HTN management program in Timor Leste, while the Indonesian government has launched an effort to manage HTN since 2018 through the Healthy Indonesia program with a family approach (The Directorate General of Controlling and Preventing Diseases, 2018).However, our study reported that the level of adherence was still quite low, and there were many obstacles to adherence experienced by the respondents in controlling BP, including in taking medication, regulating salt in food, and living a healthy lifestyle. Our findings are in line with a study in Waingapu, East Nusa Tenggara, where most of respondents did not adhere to taking the medication regularly (Mbakurawang & Agustine, 2016).

4.1. The relationship between age and adherence and barriers to medication adherence of the hypertensive patients

Our research showed no relationship between age and adherence of hypertension sufferers to practicing a healthy lifestyle and treating hypertension. Xie et al., (2020) from China have studied the socio-demographic correlations of patient adherence to self-management behaviors of type 2 diabetes and hypertension, reporting that older patients were more likely to adhere to medication therapy of hypertensive patients than others. They stated that the adult age group was more obedient in taking medication and managing a healthy lifestyle compared to other age groups. However, these findings do not make age the only factor that causes other age groups to not adhere to treatment. Other factors such as motivation and self-efficacy and work can be the reason for not visiting health care facilities. It is possible for the younger age group to disobey medication and practice a healthy lifestyle because adulthood is a productive age. They are busy

making a living to meet the needs of daily life, thus causing them to skip regular medication (Tambuwun et al., 2021). Our findings are in line with a study by Tambuwun et al. (2021) from North Mianahasa which reported no relationship between age and adherence to hypertension treatment. The age group under 46 years showed half of respondents were adherence and non-adherence, while half of the number of respondents who are age group over 46 years had adherence and non-adherence.

Based on the results of our study, although there is no statistically significant relationship between age and adherence and barriers to medication adherence, the relationship between these variables is interesting. In terms of adherence, it is initially high in the late adolescence age group, but it gradually decreases in the corresponding groups until it reaches the lowest level in the senior age group. This shows likelihood that initially when an individual is first diagnosed with hypertension, he or she makes various efforts to obtain treatment and manage a healthy lifestyle (Hardy & Urbina, 2021). However, as the person grows older, chances are he or she has started to get busy with activities, causing adherence to start to decrease (Hardy & Urbina, 2021). Another possible causative factor is that there is no target organ damage and there are no typical symptoms of hypertension, making people with hypertension ignore their hypertension problems (Kalehoff & Oparil, 2020; Obrycki et al., 2020). Boredom related to hypertension management, which is a long-term therapy, is also one of the causative factors that cannot be denied (Herrera et al., 2021).

4.2. Relationship between gender and adherence and barriers to medication adherence of the hypertensive patients

Nearly half of the respondents did not adhere, however, most of the respondents stated that they did not experience any medication barriers. Our research shows that there is no relationship between gender and adherence and barriers to medication adherence ($p>0.05$).

Gender differences seem to influence the health behavior of men and women. According to Song et al. (2020), gender is a description of behavior patterns of men or women that are recognized in life. Male personality traits are aggressive, arrogant, competitive, violent, cruel, dominant, independent, and unemotional. Meanwhile, women are more intimate, anxious, loving, dependent, emotional, gentle, sensitive, and submissive. It is the personality possessed by women that seems to make women more concerned about health than men, thus resulting in more adherence to hypertension treatment being found in women (Gheisari et al., 2020).

Health behavior between men and women shows that women are more obedient to undergo hypertension treatment compared to men. In general, women pay more attention to their health, while men often care less about their health and underestimate the condition of their bodies (Tambuwun et al., 2021). This opinion differs from our findings. In this study, although the results of the bivariate test show no significant relationship between gender and adherence, adherence among men is higher than in female. Furthermore, men experience lower barriers to medication adherence than women.

Our research is in line with a previous study by Liberty et al. (2018) in that there is no relationship between gender and adherence to treatment of hypertensive patients at several advanced health facilities in Palembang. Their findings indicate that women and men have understood the goals of hypertension treatment. This is different from the people at the Indonesia – Timor Leste border, where the majority of the people are farmers, as in this case, they probably consider that hypertension is not a major problem that must be overcome. Apart from the fact that hypertension shows no symptoms, the efforts to make a living to meet their daily needs are still a priority for them (Jahan et al., 2020; Kalehoff & Oparil, 2020).

4.3. Relationship between education level and adherence and barriers to adherence

Most of the non-educated respondents did not adhere to a healthy lifestyle, on the other hand the majority of respondents with junior high school, senior high school and university education were more adherent. There is a significant relationship between education level and adherence and adherence barriers ($p<0.05$).

Education level is related to knowledge. An individual who is highly educated has a better level of knowledge to receive information than a person with a low level of education (Chen et al., 2022). However, a high level of education alone is not a factor for an individual to comply with hypertension treatment. As our findings in this study reveal, hypertensive patients who did

not attend school have low adherence, but ironically patients with higher education (bachelor) background also have low adherence. In terms of the low compliance of hypertensive people who have a bachelor's degree, the majority of them work as employees who are busy with work, so they do not carry out routine health checks and do not take medication regularly (Tam et al., 2020). An individual with an undergraduate degree generally has adequate knowledge, but because of their busy lives, higher education is not a reason for them to take better self-care, making them focus more on their work and thereby neglect their health. The lowest adherence is seen in respondents who did not attend school, and this gradually increases to elementary school. Most of the junior high school and senior high school participants increase their adherence. The contrast appears as adherence decreases in the undergraduate group. In addition, there is a significant relationship between education level and adherence (p<0.05).

Our findings are in line with previous research by Sukma et al. (2018) which explained that the level of education was related to adherence to treating hypertension at the Pandanaran Health Center, Semarang City (p=0.008). Only a small proportion of respondents who are low education level were in the adherence category, while most of the respondents who are higher education level had adherence to medication.

In contrast to previous research from Purnawan (2019) related to adherence to treatment of hypertensive patients in Gianyar Bali, it was reported that there was no relationship between education and adherence to treatment for hypertension sufferers in Gianyar, Denpasar (p>0.05). Many respondents who were highly educated showed adherence to treatment, and the rest were disobedient to treatment. On the other hand, most of the respondents with low education level adhered to treatment, while small portion did not comply with treatment.

4.4. Relationship between marital status and adherence and barriers to adherence

Most of the respondents who are married and single have a high level of adherence compared to widowers/widows. Further analysis, there is no relationship between marital status with adherence and barriers to adherence (p>0.05).

Marital status plays an important role in hypertension. It is considered a measure of social network and is associated with improved control of hypertension. It is speculated that married hypertensive patients may have better control of hypertension partly through increased adherence to recommendations (Mahmood et al., 2020; Aliyah & Damayanti, 2022). This is contrast to our findings which. The highest adherence is seen in single respondents compared to those with hypertension who are married and widowers/widows. The barriers to adherence related to medication and healthy lifestyle practices are found to be lowest in people with hypertension who are single compared to married individuals and widowers/widows.

It is assumed that married hypertensive patients can control their blood pressure well due to the existence of a support system from both their partners and children as well as other family members. However, the findings are different in our study since single hypertension sufferers have high adherence compared to married patients and widowers/widows.

4.5. Relationship between occupation and compliance and compliance barriers

This study also revealed that there is a statistically significant relationship between occupation and adherence and barriers to adherence to BP control. Farmers are less likely to comply with antihypertensive medication and have high barriers to adherence to controlling BP when compared to patients who have other types of occupation. As another study reported from Ethiopia, farmers tend to be less educated and may have less information about medication adherence compared to patients with other occupations (Tsadik et al., 2020). One contradictory opinion describes that understanding adherence and barriers to adherence to hypertension management to have the BP control on target is less important (Misra et al., 2017). Instead, health care providers should be aware of and understand patients' beliefs about disease and treatment when providing care to them and incorporate these beliefs in designing effective interventions to improve adherence and prevent or avoid adherence barriers to hypertension therapy management, including taking medication, setting a low salt diet, and visiting health care facilities (Tsadik et al., 2020). All of students diagnosed with hypertension have very high adherence, followed by private sector/self-employed patients, retirees, and housewives. Furthermore, there are three types of occupation that make people with hypertension experience obstacles to adherence to medication, which include civil servant/soldier/police,

farmers, and unemployed. Students who are diagnosed with hypertension do not have obstacles to hypertension treatment.

5. Implication and limitation

This study showed that adherence and barriers to adherence to controlling BP were the main challenges for the people with HTN at the border of Indonesia - Timor Leste. Therefore, health care providers, including nurses, should seek the best solution through adequate interventions to strengthen the continuity of care related to BP control. Furthermore, this study reported a significant relationship between education and occupation with adherence and barriers to adherence to controlling BP for people with HTN. Efforts to improve lifestyle, including salt consumption and physical activities, require continuous support to enable people with HTN to increase their motivation and self-efficacy in controlling BP. It is necessary to develop effective interventions to optimize BP control. In addition, efforts to reduce sodium consumption and family support are needed to allow people with HTN to keep receiving support to properly control BP. Therefore, nurses should continue to provide health education, motivation, and self-efficacy support, especially for a healthy lifestyle including low sodium consumption. The involvement of family members is also very important in BP management intervention programs.

There are some limitations of this study. First, the sample size was limited since this research was conducted from December 2021 to February 2022. During the COVID-19 pandemic, there were obstacles in the data collection process, and only patients who happened to receive the questionnaire could complete it. Therefore, further research is needed to strengthen our findings. Second, the short duration of the study led to only one interaction. Third, the data collection was done through a Google form, which made it difficult to monitor the patient's honesty in answering the given questionnaires.

6. Conclusion

This study reveals that the adherence of the hypertensive patients at the Indonesia - Timor Leste border is low, but the barriers to adherence are still high. One extreme finding is that the blood pressure control is far below the target. The findings show the relationship of individual characteristics with adherence and barriers to adherence to blood pressure control. Two individual characteristics have been identified, including education and occupation. Therefore, this study has enriched knowledge of adherence and barriers to adherence to controlling blood pressure in the hypertensive patients at the Indonesia - Timor Leste border. Based on the findings, health care providers need to develop intervention strategies to improve adherence and reduce or eliminate the existing barriers to adherence. Further research needs to identify effective education methods to increase the knowledge, motivation, and self-efficacy of hypertensive patients. This is especially necessary to stimulate healthy lifestyle changes to improve BP control and avoid complications among the hypertensive patients at the Indonesia - Timor Leste border.

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Author contribution

PALB prepares the research proposal, collects data, analyzes data, interprets data, prepares the manuscript, and makes revisions. BBS, DI, and WJ give corrections, supervision, important suggestions, recommendations during the research process, and improvements to the final manuscript.

Conflict of interest

All authors declare no conflicts of interest related to this paper.

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ORIGINAL RESEARCH

Triggers of Workplace Violence in Emergency Departments: A Qualitative Study

Ibrahim Ayasreh[1], Ferial Hayajneh[2], Rana Al Awamleh[1], Mohammed ALBashtawy[3], Abdullah Alkhawaldeh[3]

[1]*Department of Adult Nursing, Faculty of Nursing, Jerash University, Jordan*
[2]*Department of Clinical Nursing, School of Nursing, The University of Jordan, Jordan*
[3]*Department of Community and Mental Health, Princess Salma Faculty of Nursing, AL Al-Bayt University, Jordan*

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Corresponding Author:
Ibrahim Ayasreh
Department of Adult Nursing, Faculty of Nursing, Jerash University, Jordan
Email: i.ayasreh@gmail.com

Abstract

Background: Workplace violence has become an alarming phenomenon facing healthcare systems worldwide. Emergency nurses were the most victimized from workplace violence incidents. There is a crucial need for conducting qualitative research addressing the unique contextual factors associated with workplace violence against emergency nurses in Jordan.
Purpose: This study aimed to explore circumstances that Jordanian emergency nurses, who were victims of workplace violence from clients and/or their relatives, perceive as provocative for workplace violence events.
Methods: A qualitative phenomenological method was used. Purposive sampling was utilized to recruit participants (n=15), who were victims of workplace violence, and working in eight emergency departments distributed over all regions of Jordan. Semi-structured face-to-face interviews were conducted. All interviews were recorded and transcribed into Arabic. The Interpretive Phenomenological Analysis (IPA) was used to manually analyse the gathered data. Member checking, prolonged engagement with data, stepwise replication, and personal journaling were used to enhance the rigor of the study.
Results: Findings of this study resulted in four superordinate themes that represents the main individual, social, and organisational factors contributing to workplace violence in Jordanian emergency departments. These themes include aggressors' misconceptions and misbehaviours with four subordinate themes, inappropriate Jordanian social customs with two subordinate themes, organisational circumstances of emergency department with two subordinate themes, and escalator nurses with three subordinate themes.
Conclusion: This study highlighted how specific social, cultural, legal, and administrative aspects of Jordanian society were inappropriately employed so as to lead to spread of the workplace violence. This study has provided insight into the need for change at personal level of emergency nurses, social level of Jordanian public, and organizational level of hospital administration and environment in order to mitigate workplace violence incidence in emergency departments.

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1. Introduction

Workplace violence is considered as one of the most pressing phenomena facing large proportion of healthcare providers worldwide. Due to the nature of nursing occupation which demands from nurse clinicians a closer and longer contact with clients, nurses were deemed as the most victimized among health personnel (Ayasreh & Hayajneh, 2021). Many previous medical and nursing studies, which were conducted to address workplace violence in health care settings, had indicated that emergency nurses were the most vulnerable to aggression from clients and/or relatives (Ramacciati & Giusti, 2020). This was attributed to the unpredictability and high-tension nature of emergency departments and rooms (Zhang et al., 2017).

The phenomenon of workplace violence against nurses in emergency departments has been addressed extensively in previous studies. A cross-sectional Chinese study conducted in 13 general hospitals in Beijing found that approximately 90% of emergency nurses were victims of workplace violence (Li et al., 2019). In USA, the percentage of emergency nurses who were abused by patients and their relatives was estimated to be nearly 86% (Gillespie et al., 2014).

Other studies conducted in Oman, Jordan, Indonesia, and Italy indicated different prevalence rates of workplace violence against emergency nurses of 87.4% (Al-Maskari et al., 2020), 91.4% (Darawad et al., 2015), 80.8 (Zahraa & Feng, 2018) and 76% (Ramacciati et al., 2015), respectively.

Previous studies identified a set of manifestations of workplace violence as being constituents of violent behaviors against emergency nurses. These manifestations were grouped mainly into three main categories: verbal, physical, and sexual violence. Most of previous research findings agreed upon on that verbal violence was the most common type of violence as experienced by emergency nurses (ALBashtawy & Aljezawi, 2016; Darawad et al., 2015; Jeong & Kim, 2017; Lee et al., 2019; Li et al., 2019; Pich et al., 2017; Ramacciatia et al., 2015; Renker et al., 2015; Stene et al., 2015; Zahra & Feng, 2018).

Several studies were also carried out to investigate factors that make emergency nurses more vulnerable to workplace violence. A study conducted by Pich et al. (2017) found that contributing factors of workplace violence can be categorized into three clusters: nurse-associated, patient-associated, and emergency department-associated. Patient-related factors were found mainly associated with clinical conditions of the client aggressors, particularly having alcohol and drug abuse (Pich et al., 2017; Ramacciati et al., 2015; Zahra & Feng, 2018). Another patient-related factor was patient and patients' relatives' misunderstanding of health care processes provided by emergency department staff, and this was obvious in ALBashtawy and Aljezawi (2016) study who found that 46% of violent acts against emergency nurses occurred when health care activities provided by nurses do not meet the expectations of patients and relatives.

Several previous studies found that emergency system and environment characteristics were strong predictors of workplace violence against emergency nurses such as prolonged waiting times (ALBashtawy & Aljezawi 2015; Pich et al. 2017), overcrowding (ALBashtawy & Aljezawi 2015; Darawad et al., 2015), understaffing of emergency departments (Darawad et al., 2015; Pich et al., 2017), and ineffective institutional security (Zahra & Feng 2018). Workplace violence against emergency nurses was found to have deleterious effects on both nurse victims and nursing profession. Many prior studies showed that victimized nurses from workplace violence were personally suffered from psychological disturbances such as feeling anxious, being timid, emotionally exhausted, and being less resilient, patient, and empathetic (Cheung & Yip, 2017; Liu et al., 2019). These disturbances have been found to reflect negatively on nurses' love and belonging to nursing profession, decrease their productivity, and maximize their intent to leave nursing job (Ayasreh & Khlaf, 2020; Bigham et al., 2014; Rayan et al., 2019).

In Jordan, workplace violence against emergency nurses has been found as a growing problem over the past years, as it was found in studies conducted by ALBashtawy (2013), ALBashtawy and Aljezawi (2016), and Darawad et al. (2015) with percentages of 75.3%, 75%, and 91.4%, respectively. These studies demonstrated the seriousness and magnitude of the workplace violence against emergency nurses in Jordan, despite of the presence of laws and regulations criminalizing any violence act against employees during their work. However, all of the previously mentioned studies were quantitative research works and were conducted based on tools and predetermined information extracted from the results of previous studies which were conducted in contexts other than Jordanian and /or Arabic contexts. These studies might not cover all aspects of workplace violence phenomenon in Jordanian context, taking into consideration that workplace violence phenomenon is cultural-sensitive concept and might be perceived in different ways among different cultures. Therefore, due to the cultural hue of workplace violence, there is a crucial need for conducting qualitative research studying the unique contextual factors hovering around of workplace violence incidents against emergency nurses in Jordan. Findings of this study might assist in developing appropriate political strategies and effective remedial and preventive measures to make emergency departments safer and more secure for both health care providers and clients. Accordingly, this study aimed to explore circumstances that Jordanian emergency nurses, who were victims of workplace violence from clients and/or their relatives, perceive as provocative for workplace violence events.

2. Methods

2.1 Research design

This study was conducted through the qualitative interpretive phenomenological design. Due to the richness of the data that can be gathered through qualitative research, this method was chosen for this topic as it allows for an in-depth description and investigation that could yield extensive data on a topic (Streubert & Carpenter, 2011).

2.2 Setting and participants

The target population of this study was emergency nurses who were working in the Jordanian health care settings and experienced at least one violent event during work in the past. The researchers used purposive sampling technique, that is represented by selection of specific individuals who can provide rich information about the phenomenon of interest. The researchers started recruiting potential participants using flyers. These flyers were distributed to the emergency departments of governmental hospitals over the North, the Middle, and the South. Additionally, the flyers were prepared in electronic forms and posted over the social media applications. To enhance the response rates of potential participants, the researcher employed the snowballing technique in which the researcher asked the participants to identify other potential participants who met the inclusion criteria.

In order to enhance the maximum variation, the researchers recruited eligible participants from both genders, and from different Jordanian regions including: the North, the Middle, and the South of Jordan. The final sample size was 15 participants who were working in eight Jordanian emergency departments and have been victimized through workplace violent incidents from patients and/or their relatives. Nurses who were victims of violence perpetrated by aggressors other than patient and/or relatives and those who were victims of violence that had no association with workplace were not considered.

In qualitative studies, there are no specific rules or formulae to determine sample size. However, most literature emphasized on the data saturation as a main criterion for determining the sample size (Streubert & Carpenter, 2011). This was considered in the current study when the researchers stopped gathering data and conducting interviews when no more themes and data were emerged after data analysis of 13 conducted interviews. However, the researchers conducted other two interviews from two participants in order to ensure the redundancy of the data and themes. Consequently, the researchers decided to stop recruiting potential participants for the study, and the final sample size was determined to be 15 participants.

2.3 Data collection

The data collection started in August 2021.The researchers used semi-structured interviews as a data gathering tool in this study. Each interview was conducted in Arabic language and started with collecting information about the socio-demographic characteristics of the participants including gender, age, marital status, working shift, level of education, and years of experience. Then, the researchers started to ask broad questions related to the study's purpose. Accordingly, interview guide was developed by the researchers based on the literature and study's research questions in order to facilitate the conversation and to keep the discussion within the line of study. However, each participant was given an opportunity to discuss any issues and to shape the flow of data based on their perceived importance of these issues. The interview guide included a number of open-ended questions that were written in simple words without using any medical or research jargon, moving through the general-to-specific pattern. Examples of the interview questions include: "Tell me about your experience of workplace violence from patients and/or the relatives", "What do you think contributed to violence happened to you?", "Why workplace violence happened that day?", "Why workplace violence happened to you?", and "What do you think would help decrease the number of violent incidents occurring?".

After getting the permission from the participants, the researchers met them and did the interviews. All interviews were recorded. The interviews lasted for an average of 42 minutes with a maximum of 90 minutes and minimum of 28 minutes, and no additional interviews were conducted for same participant (one cycle). Two copies of each interview audio file were placed in password-protected laptop and flash memory.

All the recorded responses of the participants were transcribed by the primary researcher into written texts. Transcription into Arabic started directly after each interview was being ended. Then transcribed interviews were presented to each related participant to check for accuracy and get feedback. Returning the transcript to the participants is considered as one of the strategies used to enhance the credibility of this study (Morse, 2015).

2.4 Data analysis

Data collection and analysis were conducted simultaneously. The Interpretive Phenomenological Analysis (IPA) developed by Smith et al. (2009) was used as an analytical methodological basis for this study. It was thought that IPA is appropriate to assist the researchers in revealing how study participants make meanings of their experiences and then extracting the themes that reflect their experiences. Furthermore, it might be said that IPA is appropriate in this study because it shares many philosophical concepts with Heideggerian interpretive philosophy. The steps of IPA that were followed were reading and re-reading, initial noting, developing emergent themes, searching for connections across emergent themes, and writing up the results. The analysis was conducted primarily by the primary researcher, but some same pieces of data were analysed by other co-authors independently to ensure the dependability of the study.

2.5 Trustworthiness/rigor

Credibility, transferability, confirmability and dependability were considered to ensure the rigor of the study. Credibility is defined as the extent to which the original data and analysis output are believable (Creswell, 2013). During data analysis, the researchers engaged at length and immersed in the original data through repeatedly listening to the recorded interviews and reading and re-reading the transcripts many times before moving through analysis process. Furthermore, the researchers returned each transcribed interview to its related interviewee to provide the researchers with any comments on the texts, and to check if it actually reflects their experiences as workplace violence victims (Morse, 2015).

Transferability is defined as transfer of the study findings to other similar contexts or people (Morse, 2015). This was operationalized through providing detailed descriptions of the demographic characteristics of the participants of the study.

Confirmability was operationalized through providing detailed information about each step the researchers followed during research process, including how they selected and interviewed the participants, how they transcribed and analysed data, and how interpretation and conclusions were made (Morse, 2015).

Dependability is comparable to reliability in quantitative studies. To ensure dependability of this study, the researchers used personal journaling and audit trail (This strategy, in particular, was done by the primary researcher). Furthermore, stepwise replication was used in which each researcher independently analysed some same piece of data. The results were compared in which no major discrepancies were appeared (Morse, 2015).

2.6 Ethical considerations

As a preliminary step, the ethical approval from the Institutional review board (IRB) of Jerash University (Code number: ABR 21-22) was obtained, along with additional permissions from each hospital in which study potential participants were working. Once the participants had volunteered to participate in this study, the researchers asked them to sign the informed consent, in which the participants were informed about the purpose and significance of the study, what they will be asked during interviews, benefits and risks of the study, and their rights of voluntary participation and withdrawal from the study any time during data collection process.

Participants were informed that their interviews will be recorded and transcribed. Each interview file and transcript were coded. Therefore, the nurses who participated in this study were only known to the researchers. The code list and the transcribed interviews were placed in a locked file cabinet in the primary researcher's office, and the electronic audio and word files of the interviews were placed in a password protected laptop of the primary researcher. Cited quotes were carefully screened to avoid identifying participants' characteristics, and any names mentioned during interviews were replaced with numbers.

3. Results

3.1 Participants' demographics

Fifteen emergency nurses volunteered to participate in this study. All participants were working in governmental hospitals. The average of participants' ages range was approximately 32. Sixty percent of participants were male. Regarding the type of violence, all participants claimed that they were being exposed to verbal violence, whereas one-third of participants claimed being exposed to physical as well. Furthermore, 80% of participants were married. The average years of the participants' experience was about eight years. More than half of participants were working in northern Jordan, on-third were working in Middle region of Jordan, and approximately 13% were working in southern Jordan. See Table 1.

Table 1. Participants' demographic summary

Participant	Gender	Age	Years of experience	Marital status	Hospital region
P1	Male	34	12	Single	Middle
P2	Female	30	7	Single	North
P3	Male	35	13	Married	North
P4	Female	26	2	Married	North
P5	Female	26	3	Married	North
P6	Male	36	12	Married	Middle
P7	Male	29	6	Married	North
P8	Female	28	6	Married	North
P9	Female	32	8	Married	Middle
P10	Male	30	8	Single	South
P11	Male	36	7	Married	Middle
P12	Male	32	9	Married	North
P13	Male	30	6	Married	South
P14	Male	41	17	Married	North
P15	Female	28	6	Married	Middle

3.2 Superordinate and subordinate themes

To explore the provocative circumstances of workplace violence as perceived by Jordanian emergency nurses, IPA of the participants' accounts was used. Four superordinate themes emerged from the transcripts: aggressors' misconceptions and misbehaviours with four subordinate themes, inappropriate Jordanian social customs with two subordinate themes, organisational circumstances of emergency department with two subordinate themes, and escalator nurses with three subordinate themes. See figure 1.

3.2.1 Aggressors' misconceptions and misbehaviours

All participants argued that false beliefs of aggressors had a major role in ignition of workplace violence against emergency nurses. This superordinate theme might be interpreted based on routine activities theory (RAT), which emphasizes on that violence, is maximized in presence of motivated offender. In this study, participants claimed that misconceptions and misbehaviours of clients and/or their relatives motivated them to commit violence against emergency nurses. Thirteen participants claimed that aggressors believe in that priority of care is always for their patients regardless of the seriousness of other patients' conditions in the emergency room. Most of participants attributed this belief to aggressors' lack of awareness about the role of the triage system in the emergency department. P11 said:

> *'They were five men came to me asking to see their mother. I told them; you should go to the triage before. I am working with an urgent case. They started insulting me, and they told me if you don't see our mother now, we will break your head, see my mother now'.* (P11)

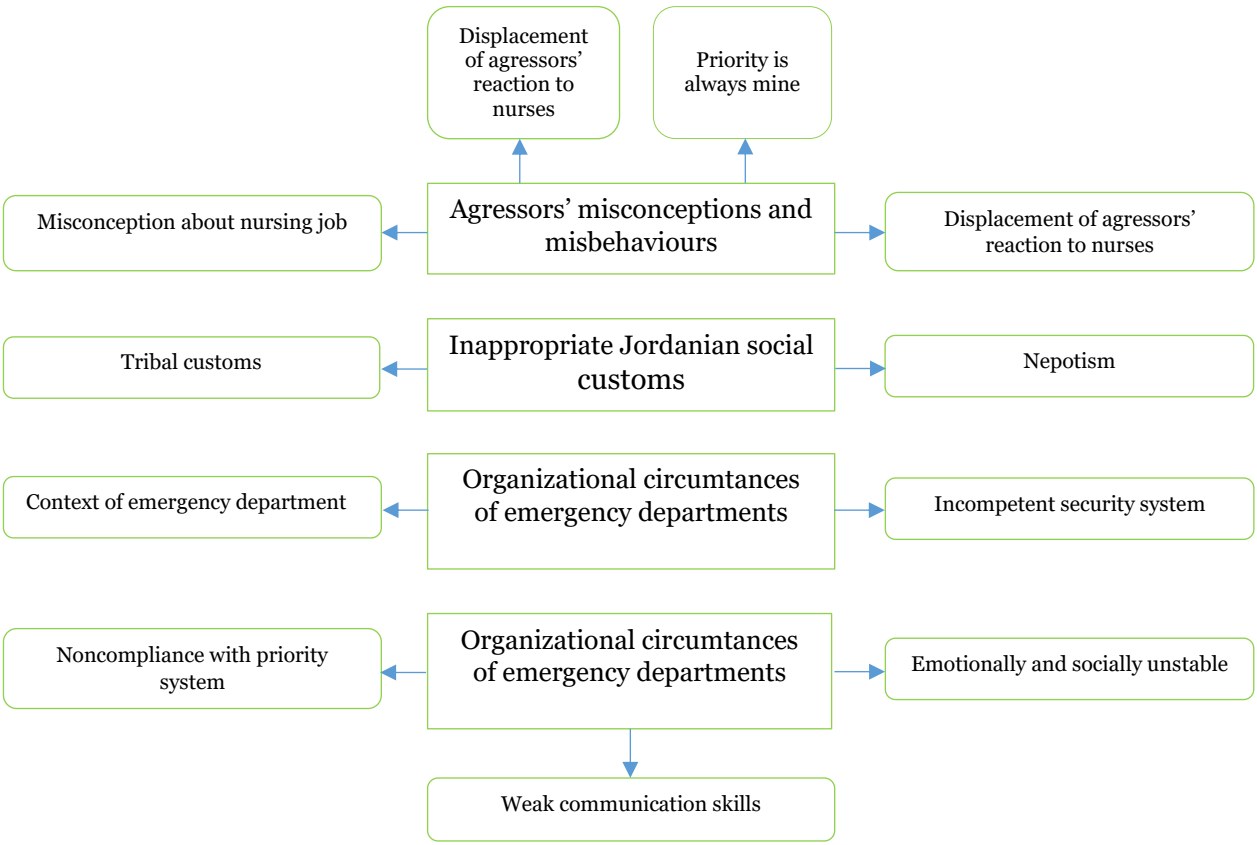

Figure 1. Superordinate and subordinate themes

Ten participants stated that lack of awareness of patients and their relatives about nursing responsibilities makes the emergency nurses more vulnerable to over-questioning and exposes them to unreasonable requests from patients' relatives. Such misbehaviours might maximize the probability of violence against emergency nurses. P14 said:

> *'They asked me to give their father medication. I told them, I am a nurse, and I should firstly take vital signs, and then doctor will decide which medication your father should receive. They yelled at me, give him medication, how the hospital employed stupid one like you. Go and bring a physician to see our father'. (P14)*

Many participants indicated that interferences of patients and relatives in the medical and nursing interventions, contribute to workplace violence against emergency nurses, as P13 said:

> *'I explained to the relatives that their patient is kept under observation. Then they asked me to give him blood because he is pale, then they asked me to take X-rays, then they asked me to give medication to make patient more relaxed. I explained to them that we do the best for your patient. They do not trust us. They intervene in all procedures we do'. (P13)*

Several participants claimed that workplace violence might be attributed to aggressors' perception of nurses as the weakest entity among health care providers. Therefore, aggressors displace their feelings of anger from physicians to nurses, particularly when aggressors feel dissatisfied with physician's orders. P2 said:

> *'The doctor told the patient's relatives, that all tests showed no dangerous injuries threatening the life of patient following RTA, so no need to stay in the hospital, I will discharge the patient. The relatives didn't like the doctor's instructions. But they show respect to the doctor. When I came to them for discharge procedures, they screamed and*

86 told me that all your procedures are false, and that you (nurses) didn't understand anything'. (P2)

3.2.2 *Inappropriate Jordanian social customs*

It was appeared in the interview texts that some Jordanian social customs had a significant contribution in escalating workplace violence against emergency nurses. Nepotism is one of these prevailing customs. In health care context, nepotism might be manifested in assigning priority of caring to specific patients based on kinship, friendship, or official position. Nepotism usually arises feelings of injustice among other patients and might lead to ignition of violence against emergency nurses, particularly those who don't conform to acuity priority system. P1 said:

'Sometime, our colleagues might be forced to pass some patients to receive in virtue of their relativeness to some colleagues or ex officio. We know it is bad behaviour. But I think it is better to make special clinics for employees' relatives'. (P1)

Cup of Coffee‖ is a metaphorical name of one of the common social customs in Jordan. Many participants claimed that most of conflicts, which occur in hospitals, were socially managed through reconciliation meetings between the tribes or families of both the aggressor and the victim, in which usually ends with public apology from the aggressor and dropping the compliant by the victim. Participants believed in that this social behaviour gives the aggressors the opportunity to escape from punishment. P7 said:

'We are tribe-oriented people. When any criminal problem occurred, representatives from tribes other than tribes of aggressor and victims intervene to resolve the criminal issue without resorting to courts. This what is known as cup of coffee. Usually, these tribal meetings end with dropping the personal right against the aggressor for a sum of money paid by the family of aggressor. I think that this tribal custom escalates the workplace violence. The law must take its course'. (P7)

3.2.3 Organisational circumstances of emergency departments

Many participants claimed that there were many organisational contextual factors, which contributed to igniting workplace violence against emergency nurses. All participants stated that hospital security personnel are incompetent, and that their performance doesn't meet the demand. Fourteen participants stated that hospital security personnel were not physically fit to protect the nursing staff. Eleven participants indicated to the curiosity of security personnel and their interferences in medical and nursing interventions as other misbehaviours that might maximize workplace violence instead of mitigating it. Six participants stated that hospital security staff doesn't intervene directly in violence situation due to fear of being injured. P8 said:

'Security is not effective at all. They are old. They cannot protect themselves. I still remember when they compete with people in emergency room to watch CPR case instead of preventing the aggregation of people at the door. They are very curious. It is better to provide more competent security or support the hospital with policemen'. (P8)

All participants argued that contextual characteristics of the emergency department plays a major role in triggering workplace violence against emergency nurses. These characteristics include crowdedness and inadequate staffing. Crowdedness which is one of the distinguished hallmarks of the emergency department, contributes to the ignition of altercations between nurses and patients' relatives, as it leads to disruption of caring processes and provision of nursing interventions. Many participants stated that presence of large numbers of relatives around the patient increases the load of the emergency nurses through excessive questioning and unnecessary requests. Ten participants stated that crowdedness in the emergency department is attributed to patients and relatives' lack of confidence in the role of primary health care centres in managing stable and simple cases, and this is reflected in increased people's visits to emergency department. P14 said:

'I asked the patient about his chief complaint. He said headache from frequent sneezing. It was common cold. (Participant laughed). I told him why you don't go to health centre. He said they 88 don't know anything, and they will not do anything. Medications here are better. I am free to go anywhere I want'. (P14)

All participants revealed that inadequate staffing in emergency department was another significant contributing factor to workplace violence. According to participants, there were some situations in which there was a large influx of critical cases such as those associated with road traffic accidents. However, the number of nurses is relatively small to deal with all these cases. Therefore, a noisy altercation arouses between emergency nurses and relatives particularly those whose patients didn't receive instant care. P11 said:

'We are only four nurses in emergency department. We cannot see all patients at the same time. Sometimes, we deal with six or more patients with same priority. Sometimes, two or more nurses working with one patient. So that the relatives of patients who did not receive care shout and scream insulting the hospital and who work in the hospital. Really, we are at critical need to recover a shortage of nursing staff in ER'. (P11)

3.2.4 Escalator nurses

This superordinate theme might be interpreted based on the concept of suitable target of routine activities theory (RAT), as it was appeared in the participant accounts that there were some emergency nurses with certain characteristics who make any simple conflict between them and the patients and/or relatives worse, and thus igniting workplace violence. Eleven participants mentioned that there were some nurses who should not be placed in emergency department due to their lack of appropriate communication skills. P2 said:

'Yes. Sometimes, the nurses themselves were responsible for igniting altercations with patients or accompaniers. Some nurses don't communicate appropriately with clients. Some nurses lack respect and courtesy in speaking with clients. These nurses should not be assigned to emergency departments'. (P2)

Nine participants stated that there were some nurses who have social or emotional problems that made them unable to control their emotions toward patients or relatives. P9 said:

'At the same time, there were some nurses who are always nervous and problematic. They have chronic diseases and have troubles in their family life. I think they should leave ER to other areas. It is more suitable for them'. (P9)

It is worthy to mention that one participant talked about presence of nurses who were uncomfortable with working in emergency department, and escalation of conflict situations might be a way to convince administration to transfer him to another department. P11 stated:

'Some nurses see that making problems with clients and accompaniers, might force the administrators to move them to another area other than emergency department. However, and due to the shortage of nurses in emergency departments, the administers can't move them. So that altercations continues to occur'. (P11)

4. Discussion

This study explored the circumstances that Jordanian emergency nurses who were victims of workplace violence from clients and/or their relatives perceived as provocative for workplace violence events.Four superordinate themes emerged from the transcripts: aggressors' misconceptions and misbehaviours with four subordinate themes, inappropriate Jordanian social customs with two subordinate themes, organisational circumstances of emergency department with two subordinate themes, and escalator nurses with three subordinate themes.

It was apparent in participants' accounts that most aggressors held inappropriate ideas about the care which they should receive in emergency departments. These inappropriate ideas had a significant role in igniting the conflicts, and thus, violence against emergency nurses.

According to the study participants, there was predominant belief among patients and their relative on that priority is always their own, regardless of the acuity of other patients' cases. Therefore, patients and/or relatives might not expect to wait for long time to receive care. This might be attributed to the lack of awareness among patients and their relatives about triage system in emergency departments, in which prioritizing incoming cases to the emergency departments is done by triage team to identify the severe cases that should be dealt with immediately, and those less severe cases that most likely placed in waiting areas (ALBashtawy, 2013). Accordingly, waiting time is inevitable in emergency departments; however, this issue mostly might be unacceptable among patients and/or relatives. This study finding is congruent with results of many previous studies which found that long waiting time is one of the main contributing factors of workplace violence against emergency nurses (ALBashtawy & Aljezawi, 2015; Ayasreh & Khalaf, 2020; Darawad et al., 2015; Morphet et al., 2014; Pich et al., 2017; Ramacciati et al., 2015; Vezyridis et al., 2014; Wolf et al., 2014). Another Ghanaian study conducted by Boafo (2016) revealed that there was an overwhelming belief in principle of ―first-come-first-served‖ among Ghanaian people; therefore, most violent cases against nurses were perpetrated by patients' relatives who didn't receive instant care upon arrival.

Unawareness about nursing profession and its responsibilities was another factor which falls under the superordinate theme of aggressors' misconceptions and misbehaviours. According to study participants, this unawareness created a state of distrust toward nurses, and leaded patients and relatives to underestimate nursing interventions. Furthermore, most of the study participants claimed that the public view of nurse as a physician's handmaiden and not as autonomous health care providers, is still common among the population in some certain areas in Jordan. Similar findings were revealed from an integrative review conducted by Glerean et al. (2017) to identify young people's perceptions of the nursing profession and described nursing work as caring career with low autonomy, and as having less appreciation than medicine among the society. Negative public image of nurses has been found as contributing factor to workplace violence than any other health care providers (Ayasreh & Hayajneh, 2021). Study participants highlighted one of the most common social behaviours in Jordanian community, which is over-questioning behaviours of patients' relatives and friends about their patient's health condition, in addition to the interference with nursing interventions in front of patients. This might mostly be attributed to relatives' and friends' beliefs in that these behaviours reflect how much they concern and care of their patients during illness and bereavement. Over-questioning and persistent interference in caring interventions have been found to increase the workload and pressure over nurses and contribute to the ignition of conflicts and violence against nurses (Al-Shiyab & Ababneh, 2018), particularly, if the patient was accompanied with large number of relatives and friends (Darawad et al., 2015).

Most of social aspects of Jordan are derived mainly from Arabic and Islamic culture. Therefore, there are many lovely customs and traditions spread in Jordanian community. However, some of these traditions and customs were inappropriately utilized to gain personal interests. Nepotism is one of the common negative social customs in Jordan, which is defined as abuse of a particular position by a particular person through giving a special consideration to relatives or friends regardless of their priorities or capabilities (Vveinhardt & Sroka, 2020). This behaviour is quite prevalent in Arab world, and this might be attributed to the tribalism which is prevailing Arab countries (Caputo, 2017). According to study participants, nepotism was operationalized through two tracks. The first one was when persons with higher official positions intervene as mediators to influence the administration decisions regarding formal reporting and filing of violent acts to judicial authorities. The second track of nepotism was operationalized when health care providers intervene to allow their relatives or friends to jump queues regardless of the acuity of presenting cases. This was congruent with the results of Ghanaian study conducted by Boafo (2016), who found that unfair favouritism and nepotistic nursing behaviours in determining priority of patients' conditions, was one of the most reported triggers of violence against nurses. Cup of Coffee‖ is a common metaphorical term used by Jordanian people to indicate the out-of-court tribal efforts to settle disputes between violence parties and convince the victim to drop the private right in exchange for a specific compensation such as public apology and/or monetary compensation. In most of social violence cases, the victim and/or his/her family are usually exposed to continuous pressures from tribal leaders out of violence parties' tribes to accept reconciliation and drop the private right. Dropping private

right reduces the penalty applied to the aggressor, and the public right of the state remains (Watkins, 2014). However, most of public rights are substituted with financial compensations. Although tribal customs have a significant role in perseveration of social security (Watkins, 2014), study participants claimed that past experiences of continuous acquiescence of violence victims to accept tribal reconciliation and drop private right, contributes significantly to the spread of workplace violence against emergency nurses. This was appeared in one of participant's accounts who stated that he and his family were exposed to social pressure for conciliation over three months after formal complaint was filed. Therefore, due to these social pressures, the participants unwillingly acquiesce to conciliation and dropped his private right, in respect of tribal mediators and to alleviate pressures over his family. It is worth mentioning that the aggressor in previous case perpetrated three other violence cases against emergency nurses in the same hospital, as the study participant claim.

It might be said that both religion and tribe are highly recognized by Jordanian government which considers them as a supporter and contributor to preserving security in the society. This is based on the principle of tolerance advocated by the Islamic religion. However, it is recommended that dropping the personal right is limited to the victim, and not to compensate the public right with monetary penalty. This might mitigate the incidence of workplace violence as a number of participants claim.

The findings of this study revealed that there were specific factors related to the organisational context and environment, which had a significant role in ignition of workplace violence against emergency nurses. These organisational factors included inadequate security system, crowded environment, and inadequate staffing. Most of study participants underlined the inadequacy of security personnel in the emergency departments for preventing violence there. This was congruent with previous studies (Alkorashy & Moalad, 2016; Brophy et al., 2018; Child & Sussman, 2017; Darawad et al., 2015). A Jordanian study conducted by Darawad and others (2015) attributed the inadequacy of security personnel to not having a deterrent actual authority. And this was emphasized by Child and Sussman (2017) study who found that mere presence of security personnel was not effective in preventing or managing workplace violence, and that it is more effective to recruit security personnel with adequate training on conflict de-escalation skills rather than just physical strength. Crowdedness, which is one of the distinguished hallmarks of the emergency department, was found as a contributing factor of workplace violence against emergency nurses. This was consistent with many previous studies (ALBashtawy & Aljezawi, 2015; Darawad et al., 2015; Morphet et al., 2014; Pich et al., 2017; Ramacciati et al., 2015). It is worth mentioning that all participants of the current study were from governmental hospitals in Jordan. Emergency departments in governmental hospitals consisted mostly of rooms open to each other, without restrictions on the number and movement of companions between the rooms (Darawad et al., 2015). This might explain the overcrowding in emergency departments. The study participants claimed that presence of large number of patients' companions in the emergency department hindered the therapeutic communication; create difficulties in providing high-quality care to the patients. This is in line with a study conducted by Alkorashy and Moalad (2016) who found that overcrowding in emergency departments increased service demands on nurses from patients' companions, and thus ignited conflicts between them. It is worth mentioning that some study participants attributed the large numbers of patients visiting emergency departments to the lack of awareness and distrust among patients toward the role of primary health care centres managing simple cases. Inadequate staffing in emergency department has been found as another organisational contributing factor of workplace violence against emergency nurses. This is in line with some international studies (Darawad et al., 2015; Ramacciati et al., 2018; Tiruneh et al., 2016). A study conducted by Tiruneh and others (2016) found that exposure to workplace violence among nurses with low number of staff (number of 1 – 5) during the same working shift was twice higher than those nurses with higher number of staff (number of more than 11). Lower numbers of nursing staff have been found to increases likelihood of workplace violence through maximizing delay in provision of care to patients, particularly in cases of large influx of critical cases (Darawad et al., 2015; Tiruneh et al., 2016).

The findings of the current study revealed that the blame was not entirely directed to patients or relatives in ignition of workplace violence against emergency nurses. Study participants claimed that there were some nurses whose presence made the situation stressful

and tense, due to their certain personality traits. This is consistent with findings of Child and Sussman (2017) study who called these nurses as escalator nurses, because they tend to escalate any conflict between them and patients or relatives, rather than soothing it. This escalating attitude might be attributed to nurses' unwillingness to work in emergency departments (Child & Sussman, 2017), or inadequate preparedness in terms of communications skills (Chen et al., 2018; Darawad et al., 2015; Ramacciati et al., 2015), and this was emphasized in Vezyridis et al. (2014) study who claimed that inexperienced nurses were at more risk than experienced ones, due to lack of adequate communication skills.

5. Implication and limitation

The findings of this study attract the attention of health policy makers toward the importance of enhancing the awareness of the public about the responsibilities of nursing staff and triage process in emergency departments. Furthermore, this study highlighted the lack of knowledge of the public about the roles of primary health care settings in managing non-urgent cases, and the roles of emergency departments in managing only urgent and emergent cases. The findings of this study implicate the need to recruit sufficient number of security personnel who have adequate training on physical fitness and communication skills.

The only limitation of this study was related to the fact that all participants were working in governmental hospitals. The themes of this study might differ from those that might arise from nurses who were working in private, military, and university hospitals.

6. Conclusion

This study highlighted how specific social, cultural, legal, and administrative aspects of Jordanian society were inappropriately employed so as to lead to spread of the workplace violence. This study has provided insight into the need for change at personal level of emergency nurses, social level of Jordanian public, and organizational level of hospital administration and environment in order to mitigate workplace violence incidence in emergence departments. Future qualitative research is needed to understand the experiences of the perpetrators of workplace violence either patients or their relatives. Such research studies could result in better understanding of the victimization event.

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Author contribution

IA: conceptualization, methodology, and data analysis; FH: writing and data analysis; RA: investigation; MA: reviewing and data analysis; AA: investigations, editing and data analysis.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ORIGINAL RESEARCH

Measures of Nursing Environment Multidimensionality and Patient Centricity Using Importance-Performance Map Analysis

Andy Andy[1], Salsabilla Maula Zalfa El-Hamzah[1], Ferdi Antonio[1]

[1]*Department of Hospital Administration, Graduate School of Management, Universitas Pelita Harapan, Jakarta, Indonesia*

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Corresponding Author:
Andy Andy
Department of Hospital Administration, Graduate School of Management, Universitas Pelita Harapan, Jakarta, Indonesia
Email:
andybai78@gmail.com

Abstract

Background: The nursing environment has become a consideration for an organization in improving service quality, especially in the implementation of patient-centred care. The various dimensions make it necessary to know which sectors need to be prioritized. However, there is still limited research that is more specific in linking the dimensions to become more operational.
Purpose: This study aimed to analyze the relationship between nursing environment dimensions and patient centricity through the Importance-Performance Map Analysis (IPMA).
Methods: A quantitative survey with a cross-sectional approach was conducted in June 2022 to test the conceptual framework on the population obtained from non-managerial inpatient nurses who worked for above two years in a general hospital in East Java, Indonesia. The constructs were measured using a set of indicators in The Practice Environment Scale of the Nursing Work Index (PES-NWI) and Patient Centricity. During the data collection, a total sampling technique was performed, resulting in 89 respondents being acquired. The data were analyzed through partial least squared structural equation modelling (PLS-SEM).
Results: At the construct level, the mean total effect and performance were 0.192 and 56.302, respectively. From the IPMA chart, it was found that the construct in the right lower quadrant with the largest total effect value but not having adequate performance was nursing manager ability (total effect: 0.294, performance: 34.563), making it a construct with the highest importance and requiring priority for improvement among all dimensions.
Conclusion: The nursing environment dimensions have to get attention to achieve patient centricity in inpatient ward nurses, where nursing manager ability is the dimension that has the most vulnerable performance. Leadership development is needed for the head nurse of the inpatient unit to strengthen the ability to lead and change the culture in nurturing subordinates so that kinship between nursing professionals can be established.

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1. Introduction

Demands for improved healthcare are created by technological advancements. All nurses, regardless of academic background, job, or clinical specialty, are affected by these advancements throughout the whole spectrum of healthcare, therefore the services offered must likewise promote greater patient growth. A workforce that is ready to embrace healthcare must be able to enlighten, educate, and empower people, address ongoing and emerging ethical concerns, and foresee any negative effects on vulnerable groups. By incorporating scientific results into moral healthcare practices that benefit both patients and society, nurses play a crucial role in driving change to improve health. However, there is strong evidence that many nurses throughout the world lack competence and confidence, and education is inconsistently provided. They claim this is connected to the working and educational environments over which they control (Mahendradhata et al., 2017; Yeoman et al., 2017).

In Indonesia, many internal and external issues are still spread regarding the problems of nurses' welfare. It can be said that nurses have provided the best nursing care and carried out all their duties and responsibilities professionally, but the efforts of nurses are sometimes still under-appreciated and also still not seen by the community (Senek et al., 2020), even though everything

nurses do is very influential on the development of a patient's health. A nurse's main goal is to improve the welfare of patients, how they apply what they know, and what they get in lectures about humanizing humans (humanism). However, in reality, it is necessary to know that nursing is one of the professions in Indonesia with the lowest reward, which is very unfortunate (Mahendradhata et al., 2017; Suhadi & Siyoto, 2020).

The welfare of healthcare workers, which is certainly diverse in Indonesia, will certainly affect the way they interact with patients, coupled with pressure in the world of work that requires them to carry out obligations related to humanity to their patients to implement patient centricity (Andy & Antonio, 2022). Various problems regarding patient centricity indicators relate to the perception and performance of nurses. A study shows that there are cases of adverse drug events with an incidence rate of 50.1 per 1,000 persons annually in a hospital in Indonesia, which are dominated by administration errors (46.91%), followed by dispensing errors (38.76%) and prescription errors (14.33%) (Hartati et al., 2014). Furthermore, there is evidence that medical waste in Indonesia is not properly managed. A study in Central Java showed that there was 37.3% unfavorable behavior of disposing medical waste caused by nurses' attitude who only prioritized avoiding patient complaints without the need to think about hospital quality control (Jennifa et al., 2021). Another study in Aceh Tamiang showed that more than 50% of nurses lacked the behavior of disposing of medical and non-medical waste (Muchsin & Syahrial, 2013). An increase in safety incidents of 0.3% in a hospital in Surabaya is also an important consideration, as a lack of safety culture can result in outcomes including longer length of stay, higher 30-readmission rates, and increased postoperative mortality rate (Adriansyah et al., 2021). This shows the need for correction of behavior in order to provide an outcome in the form of a nurse's behavior orientation that puts the interests of the patient rather than a pragmatic attitude in healthcare.

As nurses have direct patient contact, good collaboration is necessary among healthcare providers. Among the many healthcare professionals whose actions can significantly affect patient outcomes are nurses. They interact with patients and their caregivers the bulk of the time. Therefore, healthy nurse-patient and caregiver interactions are therapeutic and an essential part of treatment. In addition to their core care responsibilities, nurses frequently serve as translators or patients' advocates. Even though good nurse-patient relationships have a favorable effect on nurse-patient communication and engagement (Molina-mula & Gallo-estrada, 2020), research has revealed that several factors have a negative impact on these relationships, with major repercussions for care outcomes and quality.

Research conducted by Lamberti and Awatin (2017) found that creating patient centricity by healthcare workers, in this case, dominated by nurses, can be predicted by buy-in by senior management, organizational vision, and resources. However, in the study conducted by Nartey et al. (2020), Yu et al. (2019), and Zhao et al. (2008), it was found that patient centricity can be determined by involving, empowering, and training all supply chain actors with measurements based on technical, interpersonal, social, and moral dimensions. Due to the different perspectives found in various studies, the authors try to summarize all of these things as a nursing environment as a predictor to explore the evidence that has been presented. In addition to the above, limitations were found in a previous study by Kieft et al. (2014) that uses a unidimensional approach to the nursing environment in measuring outcomes. This was reviewed by research conducted by Arsat et al. (2022) and they propose that multidimensional measurements can be carried out in applying the nursing environment as a predictor and find out which dimensions have a dominant role. Finally, patient centricity is a variable that seems new in health service management, especially from the perspective of a healthcare provider. Therefore, a study is needed to explore this to evaluate employee motivation and performance to optimize the quality of patient-centred care that supports patient safety and quality control. Accordingly, due to the scarcity of empirically based research studying the phenomenon of multidimensionality of the nursing environment that embraces diverse sectors in hospitals in Indonesia, this study aimed to analyze the relationship between the dimensions of nursing environment and patient centricity, analyzing through the IPMA to know what aspects to improve according to their performances.

2. Methods

2.1 Research design

This study used a quantitative survey approach with a cross-sectional design to answer the research issues (Bougie & Sekaran, 2020). The objects in this study are all variables included in

this research model. The dependent variable is patient centricity, while nursing environment dimensions including nurses' participation in hospital affairs, nursing foundation for quality of care, nursing manager ability, staffing and resource adequacy, and collegial nurse-physician relationship are the independent variables. The description above is illustrated as the conceptual framework shown in Figure 1.

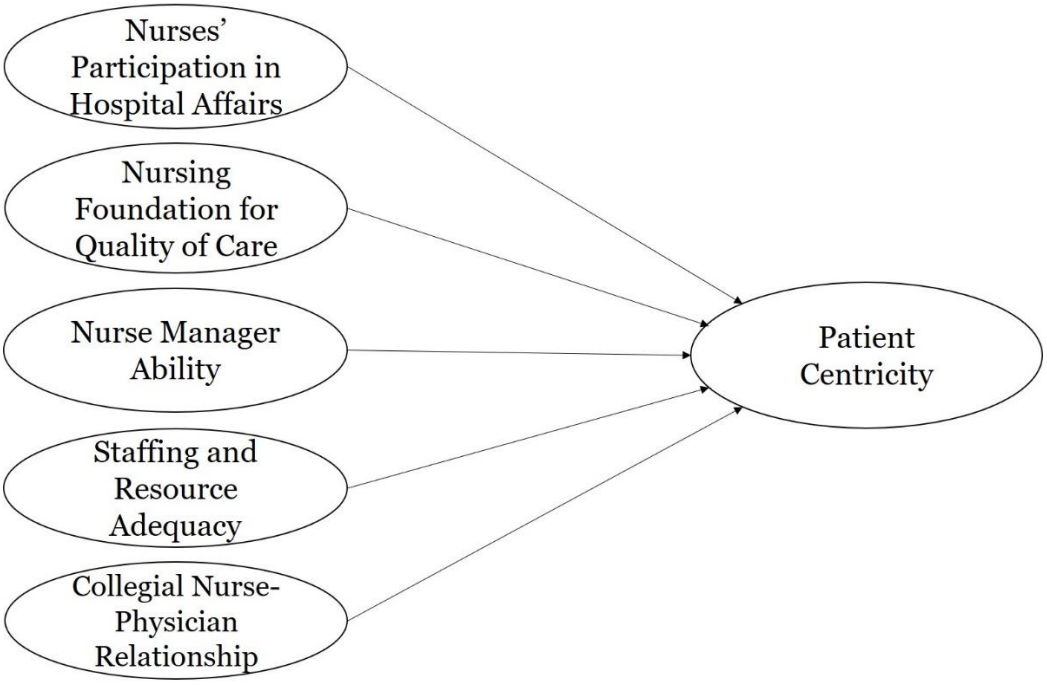

Figure 1. Conceptual framework

2.2 Setting and samples

This study employed total sampling on the population obtained from non-managerial inpatient nurses who work for above two years in a general hospital in East Java, Indonesia. The inclusion criteria for this study were nurses with permanent employee status, physically and mentally healthy, and willing to participate in the research. Respondents were excluded from the study if they were undergoing further education, on leave, or in the process of resigning. Sampling was carried out in June 2022. G*Power (version 3.1.9.7) was used to estimate the required sample size (Memon et al., 2020) based on a significance level of 0.05, an effect size of 0.35, and a power of 0.95. Accordingly, the calculated required minimum sample size for this study was 63. The number of nurses who met the population criteria above was 89 people. Questionnaires were distributed online to all of the respondents referred to above with a response rate of 100%.

2.3 Measurement and data collection

An online questionnaire was utilized for data collection in this study. Each questionnaire involved four sections. The researchers developed the first section as filter questions which ensure that participants are research subjects who have met the desired population criteria. The second section involves several items related to the demographic information of the participants. These demographic data included age, gender, marital status, last formal education, length of work, work duration (per week), department, and whether they have previous work experience in other hospitals. The third section was the questionnaire for the dimensions of nursing environment adopted from the updated review of The Practice Environment Scale of the Nursing Work Index (PES-NWI) (Swiger et al., 2017) to elicit data about the nursing environment. The part consists of five groups of statements which were "Nurses' Participation in Hospital Affairs" (9 indicators), "Nursing Foundation for Quality of Care" (10 indicators), "Nursing Manager Ability" (5 indicators), "Staffing and Resource Adequacy" (4 indicators), and "Collegial Nurse-Physician Relationship" (3 indicators). Each participant was asked to rate each statement based on a 5-point Likert scale as follows: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree

(5). Regarding the fourth section of the questionnaire, the researchers adopted the Patient Centricity questionnaire designed by Srivastava and Singh (2020). This tool involved six indicators. The participants were asked to rate each statement based on a 5-point Likert scale as follows: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). The reliability of this instrument has been established by its original authors and showed high reliability (α=0.814, p<0.001).

The researchers followed the guidelines of the World Health Organization for adopting and translating research tools (World Health Organization, 2022). Firstly, one of the nurses who have good English in collaboration with the lecturers from the Human Resource Management Division translated the original instrument into Indonesian. Then, a bilingual academician who has extensive expertise in scientific research checked the translated instrument for adequacy, conceptual correspondence, and any missing concepts or expressions. After that, an expert in English back-translated the Indonesian version of PES-NWI and Patient Centricity research instruments to English, and no major discrepancies were revealed between both versions.

In this study, the suitability and psychometric properties of the Indonesian version of PES-NWI and Patient Centricity research instruments have been examined by a panel of five experts, which satisfies the minimum required to fulfill the face validity (DeVellis, 2012), consisting of two healthcare management experts, two human resource management practitioners, and one field researcher. In this stage, there are several recommendations from experts to improve the structure of the questions to make them more understandable. After making improvements and resubmitting, seven items from 37 items were removed because they did not receive the above 80% agreement from the panel, and 30 items were still numerous enough for the next studies.

After obtaining the approval of the research ethics committees of Universitas Pelita Harapan and the targeted hospital, the researchers approached the potential nurse participants and explained the nature, purpose, and benefits of the study. Then each participant was given the link to the online questionnaire, and he/she was asked to fill in all items and submit it to the primary researcher after completing the questionnaire.

2.4 Data analysis

The PLS-SEM approach was used because it could examine complicated models in explanatory research. The conceptual framework has six components and is thought to be a complex research model. When the focus of the investigation is mainly on the model's explanatory and predictive power, PLS-SEM techniques are recommended (Hair et al., 2019; Shmueli et al., 2019). Measurement and structural models serve as the foundation for the primary PLS-SEM method. The measurement model is used to assess the validity and reliability of relationships between indicators and the corresponding model components. The structural model is used to investigate if there is a meaningful connection between each component in the study model. In this work, the authors combine descriptive analysis with inferential analysis using Importance-Performance Map Analysis (IPMA). The position of variables and indicators based on the mean (descriptive analysis) and total impact (inferential analysis) are shown in the figure (Sarstedt et al., 2017) as a two-axis mapping that combines the two analyses. IPMA can offer a useful summary of what may be improved (Sarstedt et al., 2022).

2.5 Ethical considerations

The study protocol was approved by the Institutional Review Board (IRB), Faculty of Economics and Business, Universitas Pelita Harapan, Tangerang, Indonesia (Code number: 114/EC-FEB/V/2022). The authors also requested approval from a general hospital in East Java. An informed consent form was made available as another measure to guarantee that this research did not go against ethical standards. The nurses who took part in the study signed informed consent forms that included information about the goals, methods, and participants' rights. The secrecy of responder data is one aspect of this. Before gathering the data, hospital administration approval was initially sought. The nurses were given the assurance that taking part would not have any bearing on their performance reviews.

3. Results

3.1 Respondents' characteristics

During the data collection, the number of 89 eligible samples filled out the online structured questionnaires. The demographic profile is described in Table 1. According to the data, 69.7% of respondents are in the age range of 30-49 years, so it can be inferred that the respondents are already emotionally mature. The majority of participants have a nurse profession educational background. With these circumstances, it is assumed that respondents are capable of understanding the questionnaire's questions.

Table 1. Respondents' profiles

Demographic Variables	Frequency (f)	Percentage (%)
Gender		
Male	36	40.4
Female	53	59.6
Age		
20 – 29 years	18	20.2
30 – 39 years	34	38.2
40 – 49 years	28	31.5
50 – 59 years	9	10.1
≥ 60 years	0	0
Marital status		
Not married yet	24	27.0
Married	17	19.1
Married with 1 child	15	16.9
Married with >1 child	28	31.5
Others	5	5.5
Last formal education		
Diploma	13	14.6
S1	28	31.5
Profession	48	53.9
Length of work		
3 – 5 years	44	49.4
6 – 10 years	27	30.3
> 10 years	18	20.3
Work duration (per week)		
35 – 42 hours	40	44.9
43 – 50 hours	39	55.1
≥ 50 hours	0	0
Department		
General Ward	35	39.3
Oncology Ward	22	24.7
Cardiology Ward	11	12.4
Obstetric Ward	8	9.0
Pediatric Ward	7	7.9
Surgical Ward	6	6.7
Previous work experience in other hospitals		
Yes	34	38.2
No	55	61.8

3.2 Measurement model

The outer loading from the reflective model was done in the first phase of PLS-SEM analysis to examine the indicator of reliability (outer loading). The result found 24 indicators met outer loading criteria, while four indicators NP1, NP2, NP4, NFO1, NMA1, and SR5 were excluded since the loading was below 0.708 (Figure 2). The second stage was to assess the model's internal consistency; all constructs had a Cronbach alpha of more than 0.60, as shown in the blue circles of the measurement model, and composite reliability had an upper threshold below 0.95, indicating that the model's constructs were reliable (Hair et al., 2019).

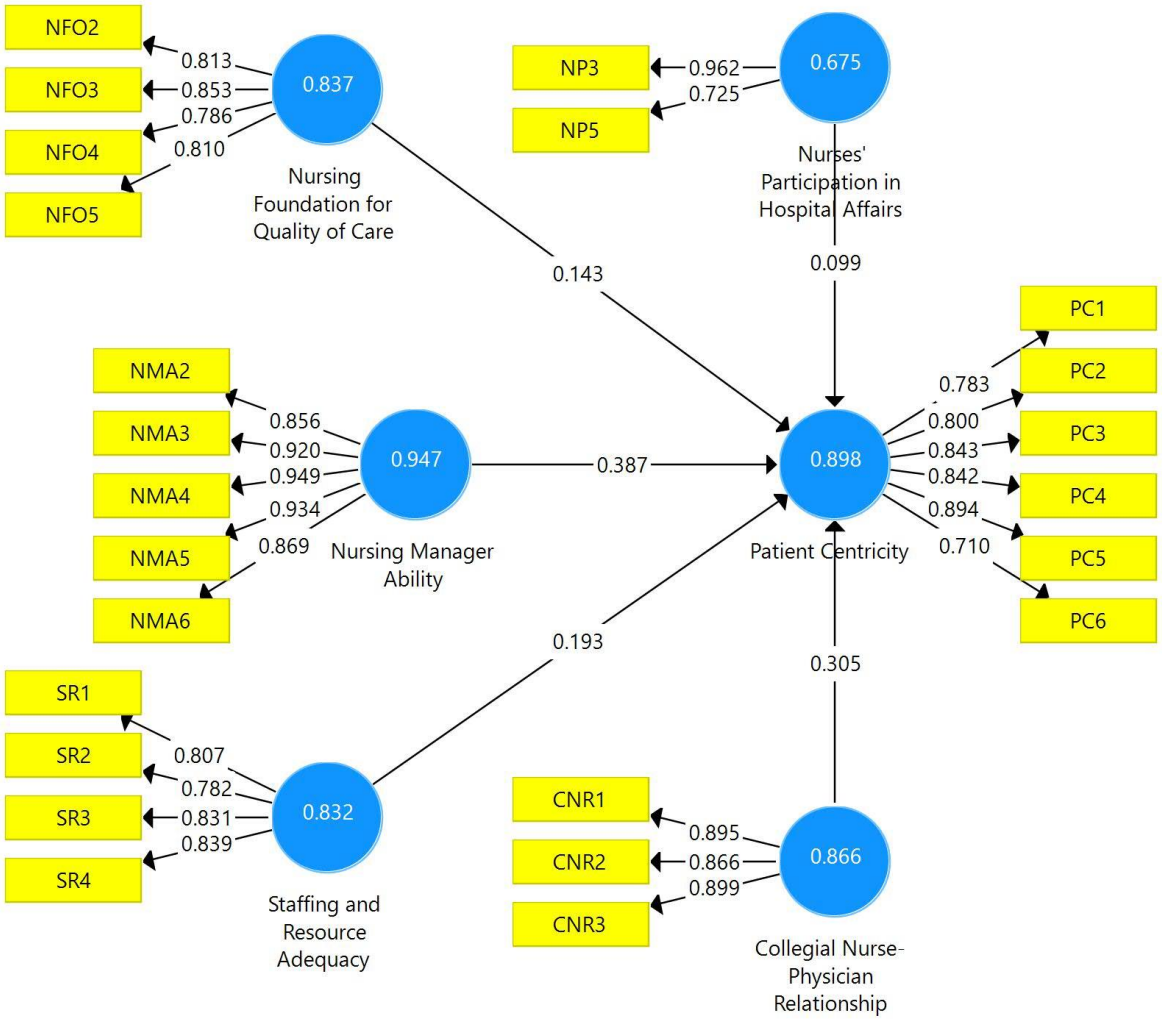

Figure 2. Measurement model

The average variance extracted (AVE) was used to measure convergent validity in the third stage. All constructions have an AVE of more than 0.50, as necessary, according to this validity check (Hair et al., 2019), showing all constructs can explain at least 50% of item variance in the model, thus establishing convergent validity. The research's reliability and validity can be seen in Table 2.

Table 2. Reliability and validity analysis

Variables	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Nurses' Participation in Hospital Affairs (NP)	NP3: Nurses have the opportunity to serve on hospital and nursing committees.	0.962	0.675	0.838	0.726
	NP5: Nurses are involved in the internal governance of the hospital.	0.725			
Nursing Foundation for Quality of Care (NFO)	NFO2: The hospital administration where I work has high expectations for standards of nursing care.	0.813	0.837	0.888	0.666
	NFO3: Patient care assignments at the hospital where I work can foster continuity of care.	0.853			

Table 2. Continued

Variables	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
	NFO4: Nursing care at the hospital where I work is based on a nursing model, rather than a medical model.	0.786			
	NFO5: There is an active quality improvement program at the hospital where I work.	0.810			
Nursing Manager Ability (NMA)	NMA2: The nurse manager is able to back up the nursing staff in decision making, even if the conflict is with a doctor.	0.856	0.947	0.950	0.821
	NMA3: The nurse manager is highly visible and accessible to staff.	0.920			
	NMA4: The nurse manager uses mistakes as learning opportunities, not criticism.	0.949			
	NMA5: The nurse manager is supportive of nurses.	0.934			
	NMA6: The nurse manager listens and responds to employee concerns.	0.869			
Staffing and Resource Adequacy (SR)	SR1: There are enough staff to get the work done.	0.807	0.832	0.888	0.665
	SR2: There are enough registered nurses on staff to provide quality patient care.	0.782			
	SR3: Adequate support services allow me to spend time with my patients.	0.831			
	SR4: There is enough time and opportunity to discuss patient care problems with other nurses.	0.839			
Collegial Nurse-Physician Relationship (CNR)	CNR1: Doctors and nurses in the hospital where I work have good working relationships.	0.895	0.866	0.917	0.786
	CNR2: There is a lot of teamwork between nurses and doctors.	0.866			
	CNR3: There is collaboration (joint practice) between nurses and doctors.	0.899			
Patient Centricity (PC)	PC1: The inpatient ward team attains better job level through high equipment utilization.	0.783	0.898	0.921	0.663
	PC2: The inpatient ward team attains better job by eliminating waste.	0.800			
	PC3: The inpatient ward team attains a responsive attitude for patient safety.	0.843			
	PC4: The inpatient ward team attains a caring and courteous nature.	0.842			
	PC5: The inpatient ward team attain higher clinical quality than others.	0.894			
	PC6: The inpatient ward team attains minimum treatment errors and better efficiency.	0.710			

The discriminant validity of the measurement model is checked in the fourth phase using the Heterotrait-Monotrait (HT/MT) ratio. This method was chosen since it is known to provide a more exact result (Hair et al., 2019; Henseler et al., 2014). The recommended threshold value for HT/MT ratio is below 0.9 referring to Hair et al. (2019) to establish that each construct indicator is conceptually different. Table 3 demonstrates that all HT/MT values are well below the 0.9

threshold, implying that all indicators utilized in this study have sufficient discrimination to assess their own constructs. The four reliability and validity testing parameters were successively passed by this outer model analysis. Therefore, it can be concluded that all indicators in this research model are reliable and valid to measure their respective constructs specifically.

Table 3. Heterotrait-monotrait ratio

Variables	Nurses' Participation in Hospital Affairs	Nursing Foundation for Quality of Care	Nurse Manager Ability	Staffing and Resource Adequacy	Collegial Nurse-Physician Relationship
Nursing Foundation for Quality of Care	0.256				
Nurse Manager Ability	0.147	0.528			
Staffing and Resource Adequacy	0.194	0.432	0.527		
Collegial Nurse-Physician Relationship	0.102	0.409	0.412	0.517	
Patient Centricity	0.208	0.184	0.166	0.215	0.305

3.3 Structural model

The structural model analysis in this study was done with IPMA to provide inputs to managers to prioritize their improvement activities (Ringle & Sarstedt, 2016). This method is based on the importance that resulted from the total effect and performance based on the mean value. Priorly, the inner variance inflation factor (VIF) test was conducted to check multicollinearity issues. The findings showed all the constructs had inner VIF values below 5 as suggested (Hair et al., 2019) thus, it can be said that there is no multicollinearity issue found in this model. IPMA could be seen as four quadrants, whereas the focus on the quadrant with more importance and performance. Through IPMA analysis in the form of mapping, it can be seen which positions of variables and indicators have shown good performance and need to be maintained, and which still need to be improved. IPMA calculation results can be divided into construct IPMA and more detailed indicator IPMA, as described below (Table 4).

Table 4. Construct importance and performance

Variable	Construct Importance for Patient Centricity	Construct Performance for Patient Centricity
Nurses' Participation in Hospital Affairs	0.052	51.102
Nursing Foundation for Quality of Care	0.149	56.922
Nursing Manager Ability	0.294	34.563
Staffing and Resource Adequacy	0.191	64.550
Collegial Nurse-Physician Relationship	0.276	74.373
Mean	0.192	56.302

From Table 4, it is known the mean value for importance and performance for the patient centricity construct. The mean for importance and performance are 0.192 and 56.302, respectively. Values below this mean are considered low, while values above this mean are considered high. From this data, two lines can be drawn so that the four quadrants can be grouped in the graph as shown in Figure 3.

From Figure 3, it can be seen that the target construct of the research model is patient centricity, in the upper right quadrant there are collegial nurse-physician relationship and staffing

and resource adequacy. This quadrant shows important areas that have performed well. Thus, it can be said that collegial nurse-physician relationship and staffing and resource adequacy are considered important by respondents who are functional inpatient ward nurses in the general hospital. Therefore, it can be suggested for hospital managers to maintain the collegial nurse-physician relationship and staffing and resource adequacy in keeping a good work climate for implementing nurses to increase patient centricity among the nurses concerned. In the right lower quadrant, there is nursing manager ability which is a construct with the highest importance but has not performed well to realize patient centricity. Therefore, it is necessary to take a crucial step on the part of the hospital management to improve the ability of the head nurse in nursing leadership so that a good work environment can be established in clinical service for daily nursing practice.

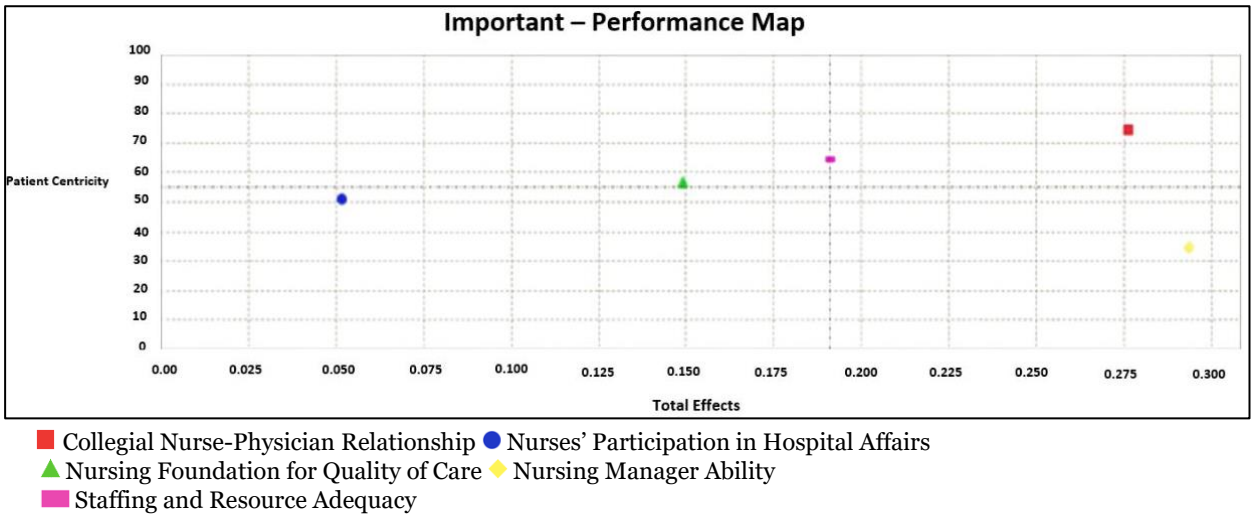

Figure 3. Importance-performance map of constructs

More in-depth analysis can be done on the IPMA indicator. Table 5 shows the mean values for the importance and performance of the patient centricity construct for each indicator. The average indicator for importance is 0.053 and the average for performance is 54.874. Interpretation of values that are below or above that value is the same in principle with the construct IPMA.

Table 5. Indicator importance and performance

Variable	Indicator	Indicator Importance for Patient Centricity	Indicator Performance for Patient Centricity
Nurses' Participation in Hospital Affairs	NP3	0.038	47.753
	NP5	0.014	60.393
Nursing Foundation for Quality of Care	NFO2	0.027	60.674
	NFO3	0.050	62.921
	NFO4	0.037	61.049
	NFO5	0.036	41.573
Nursing Manager Ability	NMA2	0.029	31.742
	NMA3	0.056	36.236
	NMA4	0.070	35.112
	NMA5	0.049	34.551
	NMA6	0.090	33.989
Staffing and Resource Adequacy	SR1	0.050	57.303
	SR2	0.040	68.258
	SR3	0.052	70.225
	SR4	0.049	62.921
Collegial Nurse-Physician Relationship	CNR1	0.117	75.281
	CNR2	0.096	73.034
	CNR3	0.064	74.719
	Mean	0.053	54.874

From this data, two lines can be drawn so that the four quadrants can be grouped in the graph as shown in Figure 4.

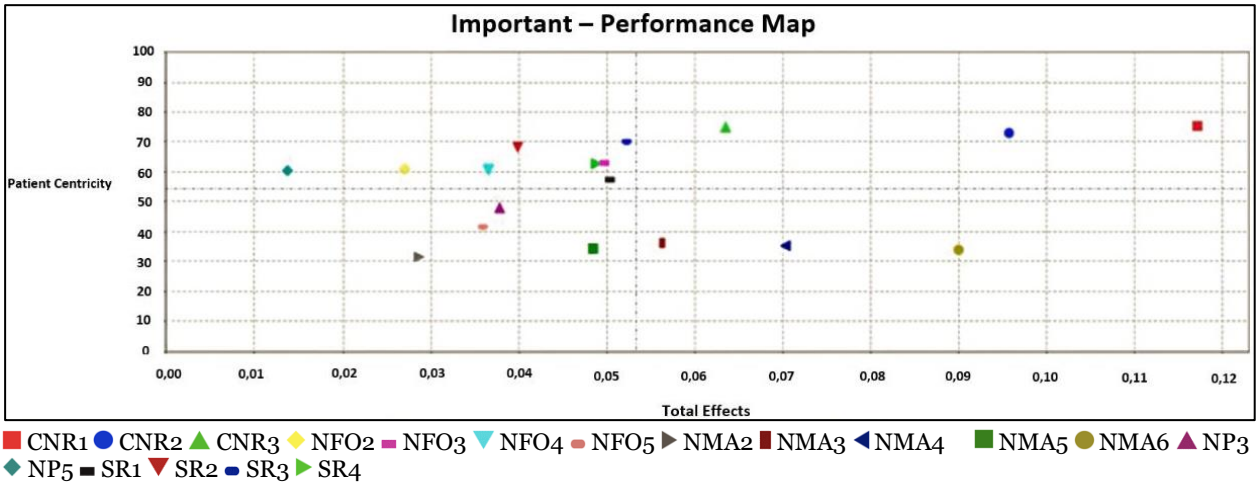

Figure 4. Importance-performance map of indicators

Figure 4 illustrates some indicators that are suggested to be noticed on which hospital management must pay more attention. Indicator CNR1 which contains respondents' responses that doctors and nurses in the hospital where they work have good working relationships, and CNR2 which contains respondents' responses that there is a lot of teamwork between nurses and doctors, have been sufficient and have shown adequate performance. Therefore, these matters need to be maintained by the hospital management because it is considered important for maintaining their motivation in implementing patient centricity in the hospital. On the other hand, in the right lower quadrant, there are indicators with high importance, but have not performed well to realize patient centricity. The indicators that are highlighted here are NMA6 which states that the nurse manager listens and responds to employee concerns, and NMA4 which emphasizes that the nurse manager uses mistakes as learning opportunities, not criticism. On this basis, it is necessary to take action from the hospital management regarding the guidance of the head nurse of the inpatient unit in conducting leadership in inpatient clinical service in relation to the implementing nurse.

As seen in the data analysis, the nursing environment has a weak predictive accuracy on patient centricity (R^2=0.213). Microdata on individuals, families, or households tends to have low R^2 because there is so much variation in individual perception (Crown, 1998). However, there is room for this research model to be tested in a larger and more diverse population of respondents for future research on the nursing environment and patient centricity of inpatient ward nurses.

4. Discussion

This study aimed to investigate the relationship between nursing environment dimensions and patient centricity in inpatient nurses. Five relationships between the six variables in this suggested model are being examined using IPMA. The results of this analysis show that the collegial nurse-physician relationship is a construct with high priority and adequate performance, while nursing manager ability is a construct with great importance but its performance still needs to be improved in supporting patient-centred care.

As it has been seen, IPMA is based on standardized regression coefficients (importance) and adds a new dimension to the analysis by taking into account the values of the predictor variables, which are now stated in terms of a scaled performance index from 0 to 100 (Salleh et al., 2017). The results demonstrated the overall impact of the nursing environment's independent factors on patient centricity, which was evaluated using a scale of latent scores ranging from 0 to 100. When making decisions to increase patient centricity, individuals in charge at the hospital will find these results useful. This study supports Gaalan et al.'s (2019) study, which found that the nursing environment positively impacted patient-centred care. However, these authors analyzed the relationship between both variables through a unidimensional aspect of the nursing environment

using hypothesis testing, and the present study has confirmed the positive relationship through a multidimensional approach. Both studies, however, include different samples of nurses and use PLS-SEM to examine the connections between the nursing environment and patient centricity. In addition to this research, there is another study by Peeler (2015) of nurses in a rural hospital in South Carolina which found no significant relationship between nurses' work environment factors and their perceptions of the quality of service to patients. In this case, autonomy in determining work schedules is what gives job satisfaction and provides an outcome in the form of a better perception of patient-centred care. This is also reinforced by a study conducted by Andy and Antonio (2022) in which health worker autonomy is the antecedent that has the most dominant relationship to work engagement in terms of its impact on patient centricity. This can be a consideration in explaining that there are factors outside of the nurse's work environment that can predict patient centricity beyond the 21.3% coverage of predictive accuracy contained in this study.

In summary, the results of the IPMA indicated that the most beneficial variable to improve patient centricity in inpatient ward nurses is nursing management ability. Ability referred to here is the perception of leadership shown by the head of nursing in the inpatient ward, instead of the level of the nursing directorate of the hospital. Precisely, this aspect would be related to the nursing manager's ability to accommodate the aspirations of his/her subordinates, the ability to learn from mistakes, the ability to support fellow nurses, and the ability to share and organize daily work in the inpatient ward. This is in line with research by Manning (2016) which found that nursing managers who support and communicate through transformational and transactional leadership styles can enhance organizational outcomes by enhancing staff nurses' work engagement. This study also claims that nursing managers' passive avoidant leadership styles have a detrimental impact on staff nurses' work engagement. This has an impact on the growth of the nursing profession and is consistent with the multicenter study by Gad (2018) on nurses in tertiary hospitals in Saudi Arabia, which found that organizational traits and nursing managers' leadership styles have a positive impact on the performance outcomes of nurses, including innovative behavior. A different insight was obtained from research by Abualrub and Alghamdi (2012) which suggested a less meaningful relationship between nurse leadership and nurse work involvement. This can be related to various leadership styles so that it can provide different outcomes on the performance of subordinates. For example, a study by Mehrad et al. (2022) revealed that transformational leadership, transactional leadership, and three outcome scales were positively related to nurse work engagement, but laissez-faire showed a negative relationship. These findings become a consideration for future research to include various types of leadership as moderating variables.

Nurses' participation in hospital affairs is the variable with the lowest importance among the five dimensions of the nursing environment in relation to patient centricity. This can be caused by the low participation of nursing staff in decision-making related to policies in this hospital environment. This is in line with the findings by Rawah and Banakhar (2022) who found an insignificant relationship between nurses' participation in hospital affairs and career commitment due to the limited space for them to participate in decision-making. In addition, this can also be caused by conditions where nurse participation in hospital policy-making and teamwork are extremely unfavorable, contested, and complex (Ditlopo et al., 2015; Ali & Wajidi, 2013). Nurses who were respondents in this study predominantly had less than 6 years of work experience, which was inferior to nurses who had more than 10 years of experience. This is related to their confidence in their involvement in determining hospital policies so that they are more likely to entrust it to their superiors (Jafree et al., 2016; Numminen et al., 2016). This form of trust makes the responsibility of a nursing manager to be great in increasing the patient centricity orientation of their subordinates for service optimization.

5. Implications and limitations

This research provides a new contribution to the field of nursing through IPMA analysis which shows the strongest dimension in its influence on the quality of health services as a correction material for hospital management. This model can be suggested to be replicated and tested in a larger and more diverse population of nurses in future studies. There are no similar studies that predict patient centricity with the dimensions of the nursing environment. In terms of managerial implications, this can be realized by evaluating and monitoring operational

standards in effective communication between health workers. To maintain staffing, hospital management needs to realize what is the goal of nurses working in the hospital concerned to maintain work engagement and prevent burnout which can ultimately have an impact on patient centricity. The adequacy of hospital facility resources is one of the factors that greatly support the work of nurses in implementing patient centricity. In increasing motivation and maintaining nurse performance in patient-centred care, management can make efforts to procure high-quality facilities by the repertoire of value-based procurement and periodically calibrate health facilities to prevent obstacles in service that affect the welfare of nurses. To improve nursing manager ability, leadership development is needed for the head nurse of the inpatient unit to strengthen the ability to lead and change the culture in nurturing subordinates so that kinship between nursing professionals can be established.

Several research limitations were found in this study as a concern for future research on similar problems regarding nursing environment and patient centricity. First, this study used a cross-sectional design for data collection. Nursing environment, in this case, can fluctuate in terms of workload, for example, during the current coronavirus disease 2019 (COVID-19) pandemic, natural disaster, or other conditions affecting the nurses' well-being and the perception of each respondent regarding their welfare at work. The author recommends that this study can be continued with a longitudinal design in the next research. Second, the data collection technique used in this study, an online questionnaire, has limitations because it was undertaken when the COVID-19 pandemic was still active. Online questionnaires have a flaw in that the respondents' health cannot be determined with precision. The mood of the respondent when filling out the questionnaire might have an impact on the results. Suggestions for future study include collecting data or handing out surveys to respondents in person while still following community health procedures. Finally, the small size of samples is an obstacle to be considered, so in future research, it is expected that this model can be tested on more samples to increase the precision of findings in the application of this model.

6. Conclusion

This study concludes that the nursing environment dimensions have a relationship with respective importance and performance towards patient centricity in inpatient ward nurses. Collegial nurse-physician relationship and staffing and resource adequacy are very important constructs and have performed well, so they need to be maintained from a managerial perspective to remain sustainable. On the other hand, nurse manager ability as a construct with the highest importance among all dimensions requires room for improvement to perform well to realize patient centricity in inpatient ward nurses. Maintaining the quality of current dimensions of the nursing environment can help obtain the optimal patient centricity.

There are several recommendations for further studies. First, this study was conducted in a limited number of samples with representative results. It is expected that a confirmatory analysis can be carried out with a larger number of samples. Second, there are dynamics in changes in responses from respondents in certain periods, especially during the COVID-19 pandemic era, so the authors suggest conducting a longitudinal study related to this model. Finally, this study has not considered confounding factors that can give heterogeneity to the data, so future research is expected to include control variables in the model, for example, marital status, length of service, training received, or other potential variables.

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Author contribution

Conception and design of the study: A. Andy; Supervision: F. Antonio; Data collection: A. Andy, S.M.Z. El-Hamzah; Data analysis: A. Andy analyzed the data which was confirmed by S.M.Z. El-Hamzah and F. Antonio for accuracy; Drafting of the manuscript: A. Andy drafted the manuscript; Review and editing of the manuscript: F. Antonio. All the authors are in agreement of the final version of the manuscript.

Conflict of interest
None declared

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ORIGINAL RESEARCH

The Effect of Mindfulness-Based Stress Reduction on Restless Legs Syndrome in Hemodialysis Patients: A Randomized Clinical Trial

Zahra Delshad[1], Mohammad Aghajani[2]

[1]*Faculty Member of Nursing, Islamic Azad University, Kashan Branch, Kashan, IR Iran*
[2]*Infectious Diseases Research Center, Department of Psychiatric Nursing, Kashan University of Medical Sciences, Kashan, IR Iran*

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Corresponding Author:
Mohammad Aghajani
Infectious Diseases Research Center, Department of Psychiatric Nursing, Kashan University of Medical Sciences, Kashan, IR Iran
Email:
Aghajani_m@kaums.ac.ir
aghajani1362@yahoo.com

Abstract

Background: There is currently no definitive cure for restless legs syndrome (RLS), and the common treatments are only used to reduce symptoms. Mindfulness-based stress reduction (MBSR) is an intervention that has shown beneficial effects in many mental and physical disorders.
Purpose: This study aimed to determine the effect of MBSR on RLS in hemodialysis patients.
Methods: This study was a randomized clinical trial involving 60 hemodialysis patients with RLS recruited by convenience sampling each group. Inclusion criteria were patients with RLS diagnosis, age 18-65, Hb>10, no cognitive disorders, ability to read and write, no vision or hearing problems, and history of hemodialysis ≥6 months. The intervention group received eight sessions of the MBSR program, and the control group received routine care in a government dialysis center. International Restless Legs Syndrome Scale and Restless Legs Syndrome Severity Scale were used to measure RLS. Statistical analyses were conducted using independent and pair t-test and ANCOVA.
Results: Significant difference was found in the severity of RLS scores (Mean(SD)) between the intervention group (12.90(4.58)) and the control group (22.27(4.19)) (95% CI:-11.66 to -7.08, p<0.0001). The effect size between groups was obtained based on Cohen's d of 2.13.
Conclusion: MBSR showed a significant reduction in the severity of RLS in hemodialysis patients. This preliminary study suggests that MBSR can be a promising treatment option in the management of RLS patients.

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1. Introduction

Restless legs syndrome (RLS) is a sensory-motor disorder of the limbs that is very prevalent among the general population (Darvishi et al., 2020); it is characterized by unpleasant sensations and an irresistible urge to move the legs (de Menezes et al., 2018). The most prevalent and important complications in patients undergoing hemodialysis (HD) include muscle cramps, sleep disorders, and RLS (de Menezes et al., 2018; Kusuma et al., 2018). In addition, RLS can be associated with mental disorders, sleep disorders, increased risk of cardiovascular diseases, and increased risk of mortality in these patients. The prevalence of RLS in HD patients has been reported to be 40.7% in China (Zhang et al., 2020), 16.8 in Turkey (Turk et al., 2018), and 31.7% in Tehran (Chen et al., 2022). Some factors affect RLS severity, including lifestyle factors, such as stress and anxiety, lack of physical activity, obesity, cigarette smoking, alcohol intake, and consumption of coffee (Batool-Anwar et al., 2016).

People with RLS may experience chronic insomnia, daily drowsiness, and stress. These conditions interfere with patients' daily functional roles, prevent them from enjoying life, have negative effects on their social activities and family life, and increase the anxiety and depression of these patients (Basaran & Tas, 2022). A study found that RLS is one-third of sleep disorders in people over 60 years of age (Myc et al., 2018). A study has also shown that this syndrome has a negative effect on the quality of daily life of patients (Rikos et al., 2019). There is currently no definitive cure for RLS, and the common treatments are only used to reduce symptoms (Selfe et al., 2019). Pharmacotherapy, alternative therapies, and psychological therapies are among the

available treatments for RLS (Bablas et al., 2016; Cochen De Cock, 2019; Hashemi et al., 2015). Pharmacotherapies include sedatives, anxiolytics, dopaminergics, and analgesics, all of which have serious side effects such as nausea, vomiting, hypotension, dizziness, insomnia or drowsiness, and blurred vision (Guay et al., 2020; Silber et al., 2021; Song et al., 2020). Due to the side effects of drug treatments, the use of alternative and psychological therapies has been considered. Cognitive-behavioral therapy (Hornyak et al., 2008), yoga (Innes et al., 2013), and progressive muscle relaxation (Mousavi et al., 2016) are some of the effective psychological therapies in RLS which have been investigated in different studies.

Today, Mindfulness-Based Stress Reduction (MBSR) is used as one of the treatments for a wide range of psychological problems, such as anxiety, depression, and sleep disorders (Chen et al., 2022). MBSR means to focus one's intentional attention on the experience which is currently going on. This attention has a non-judgmental character accompanied by acceptance (Norouzi et al., 2020). Although there is no definitive treatment for RLS, and this disorder is one of the psychiatric disorders in the family of sleep disorders, and its symptoms and consequences include anxiety problems, and depression, there are limited studies investigating the effect of mindfulness on the severity of RLS (Bablas et al., 2016). The researchers recommend further studies in this area and in different conditions (Yang et al., 2020). Therefore, given the high prevalence of RLS in HD patients, its complications and consequences, and the need for psychological therapies to help these patients, this study was conducted to determine the effect of mindfulness-based stress reduction on restless legs syndrome in hemodialysis patients.

2. Methods

2.1 Research design

This study was a randomized, single-blind, clinical trial study.

2.2 Setting and samples

This clinical trial was conducted from November to December 2020 on 60 hemodialysis patients with RLS in a government dialysis center in Kashan, Iran. According to the mean estimates of 9.85 and 9.69, and the standard deviation difference of 7 in the previous similar study (Mousavi et al., 2016), as well as the 95% confidence level and 80% test power, the sample size was determined to be 30 subjects in each group.

Inclusion criteria were patients with RLS diagnosis (receiving a score of 4 from the International Restless Legs Scale), 18-65 years old, full consciousness, Hb>10, no peripheral neuropathy, no cognitive disorders based on the patient's clinical record, ability to read and write, no vision or hearing problems that interfere with the study, and a history of at least six months of hemodialysis. Exclusion criteria included absence in more than two sessions of intervention and migration during the study. The patients were then allocated to the intervention and control groups by block randomization (selection of quadruple and senary blocks). The sample selection is illustrated in Figure 1. The study was single-blind, so data collection was done by a nurse as a research colleague who did not know the type of groups.

2.3 Intervention

The intervention group underwent eight of 1.5-hour sessions (two sessions per week) at intervals of two days and in 3-4-subject groups by the first author, who was trained in an MBSR program in a course (16 sessions), under the supervision of the second author who has more than eight years of experience in leading group therapy in the area of psychological treatments, during her MSc psychiatric nursing. Given the Covid-19 pandemic, the intervention was performed in a room with a calm and suitable environment for education in the dialysis center and observing the health protocols and social distancing, and using a mask. The control group received routine care. They also received a training pamphlet on RLS care designed by the North American Nursing Diagnosis Association (NANDA). MBSR content was designed based on the study protocol of Bablas et al. on patients with RLS according to Kabat-Zinn's protocol (Bablas et al., 2016). In this intervention, techniques such as body scanning, yoga, sitting meditation, mindfulness of emotions and physical pain, mindful breathing, mindful walking, recognition of strong emotions and accepting and acknowledging their presence, self-reflection and self-management were used in a classroom in the HD center. The content of the intervention is presented in Table 1.

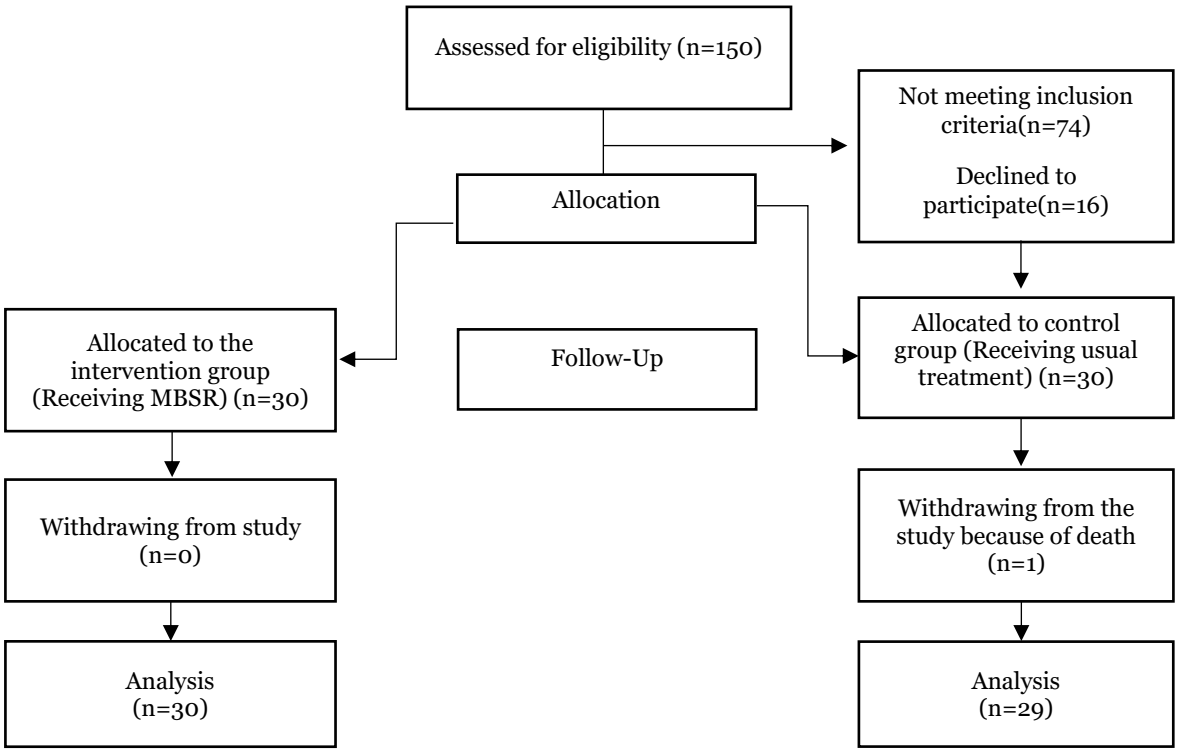

Figure 1. Sample selection chart

Table1. The mindfulness stress reduction program content for HD patients with RLS

Week	Summary of the program
One	Mindful sitting meditation-expanding awareness (15 mins); body scan (25 mins); mindful walking meditation (7 mins); mindful yoga (60 mins [30 mins laying postures and 30 mins standing postures]); mindfulness of emotions and physical pain (15 mins); mindfulness of the breath (8 mins); 3-minute breathing exercise (3 mins).
Two	Participants were guided through sitting with the breath and expanding awareness of the body as a whole, sitting with sound, sitting with thoughts and feelings and choiceless awareness (20 mins), practice breathing meditation for 10-15 minutes
Three	This session involved an introduction and practice of an inactive meditation: the body scan technique. Participants were guided through a 20 min body scan followed by a discussion of their experience. As RLS symptoms can often be brought on by long periods of inactivity, the walking meditation (20 mins) was also introduced and practiced following the body scan.
Four	This included laying and standing yoga postures (45 mins). This was followed by a discussion of their experience and discussion of the benefits of cultivating strength, balance, and flexibility.
Five	The focus of this session was on the identification and recognition of strong emotions and the acceptance and acknowledgment of their presence. In addition, mindfulness was discussed as a stress reduction strategy, and mindfulness of emotions and physical pain (10-15 mins) guided meditation was performed.
Six	The second half of this session focused on the effects of 'autopilot' and mindfulness in everyday life. The formal and informal practice was discussed, and a discussion of how to incorporate these into everyday routines. Participants were instructed to incorporate the informal practice into their routines as much as possible and to continue with their choice of formal meditation (30-45 mins) for at least six days that week.
Seven	Sitting meditation, body scan meditation, yoga, awareness of breathing meditation, loving-kindness meditation, being with baby meditation, mindfulness exercises for activities of daily living,
Eight	The final session was used primarily for self-reflection and to generate a summary of the program. Participants discussed their experiences and adhered to their understanding of how mindfulness can be used to self-manage RLS and related symptoms.

2.4 Measurement and data collection

The questionnaire consisted of three parts: 1) International Restless Legs Syndrome Scale (IRLSS); 2) Demographic information questionnaire including age, sex, education, marital status, occupation, history of underlying diseases, number of dialysis sessions per week, dialysis history, and number of children; and 3) Questionnaire to assess the severity of restless legs syndrome.

2.4.1 International restless legs syndrome scale

IRLSS, which has been recommended by the International Restless Legs Syndrome Study Groups (Walters et al., 2003), includes 1) Frequent movement of the legs with abnormal sensation in the skin of the legs; 2) Temporary relief of unpleasant symptoms by moving the legs; 3) The onset or exacerbation of symptoms while resting or not moving the legs, and 4) The onset or exacerbation of symptoms in the evening or night. The individuals with all four criteria were considered patients with RLS. The RLS scale is a standard instrument whose validity and reliability have been measured in previous studies. In this study, we used the Persian version of the scale based on the Iranian culture. The reliability of this questionnaire was estimated to be 0.95 by using Cronbach's alpha method (Hemmati & Alidosti, 2012).

2.4.2 Restless legs syndrome severity scale

The questionnaire has 10 five-choice questions, and each question is scored between 0 and 4. The total score is between 0 and 40, indicating the severity of the disorder. The higher the score, the more severe the restless leg syndrome will be. Habibzadeh et al. (2011) have confirmed the reliability of this questionnaire with a Cronbach's alpha coefficient of 0.97.

Measurements were conducted two times; the beginning of the study (pre-test) and the fourth week study (post-test). Indeed, post-test was at the end of eight MBSR sessions in the intervention group and fourth weeks after the start of the study in the control group.

2.5 Data analysis

The Kolmogorov-Smirnov test was used to test the normality of variables. Data were normally distributed; thus, parametric tests were used. The exact Fisher test and independent t-test were used to compare demographic variables in the two groups. Paired t-test and independent t-test were used to compare the Mean(SD) of RLS within and between groups, respectively. Cohen's d effect size (ES) was calculated between the group. Between-group comparisons in score changes were performed using analysis of covariance (ANCOVA), controlling for baseline score. The significance level was set at less than 0.05 in all the tests. Statistical analyses were performed using SPSS version 16 (SPSS Inc., Chicago, IL, USA).

2.6 Ethical considerations

This study was confirmed by the institutional review board and the ethics committee of the University of Medical Sciences (IR.KAUMS.MEDNT.REC.1398.068). The objectives of the study were stated for all patients, and informed written consent was signed by them. The current research was registered at the Iranian Registry of Clinical Trials (IRCT) with a registration code of IRCT20130721014086N13.

3. Results

The total number of samples assessed for eligibility was 150, of whom 60 patients who had the inclusion criteria were included in the study and were randomly allocated to the control and intervention groups. One patient in the control group died and was excluded from the study, and finally, the analysis was performed on 59 HD patients with RLS (Figure 1).

3.1 Demographic characteristics of the respondents

The mean age of the subjects in the intervention group was 55.33(10.97) (ranging from 40 to 60 years), the mean number of children was 3(1.50), and the mean history of dialysis was 56(32.47). In this study, most of the patients were married (86.7% in the intervention group and 79.3% in the control group). The independent t-test did not show a significant difference between the two groups in terms of variables, and the variables were identical (Table 2).

Table 2. Demographic characteristics of the intervention and control groups[†]

Variables	Intervention group (n=30)	Control group (n=29)	*p*-value
Age (year)	55.33(10.97)	51.27(11.32)	0.16*
Number of children	3(1.50)	2.89(2.02)	0.82*
History of dialysis (month)	56.93(32.47)	48.20(37.49)	0.34*
Gender			
Female	11 (36.7%)	12 (41.4%)	0.45**
Male	19 (63.3%)	17 (58.6%)	
Marital status			
Single	4 (13.3%)	6 (20.7%)	0.34**
Married	26 (86.7%)	23 (79.3%)	
Having children			
Yes	26 (86.7%)	23 (79.3%)	0.34**
No	4 (13.3%)	6 (20.7%)	
Occupation			
Occupied	17 (56.7%)	18 (62.1%)	0.43**
Retired	13 (43.3%)	11 (37.9%)	
Education			
Undergraduate	19 (63.3%)	17 (58.6%)	0.45**
Diploma	11 (36.7%)	12 (41.4%)	

Notes.
[†] Data are presented as f(%), except age, the number of children and history of dialysis, which are presented as mean(SD).
* Obtained from Independent *t*-test.
** Obtained from Fisher Exact test.

3.2 The difference in RLS score between groups

As shown in Table 3, the independent t-test showed no significant difference in the severity of RLS between the intervention group (24.33(4.46)) and the control group (23.44(3.18)) at baseline (t=0.87, df=57, 95% CI:-1.14 to 2.91, $p>0.05$). However, at the end of the study, this test showed a significant difference in the severity of RLS between the intervention group (12.90(4.58)) and the control group (22.27(4.19)) (t=-8.18, df=57, 95% CI:-11.66 to -7.08, $p<0.0001$).

3.3 The difference in RLS scores within groups

The paired t-test showed a significant difference in the severity of RLS before the intervention (24.33(4.46)) and after one month of mindfulness (12.90(4.58)) in the intervention group (t=12.99, df=29, 95% CI:9.63 to 13.23, $p<0.0001$). By contrast, no significant difference was observed in the severity of RLS before the intervention (23.44(3.18)) and after one month of mindfulness (22.27(4.19)) in the control group (t=1.52, df=28, 95% CI:-0.4 to 2.74, $p=0.13$) (Table 3).

3.4 The effect of MBSR on RLS after controlling the confounding factors

According to the results of covariance analysis, the mean severity of RLS in the intervention group was significantly lower than in the control group (F=85.69, Adjusted R:0.6, $p<0.0001$) (Table 3). Adjusting the analyses for the participants' general characteristics, no significant difference in age ($p=0.3$) and dialysis history ($p=0.16$) was observed.

For effect size estimates between groups, Cohen's d=2.13 showed that the effectiveness of the intervention was very large.

Table 3. Comparison of pre-test and post-test of the severity of RlS between two groups [a]

Variables		Intervention group n= 30	Control group n= 29	*P* [b]	*P* [d]
Severity of RLS	Before	24.33 (4.46)	23.44 (3.18)	0.38	0.0001[e]
	After	12.90 (4.58)	22.27 (4.19)	0.0001	
	P [c]	0.0001	0.13		

[a] Data are presented as Mean(SD); [b] Obtained from Paired t-test; [c] Obtained from Independent t-test; [d] Obtained from ANCOVA; [e] Adjusted R Squared = 0.60

4. Discussion

This study aimed to investigate the effect of MBSR on RLS severity in HD patients. The findings indicated that a mindfulness-based stress reduction program was effective in reducing the severity of RLS. MBSR could be effective by increasing the capacity to accept thoughts and emotions and modulating and reducing negative and dysfunctional thoughts (Jalali et al., 2017). In addition, mindfulness helps people to identify situations that lead to discomfort and pain, gain a better understanding of themselves, and learn coping strategies in dealing with these situations (Mohammed et al., 2018) and, consequently increasing the indicators of well-being and psychological health (Jalali et al., 2017). The result of this study is congruent with a previous study by Bablas et al. (2016) that examined the effect of MBSR on women with RLS admitted to a sleep clinic. It was found that MBSR effectively reduced the severity of RLS and its consequences, such as anxiety and depression, and showed improvement in the quality of life and the quality of sleep (Bablas et al., 2016).

Effective mechanisms of mindfulness include coping/encountering, cognitive change, self-management, relaxation, and acceptance; all of which can reduce the severity of pain and discomfort (Khoo et al., 2019). Various studies have measured the effect of effective mechanisms in mindfulness intervention on RLS and kidney patients separately. Mousavi et al., for instance, revealed that progressive muscle relaxation effectively reduces pain intensity and RLS symptoms (Mousavi et al., 2016). Furthermore, Innes et al. (2013) also indicated that yoga significantly increased sleep quality and mood and reduced the prevalence of insomnia and hypertension in middle-aged women with RLS.

Mindfulness practice through various pathways affects pain (Zeidan et al., 2011). First, manipulating attention in meditation practices might impress both sensory and affective components of pain perception. Second, mindfulness reduces the reactivity to distressing thoughts and feelings that accompany and strengthen pain perception. Third, mindfulness reduces psychologic symptoms such as comorbid anxiety and depression and finally increases parasympathetic activity, which can promote deep muscle relaxation that may reduce pain (Omidi & Zargar, 2014). Therefore, it seems that mindfulness mechanisms can affect the severity of RLS. Research has also shown that MBSR training, combined with relaxation and mental meditation through breathing and thinking, is associated with a variety of health outcomes, such as the relief of pain, stress, anxiety, and depression (Sobhani et al., 2019). Vøllestad et al. (2011) argued that MBSR had an effect on anxiety disorders and other disorders whose symptoms were similar to anxiety disorders and reduced these symptoms. Cho et al. (2017) also indicated that MBSR is an effective program for controlling stress in HD patients. Furthermore, Haghshenas et al. (2019) showed that MBSR significantly reduced anxiety and depression in HD patients. Therefore, since RLS is a psychiatric disorder with symptoms and consequences such as pain, stress, anxiety, and depression, it seems that MBSR can have an important effect on RLS in HD patients by reducing psychological problems such as stress, anxiety, and depression and, thus, leads to pain reduction.

In a previous study, cognitive therapy was introduced as an effective method for reducing the symptoms of depression, anxiety, and stress in renal patients undergoing HD (Khoshkhatti et al., 2020). However, studies have revealed that the effect of MBSR treatment in reducing the stress of HD patients has been more than cognitive-behavioral interventions (Khoshkhatti et al., 2020) and commitment-based psychotherapy (Yasaie Sokeh et al., 2017). Therefore, because of its focus on the present time and acceptance as well as being conducted in groups, MBSR treatment seems to be more effective in reducing the severity of RLS, which indeed requires further studies and comparison in these patients.

According to studies, the duration of each mindfulness training session and the exercises and tasks which should be performed at home are the factors increasing the effect of mindfulness programs on RLS (Haghshenas et al., 2019). Therefore, this factor was also considered in the present study. The researchers also tried to follow up on the exercises and tasks through weekly phone calls (if needed) and text messages. Additionally, we tried to adjust the time according to the content so that it could be most effective.

5. Implications and limitations

MBSR can be included as an alternative treatment in nursing interventions for hemodialysis patients with RLS. Teaching and learning the techniques and components of mindfulness help nurses provide holistic care by considering the psychological aspects of RLS for patients. Nurses

in general or hemodialysis nurses could implement MBSR to help RLS patients reduce their pain, agitation, and other related symptoms of RLS.

The present study has been successful in investigating the effect of MBSR on reducing the severity of RLS in HD patients; however, some limitations are warranted. One of the limitations of this study was the lack of blinding the study so that participants might receive information from other sources or the interaction of patients with each other, which were not within the control of the researchers. Also, limited controls of the confounding factors of RLS, such as stress and anxiety, should be considered in future studies.

6. Conclusion

This preliminary study showed that the implementation of the MBSR program significantly reduced the severity of RLS in HD patients. MBSR has the potential to be a complementary healthcare program for patients with RLS. Accordingly, it may be recommended for health professionals to add MBSR to their interventions. Further research can evaluate the use and continuity of the effectiveness of this treatment as a complementary treatment in patients. It is suggested that more follow-ups be performed in future studies to evaluate the long-term effects of this intervention. Moreover, it is recommended that more research be conducted to compare the effects of other psychological therapies with MBSR on the severity of RLS in patients.

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Author contribution

All authors contributed to the study's conception and design. Material preparation and data collection were performed by ZD and MA. The analysis and final draft of the manuscript were written by MA.

Conflict of interest

No potential conflicts of interest.

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ORIGINAL RESEARCH

"A life without a supervisor is like a seed that never grows": Students' Experiences of Undergraduate Nursing Research Supervision

Cyruz P. Tuppal[1], Alejandro C. Nonog Jr[2], Shanine Mae P. Tuppal[3], Mark Donald C. Reñosa[4], Marina Magnolia G. Ninobla[5], Mary Nellie T. Roa[6], Christian S. Tu[7]

[1]*Director, The Center for Research and Publication, Emilio Aguinaldo College, Manila, Philippines*
[2]*Academic Program Coordinator EMS Education and Training Dr. Kiran C. Patel College of Osteopathic Medicine, Nova Southeastern University, Fort Lauderdale, 33312, Florida, United States of America*
[3]*Department of Nursing, National Kidney and Transplant Institute, East Ave, Metro Manila, Philippines*
[4] *Heidelberg Institute of Global Health, University of Heidelberg Germany*
[5]*Oman College of Health Sciences, Sultanate of Oman*
[6]*Associate Vice President for Academic Affairs, St. Dominic College of Asia, Bacoor, Cavite City, Philippines*
[7]*Program Chairperson, Nursing Program, School of Health Science Professions, St. Dominic College of Asia, Bacoor, Cavite City, Philippines*

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Corresponding Author:
Cyruz P. Tuppal
The Center for Research and Publication, Emilio Aguinaldo College, Manila Philippines
Email:
cyruz.tuppal@eac.edu.ph

Abstract

Background: Undergraduate research is an inquiry or investigation conducted by students who develop an original intellectual or creative contribution to the discipline. However, little is known within the Philippine context that explores undergraduate nursing research experience and supervision.
Purpose: This study illustrated the students' lived experiences of undergraduate research supervision using transcendental phenomenology.
Methods: This study made use of transcendental phenomenology. Thirty students enrolled full-time in a nursing research course during the academic year (AY) 2019-2020, and AY 2020-2021 were purposively sampled. These students completed their research projects as required for the nursing research course and were supervised by a mentor. Each participant underwent an in-depth one-on-one interview, of which the responses were transcribed and analyzed based on the modified Stevick-Colaizzi-Keen method.
Findings: From the thirty-nine significant statements carefully reviewed and clustered into meaning units, three themes emerged, namely (a) re-capturing tripartite challenges in doing research, (b) re-cultivating quintessential requisites in doing research, and (c) re-envisioning the future ahead. These themes provided textural and structural descriptions that intuitively integrate into the essence of the lived experience of being supervised in undergraduate research.
Conclusion: Undergraduate research supervision resonates with the mutual exchange of novel ideas in a dialogical encounter, collective learning, and participatory-in-action where sciencing and caring thinking is imbued to develop critical thinking, inquisitiveness, and caring intuitiveness.

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1. Introduction

Undergraduate research is an inquiry or investigation conducted by students who develop an original intellectual or creative contribution to the discipline (Council on Undergraduate Research, 2012). Perrella et al. (2020) describe the nature of undergraduate research as research-tutored (i.e., *engaging in research discussions)*, research-based (i.e., *undertaking research and inquiry)*, research-led (i.e., *learning about current research in the discipline)*, and research-oriented (i.e., *developing research skills and techniques)*. Undergraduate research is also recognized as an educational tool that contributes significantly to student learning (Mendoza & Golden, 2019). According to Severinsson (2015), undergraduate research supervision in nursing intensifies socialization and understanding of the disciplinary culture in nursing. However, the quality of experience among the supervised students is somehow dependent on the interactions, communications and supervisory styles that lead to mutual trust, respect and obligation

(Armstrong, 2004). Severinsson (2015) surmised that the most important part of the research supervision process was the research supervisory relationship, as well as learning about and developing new knowledge of the research process.

Multi-approaches were documented, including project-based learning (Si, 2020), interdisciplinary project design (Eydgahi, 2019), independent study, technical electives, and capstone project (Mueller et al., 2018), inter-institutional, community-engaged (Malotky et al., 2020), secondary data analysis, or literature-based projects (Malotky et al., 2020), undergraduate research fellow in clinical and translational research projects (Slattery et al., 2016; Vessey & DeMarco, 2008), intensive university-based summer research experience (Kain et al., 2014), participatory health research (de Jong et al., 2018), care innovation projects (Snoeren et al., 2016) or undergraduate research assistant program (Mitchell et al., 2020). These approaches explore a field of interest to advance the profession's knowledge, seek answers to practice-related issues, and translate evidence into practice through a systematic inquiry.

The American Association of Colleges of Nursing (AACN) acknowledges that "professional nursing practice is grounded in the translation of current evidence" (p. 16) from the start of baccalaureate education to facilitate students' understanding of research and its utility to nursing practice (American Association of Colleges of Nursing (AACN), 2008). Mailloux (2011) asserts that nursing envisions a research-driven practice committed to rigorous scientific inquiry to optimize population health and well-being. Graduate competencies at each level of nursing education are often revisited to ensure basic research integration into the curricular and instructional design and delivery. As a result, graduates are expected to apply research findings, understand the basic elements of evidence-based, research-based, or theory-based practice, collaborate with others to identify key research areas and develop actionable strategies for advancing the practice.

Similarly, in the Philippine context, graduates who completed the four-year outcomes- and typology-based Bachelor of Science in Nursing (BSN) program amalgamate nursing-focused professional courses embedded into didactic clinical practicum in various settings to become proficient in client care. Some courses apply the concepts of leadership and management that prepare the students to be future-ready managers across healthcare settings. This is also in consonance with other nursing schools across the globe to produce quality graduates equipped with adamant knowledge, attitudes, and skills in terms of nursing practice related concepts. Moreover, the BSN program integrates research into the curricular nomenclature not only as a specific course but also in all other nursing courses. In so doing, the students become more adept when it comes to foundational knowledge and application as a student and research-driven future healthcare professionals toward effective client care, leadership, management, and evidence-based practice. These are also evident in the outlines, syllabi and prospectus based on the recommended templates and framework for the baccalaureate program in nursing. In a more intricate process, during the early onset, students are taught and immerse to define, determine, and identify a problem anchored on their interest. Students are also able to plan the design and methodologies, collect data, analyze and interpret data findings, and disseminate them. Some studies mentioned about some factors related to the students, teachers and institutional that are considered as deterrents (Kostovich & Thurn, 2013; Piamjariyakul et al., 2021) to effective undergraduate research supervision or even toward the completion of the said scholarly pursuit. Same research explicate that if these deterrents when not addressed, students may feel demotivated, bombarded with academic stress, academic anxiety and academic burden leading to high student attrition rates.

In this regard, undergraduate research and the nature of supervision should be viewed as potent instrument that benefits students, faculty, and schools. Several studies show that involvement in research stimulates students' interest in future inquiries and the pursuit of graduate studies fulfills the growth of their chosen profession (Arellano et al., 2012; Campillan, 2019; Gacrama & Baptista, 2019; Taraban & Logue, 2012).

Research involvement has been considered a trademark as the Center of Excellence awarded to higher education institutions in the Philippines being recognized as having institutional reputation locally and internationally. Some colleges and universities explore innovative strategies to incorporate research into their programs at every level, focusing on how student scholarship can be further intensified. However, there is a lack of evidence in the body of literature exploring undergraduate research supervision experiences and finding the meaning and essences of that

experience. This becomes impetus in the conduct of this one of a kind undertaking apart from the challenges and issues that previous studies mentioned (Kostovich & Thurn, 2013; Piamjariyakul et al., 2021). Hence, this study came into existence to explore nursing students' lived experiences of undergraduate research supervision. Through this study, the results may shed light and offer a new array body of knowledge to improve, enhance the undergraduate research supervision.

2. Methods

2.1 Research design

This transcendental phenomenology study (Moustakas, 1994) explored the nursing students' lived experiences of undergraduate research supervision. The term 'transcendental' resonates a phenomenon viewed with a fresh eye and open mind whereas the meaning derived through the participants' consciousness after an in-depth evaluation of the phenomenon is the true reflection on how the participant view their world and how the world works. The derived meanings become the essence of the structures of the experience focusing on what is real and how *we know what we know* to allow the stories to be told from the participants' perspective—described as authentic and genuine. The specific strategy anchored into the method of analysis made the design distinct from other phenomenological approaches (Husserl, 2005; Moustakas, 1994; Skirke, 2022).

2.2 Setting and participants

The study was conducted in a registered nursing college with a Level III accreditation from the Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA), having a total population of 150 to 500 nursing students enrolled in part- and full-time status. In this study, a total of thirty students in a nursing baccalaureate program from the third year and fourth-year levels were purposively sampled. Students who completed their research projects in a selected private tertiary higher education institution enrolled full-time in the nursing research course, supervised by their qualified supervisors during the first and second semesters of Academic Years 2019-2020 and 2020-2021, were included in the study. Although this study was somewhat small regarding the study population, the expected number concurs in conducting a phenomenological study (i.e., 5 to 25 participants) (Polkinghorne, 1989).

Phenomenological samples do not usually have many participants, as the data collection process requires an in-depth study of human experience. However, such studies need enough participants to offer different experiences of the phenomenon being studied (Moustakas, 1994). Dworkin (2012) argue that phenomenon often centered on the how and why of a particular issue, process, situation, subculture, scene or set of social interactions. In-depth interview work is not as concerned with making generalizations to a larger population of interest and does not tend to rely on hypothesis testing but rather is more inductive and emergent in its process. Hence, the researchers, followed this suggestion in including thirty students who were qualified to be part of the in-depth interview to cover the diverse experiences that later were consolidated to understand better the meaning and essences of such experiences (Dworkin, 2012; Moustakas, 1994).

2.3 Data collection

After each student agreed and consented, in-depth face-to-face semi-structured interviews were conducted (Authors CT and AN). Central questions were: "What stands out in your experience as a student researcher or your desire to complete undergraduate research?", "What situations have typically influenced or affected your experiences?" All interviews were audio-recorded. Each participant was interviewed in English since all the students are proficient to respond in the said language during the interviews. There were two sets of interviews conducted. Each interview ran for about 30 to 45 minutes or a maximum of one hour in a designated room to provide a quality dialogue and create a relaxing and trusting atmosphere (Moustakas, 1994). The researchers who interviewed each participant also allocated another interview for any clarification specifically on the transcribed statements that were unclear. Each narrative was transcribed word-for-word by the authors (ST, MR, MN, CT, MNR), and was sent back to the participants to ensure accuracy and clarity in their responses. After the validation, transcribed data were uploaded in NVivo 12 Pro (NVivo, 2002), secured in a password-protected computer in a locked office, accessible only to the researchers. All transcriptions, including the informed consent forms and electronic transcripts, were kept confidential.

2.4 Data analysis

The Modified Stevick-Colaizzi-Keen method (Moustakas, 1994) guided the researchers in the data analysis (see Figure 1). The researchers underwent bracketing that allows the simultaneous flow of consciousness based on what is known to the researchers (epoche). Using a reflective journal, each researcher jotted down their feelings, expectations, and views about the phenomenon of interest before the actual data collection—this step aimed at focusing on the key informants' experiences with a fresh eye in a wide-open sense. Second, the researchers conducted the interviews and continuously immersed themselves in the narratives, reading and re-reading. All transcribed statements were given equal value. The researchers highlighted the significant statements while other irrelevant, repetitive, or overlapping statements were deleted (transcendental- phenomenological reduction). The remaining statements refer to the invariant horizon of the experience that is later clustered into themes (i.e., meaning units or themes). Fifth, the themes were then used to describe the 'what' (textural) and the 'how' (structural) of the students' experiences (imaginative variation). Each step was applied in every student transcription. Thick and dense accounts of the experience until the final themes were consolidated, leading to a textural-structural description that illustrates the meaning and essence of the experience to capture the whole phenomenon with verbatim examples (synthesis, universal description) (Moustakas, 1994). These specific strategies anchored into the method of analysis made the design distinct from other phenomenological approaches.

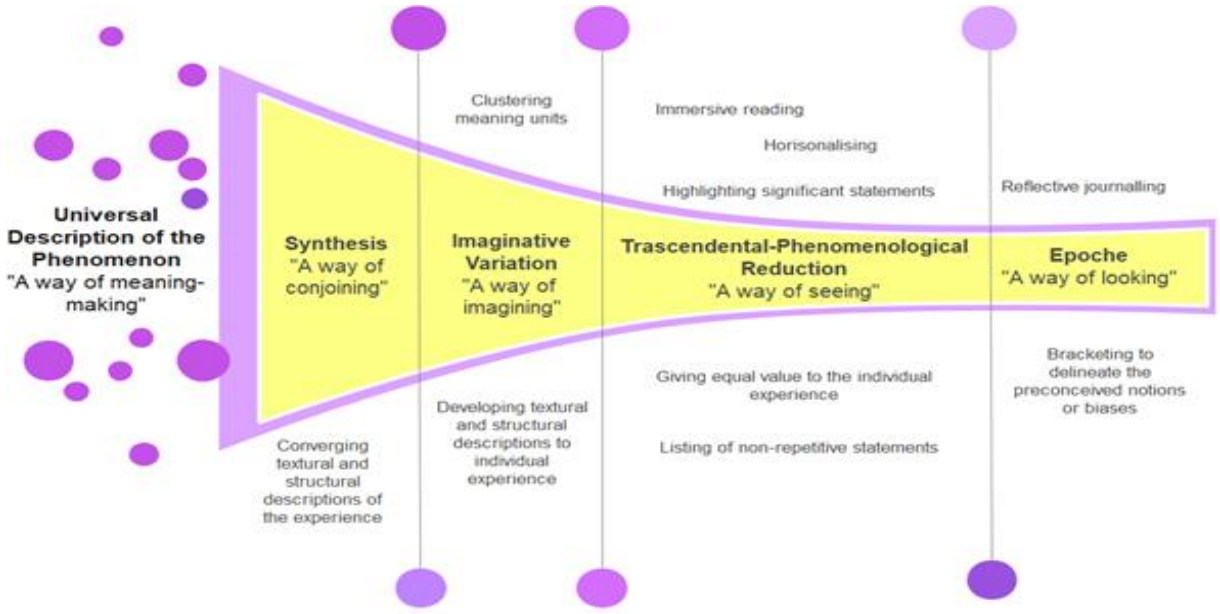

Figure 1. Modified Stevick-Colaizzi-Keen method

2.5 Rigor

The Rigor refers to the strength of the research design and the appropriateness of the method to answer the questions (Cypress, 2017). The choice of transcendental phenomenology fits well owing to the study design that illuminated the meaning and essence of students' experiences with a fresh eye and open mind. Bracketing was also performed to critically reflect on researchers' possible preconceived ideas and biases through journaling before data collection. Each student's responses were consolidated that yielded thick, full, dense, and saturated homogenous descriptions of students' experiences from a systematic triangulation, including in-depth interviews and face-to-face conversations from one to two weeks. An audit trail was performed by each member of team who followed incessantly based on Moustakas's suggested coding process by reviewing the raw data, transcribing the narratives, listening to each of the participant repeatedly to become familiar about the individual experiences and different perceptions. This resonates phenomenological process of epoche, by reading line-by-line while listening to the audio-recorded tape of each interview.

A second interview was conducted after the transcriptions of the narratives were performed to validate the raw data. Also, in the phenomenological reduction process. The researchers were receptive to every statement of the co-researcher's experience, granting each comment equal value. Statement that was reviewed by each researcher formed part of the horizontalization of the data where the statements that referred to the phenomenon investigated, were lifted out from the transcript and recorded on a separate piece of paper while the researchers reflected on the following questions: Does it contain a moment of the experience that is a necessary and sufficient constituent for understanding it? Is it possible to abstract and label it? (Moustakas, 1994, p. 12).

Th reduction process entails the invariant horizons, or meaning units, were gathered to form core themes for each of the participants in this study. The individual textual descriptions give what of the experience in a transcendental phenomenological study that conveys the unique meaning of the phenomenon investigated. After which, the composite textual descriptions were culled from the individual textual descriptions by reviewing the invariant meanings and themes of every co-researcher. The individual textural descriptions were synthesised so that a synopsis of the experiences could be created in the form of composite textural descriptions towards the amalgamation of the composite textural and structural descriptions that offer a whole meaning and form the essences of the experiences (Moustakas, 1994).

Finally, each member of the research team met for the final consolidation of the meaning and essences of the experiences culled from what they derived from each narrative that were transcribed, read line-by-line, and consolidated the commonalities, similarities, and differences. From this audit trail, the records are kept regarding what was done in an investigation. and member check to ensure that findings were based on key informants' responses instead of the researcher's preconceptions and biases. The themes derived from the responses were reviewed by each key informant (Creswell, 1998; Lincoln & Guba, 2000). This audit trail, helps the researchers to maintain and demonstrate reflexivity, improve the rigor and transparency of the transcendental phenomenology approach (Lincoln & Guba, 2000; Moustakas, 1994).

2.6 Ethical consideration

The research ethics committee reviewed and approved this study from an accredited private higher education academic institution (St. Dominic College of Asia [SDCA03302020]). Upon approval, the researchers discussed with the Dean, Registrar's Office, and designated course faculty about the study and requested the student list. Each eligible student identified as the key informant was given an invitation indicating the purpose of the study. The researchers explained voluntary participation to each student who may partially or completely withdraw from the study. The researchers protected the identity of all the key informants by using codes (e.g., Student Nurse ID Number: SN-ID01), and no other identifiable information was collected. During the data presentation, all data were aggregated and combined prior to its thorough analysis.

3. Results

3.1 Participants' profile characteristics

The results indicate that all participants belong to age groups of 26-30 (n=30, 100%), female with 66.7% as compared to the male with 33.3% (n=10). Moreover, in terms of academic status, a majority were enrolled full-time with 80% (n=26) as compared to those students who were part-time with 20% (n=6) and have completed (n=30) and passed their nursing research course (n=30).

3.2 Explicated meaning units or themes

This qualitative study facilitated the acquisition of data allowing the researchers to illuminate the essence by aggregating students' experiences of undergraduate research supervision. Thirty-nine significant statements were identified and clustered into meaning units or themes from the students' narratives. Each statement was given equal importance to understand the nature and meaning of the experience. This process, called horizonalization, allows rhythmical flow between the research participant and researcher.

Three major themes emerged, namely (a*) re-capturing tripartite challenges in doing research,* (b) *re-cultivating quintessential requisites in doing research, and* (c) *re-envisioning the future ahead—the Aha moment in doing research.* Each major theme consists of three subthemes.

Undergraduate research supervision offers an array of opportunities to amplify their involvement and engagement in any forms of scholarly inquiry that strengthens their level of competence when they become nurse clinicians. However, to facilitate the assimilation of undergraduate students' understanding on research, it is imperative to recapture the multipronged challenges that may have significant influence while the students are completing their research projects. Based on the students' narratives, there are challenges that hamper their continuance in the conduct of their research. These challenges could be related to the students, teachers, and the institutional factors.

3.2.1 Theme 1: Re-capturing tripartite challenges in doing research

The first theme illustrates the students' challenges (e.g., student, supervisor, and school).

> *Undergraduate research is very challenging. Imagine the process is like finding a needle in a haystack. Each step requires an output. There were also issues with each member of our group. We were fortunate to be supervised properly. Our supervisor helped us understand the step-by-step process we needed to know. But sometimes, she couldn't meet us due to other school functions that she needed to attend. Also, we need more resources like the electronic databases the school should provide. [SN-ID01]*

3.2.1.1 Student factor

The students find it challenging to engage themselves because of the stories they heard from other students. Some stories brought fears, anxieties, or frustrations, especially for those students who recently started research projects. Some felt inferior because they believed doing research would be a stand-alone process without supervision.

> *I was scared because of what they said [doing research is toxic]. It was an anxiety-producing activity. It was my first time. I know [for myself] I am not smart. I felt I had nothing to offer my group, which made me more anxious. [SN- ID29]*

> *Hearing other students, especially our seniors who completed their research projects, mention that it was scary because you must do it yourself. Also, I was a new student back then [. . .], and I had difficulty adjusting to the new environment and [be part] in a [new] group. [SN-ID30]*

Some other students could not catch up with other course requirements. The innumerable activities required for submission caused anxiety, fear, and disengagement. There was also stranger anxiety, considered an adjustment burden.

> *[Teary eyes] I felt demotivated because of [hmm...] I could not catch up with my other subjects' requirements. Sometimes, I care less and am absent during group discussions because I have so much on my plate! While I was looking at every member of our group, I also felt their frustrations. [SN-ID13]*

> *I felt deprived because some other subjects were much more toxic than expected. Our group wanted to focus on the research project. We just divided the tasks and met if time permits. [SN-ID01]*

3.2.1.2 Supervisor factor

Another factor that surfaced from the narratives was the supervisors' unpreparedness during meetings and the students' insufficient feedback.

> *Sometimes, our supervisor was unprepared [perhaps] due to work-related. As a result, we often received insufficient feedback about our work. [SN- ID12]*

> *Whenever the group wanted to meet our supervisor, we felt she wasn't prepared. She kept asking to send the file from time to time [but] in the end; she couldn't give good feedback. [SN-ID02]*

Moreover, the students felt that traditional face-to-face was no longer effective during meetings. Some students preferred to have a web-based platform.

> *The traditional face-to-face meetings were not effective [or] unnecessary, given that we also have some other course requirements to finish. We can use several online platforms, including Facebook Messenger, Microsoft Teams, Zoom Meeting, or Google Meet. Nonetheless, we appreciate the time we spent with our supervisor. Gosh! We are now in a techy world, so we better find ways. [SN-ID04]*

3.2.1.3 School factor

Students conveyed that the school should provide a more robust and comprehensive electronic database to extract relevant sources. Some students encountered limited resources during the literature review or finding studies to support their research projects.

> *Undergraduate research requires support from the school, especially reading resources. However, resources are limited. We visited some other nearby libraries and thanks [internet] for online resources that helped us harvest tons of information relevant to our study. [SN-ID04]*

> *It was difficult to look for literature, either primary or secondary sources, because of the limited information we could get from the library. I know that most sources should be from reputable online databases. Our school needs this [badly]. [SN-ID25]*

After the challenges have been identified, the next process is to identify various ways on how the quintessential elements in doing research may be cultivated. Those challenges that are reflected in the students' experiences can be addressed through an open dialogue (i.e., supervisor-student). By doing so, the students can regain their motivation and become more engaged, committed, and responsive until they have reached their momentum towards the completion of their undergraduate research. A constant and open dialogue elicits openness to learning-by-doing that resonates the learning process dynamics. Moreover, to cultivate the students' engagement in doing research, the learning environment must also be cultivated ensuring that it becomes a hub that invites learning assimilation.

3.2.2 Theme 2: Re-cultivating quintessential requisites in doing research

This themes consists of three sub-themes: re-enriching supervisor-student dialogue, re-weaving openness to learning-by-doing, re-harnessing supportive learning environment. Students felt a deep-seated psychological reward in the research project completion, apart from an appreciation for new knowledge. Students narrated:

> *A supervisor who helped with our journey in completing our research is [something] that I value most. More so, the process was welcoming. I felt appreciated for what I contributed to our group. [SN- ID01]*

> *Having a great feeling when someone encourages you [our supervisor], you would not feel the pressure [but] instead, and you will enjoy every step until you complete it. The experience gave me a sense of wholeness because I [our group] may have contributed something worthy to nursing […] future profession! [SN- ID21]*

3.2.2.1 Re-enriching supervisor-student dialogue

Students emphasized the importance of the supervisor-student dialogue as reflected in the following transcripts:

> *Having a supervisor from the very start helped us better understand the process and address any issues we may face. I liked it most because every time we had a schedule with her, she always asked,' How can I assist my co-learners?' [SN- ID21]*

3.2.2.2 Re-weaving openness to learning-by-doing

The hands-on experience boosts the students' morale from the activities that value their worth as students.

> *[Our] supervisor provided us with directions and monitored the progress of our paper. The words of encouragement helped us become more inspired as beginning researchers. We became more open to suggestions or even constructive criticisms. [SN- ID15]*

> *Our supervisor directs us but never commands what she wants for the paper. I felt she trusted us [our group], which was the most important part of being supervised. We learned while we were guided by doing all the relevant activities in completing our project. [SD-ID18]*

3.2.2.3 Re-harnessing supportive learning environment

A supportive learning environment becomes an ingredient of success in sustaining students' motivation

> *When I felt supported either by other group members or our supervisor, I became more engaged and motivated. [SN- ID05]*

> *In studying the first part of Nursing Research during our first semester, I thought it was easy when our professor discussed it. However, I realized it was not easy during the conceptualization and empirical phase. We were thankful to our supervisors and other faculty members for being willing to share their knowledge and support in all possible ways. [SN- ID29].*

Undergraduate research is more than an opportunity and should also be considered as a gateway where the students begin a new perspective looking at their future roles as nurse clinicians, nurse administrators or nurse researchers. The future of nursing is volatile, uncertain, complex, and ambiguous. In this regard, supervision opens a panoramic lens where the students appreciate more the relevance, significance and impact of research on their future practice.

3.2.3 Theme 3: Re-envisioning future—The AHA moment in doing research

Undergraduate research remains challenging to many students. However, students become motivated, involved, and empowered when they appreciate the relevance of doing research. They also realize that nursing practice is anchored on evidence, research, or theory, making them feel they need to be more practice-ready after completing their research.

> *After graduation, there will be no professors, clinical instructors, or supervisors. It will be my [own] battlefield to win. The experience made me realize that as a future nurse, doing research must be threaded into practice. Our supervisor was very eager to make us realize this for our future as nurses. [SN- ID30]*

> *Through this research experience, I am ready to be a nurse with a passion for knowledge and a commitment to improving my chosen vocation. If the hospital asks for a nurse researcher, I will be part of it [...that group] because our supervisor has taught me valuable lessons and a passion for researching. [SN-ID14]*

3.2.3.1 Re-living the purpose of the profession

Undeniably, undergraduate research also cultivates a student's sense of purpose in why they chose to be nurses.

> *[Hmmm] who knows, after completing this subject [nursing research] and our research project with our professor and supervisor's help, we would produce something worth publishing [...] something [that is] worth sharing. Our group [and I personally] felt like being reborn with a clearer purpose for why we chose to nurse. We are the future*

instruments to advance the practice to sustain its uniqueness as a profession and a vocation. [SN- ID20]

3.2.3.2 Re-imbibing sciencing nursing

Students must pass science courses (e.g., anatomy, chemistry, microbiology, physiology, and behavioral sciences (e.g., psychology and sociology). Understanding these core sciences is a sine qua non to nursing. Students felt the connection between those subjects and nursing, which help them understand more about nursing scientifically and holistically.

While reflecting on my experience towards the end of our project implementation, all other knowledge from our past courses made me realize that everything [all subjects, I mean] is integrated. I thought those subjects were not necessary [but later], and I fully realized they had something to offer, which made the process scientific and whole [SN-ID01]

I realized from my experience while doing our research—science and innovation are two interlocking words. People crave something new that could lead to change. As part of the research, science sets out something new and stimulates people's interest—we learn to innovate [and] we learn to integrate scientific and innovative ideas. Is there a word such as 'sciencing,' Sir? [or] Sciencing in Nursing? [SN- ID24]

Our future practice entails evidence-, research- or theory-based approaches. I realized this as our group from the time we were completing our literature review, and it opened my mind to different sources of information or worldviews [SD-ID30]

3.2.3.3 Re-thinking caring

Nursing is both a science and an art. When applied together, the science-art nexus is a force that makes nurses more efficient and effective in a very compassionate way. With this, undergraduate research in nursing must continue to highlight both domains while reinforcing awareness, dialogue, and understanding of caring-in-research or caring research in nursing. Students narrated the importance of caring in undergraduate research.

Our supervisor included the concept of caring from the start of our research project. It all started by asking what nursing is, what a nurse does, and how a nurse should think. I realized that I must strengthen my understanding of caring. Although it is a ubiquitous concept, as I read in other articles, caring makes nursing unique. Nurses' work is all about caring. Nurses should always think about caring and research caring to improve the caring process in all nursing situations. [SN- ID26]

Our group conducted a study on students' understanding of caring. We found that students have a different understanding of caring [different views or lens], but what was concluded in our study, caring is inherently manifested in all facets of nursing students' life [the way they think and act and how they perceive the world]. At first, I thought students [just] wanted to finish their degree and work abroad for higher-paying jobs, but I was wrong. Although I am not an expert, caring research should find its place in many schools. [SN-ID29]

3.3 The textural and structural descriptions

The themes were synthesized to illuminate both textural and structural descriptions. The textural description refers to the '*what'* of the experience (Moustakas, 1994). This study describes undergraduate research as "a challenging endeavor among the students—*like finding a needle in the haystack* [...]. *A life without a supervisor is like a seed that never grows"* [SN-ID01]. Students described it as *"a bridge that connects and reconnects the known and unknown"* [SN-ID30], *"shedding light on shadows"* [SN-ID19], or "*like a mountain summit"* [SN-ID12].

On the other hand, the structural description refers to 'how' feelings or thoughts are threaded into the experience. Undergraduate research epitomizes the "mutual exchange of novel and creative ideas essential in advancing our nursing knowledge" [SN- ID20] through "a dialogical process" [SN-ID13] between the supervisor and student. Also, it is described as an aid to

"*critically reflect on various nursing situations relevant to practice* [SN-ID16], "*a glue that strengthens science-art of nursing through participatory-in-action in doing research*" [SN-ID 18] and *illuminating caring as an essential element of nursing while doing research* [SN-ID01]".

3.4 The essence of the lived experience

Moustakas (1994) highlights that intuitive integration derived from the textural and structural description captures the essence attributed to the experience. Undergraduate research supervision resonates with the mutual exchange of novel ideas in a dialogical encounter, collective learning, and participatory-in-action where sciencing and caring thinking is imbued to develop critical inquisitiveness and caring intuitiveness where science and caring converge to advance the practice of nursing (Figure 2). Although the students described themselves as neophytes in research, the embodied supervisor-student dialogue taught them to be critically inquisitive and caring intuitive. Undergraduate research supervision enhances the students' research capacity to face a challenging real-life practice, advances their knowledge, builds a strong fulcrum in their practice, and articulates their inherent caring attributes towards patient care.

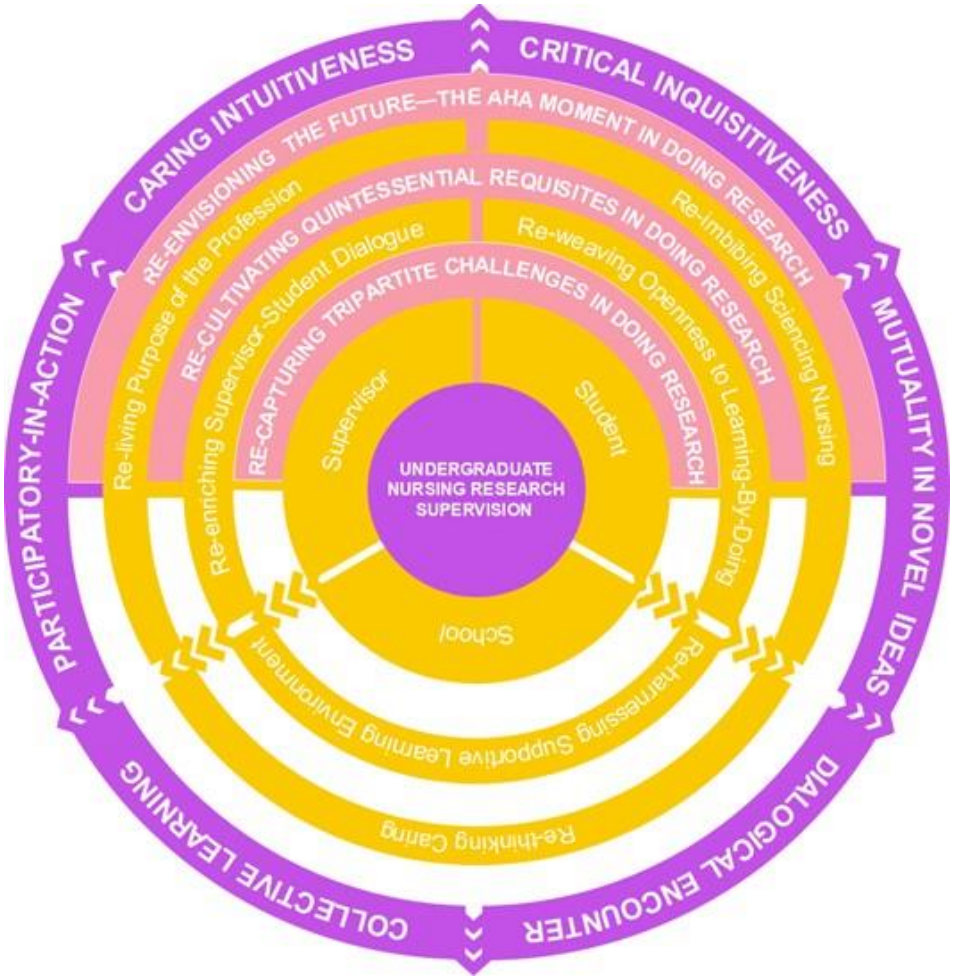

Figure 2. The undergraduate research supervision model derived from the students' lived experiences.

4. Discussion

Many studies defined effective supervision of undergraduate research from various academic fields (Eydgahi, 2019; Kain et al., 2014; Malotky et al., 2020; Mendoza & Golden, 2019; Tan, 2007; Vessey & DeMarco, 2008; Voelkel et al., 2018), but little is known about nursing (de Jong et al., 2018; Malinski, 2009; Slattery et al., 2016). This study is the first of its kind that explored the nursing students' lived experiences of being supervised with their research projects within the Philippine context. Based on consolidated students' narratives, undergraduate research

supervision resonates with a mutual exchange of novel ideas in a dialogical encounter, collective learning, and participatory action where sciencing and caring thinking is imbued to develop critical inquisitiveness and caring intuitiveness to advance the practice of nursing. This definition offers a fresh eye from the students' lens where science and caring converge. In other words, undergraduate nursing research must capture empirical knowledge and caring perspectives where supervision should be grounded.

Moreover, this study illustrates the three themes. The first theme—*re-capturing tripartite challenges in doing research* describes various issues students encountered while completing their research (e.g., student, supervisor, and school). Hearing about the past experiences of those who completed their projects conveys negative connotations for the student-related factors. Students told about the' toxicity' associated with the research undertaking that led to anxiety, fear, or disengagement. Students may seek advice or help from others to hear both stories. Student organizations can be formed, such as a journal club that aims to support students who have difficulty adjusting to the demands of doing research. Also, self-help groups may boost students' confidence. The findings of Campillan (2019) supported our study findings. Students had challenges on time, the absence of research partners, and personal issues. These challenges may have been attributed to students' difficulties, such as research problem formulation, literature review writing, sampling methods, research instruments, transcriptions of interviews, video production, coordination, and plagiarism processing (Liou et al., 2013).

Another significant result described in this study was the overarching demands of doing research and overlapping student requirements in another course, including homework, paper presentation, and examinations. Students who engaged longer hours doing their homework in school experienced more academic stress, physical health problems, or lack of balance in their lives (Liou et al., 2013; Taraban & Logue, 2012). Undergraduate research can be offered during the fourth year of the baccalaureate program while completing their intensive clinical practicum. Since students are in clinical settings, they may become more adjusted and focused on doing research. Moreover, this approach can help them fully immerse themselves in client care and understand every nursing situation. Their research becomes more patient-focused and care-driven, which resonates with real-life practice.

In doing research, supervisors and schools should understand the sequential stages that students undergo in doing research. Tan (2007) described these undergraduate research stages. Firstly, the *Groping Stage,* where the students felt insecurities, fears, and other challenges at the start of the research endeavor. Secondly, during the *Developing Stage*, students had mixed experiences such as confusion, exhaustion, motivation, inspiration, nurture, frustration, and humanization. Thirdly, *Accomplishing Stage,* students experienced fulfillment with excitement and frustration. In this regard, supervision must also consider the psycho-emotive experiences of the students in every facet of doing research. Through storytelling, self-awareness or self-reflection can be initiated at the early and later stages. In so doing, it can encapsulate the wholeness of the students' experience.

On the other hand, supervisor-related factors surfaced from the transcripts (e.g., unpreparedness and insufficient feedback during advising. The ineffectiveness of traditional face-to-face meetings was also evident. These findings concur with one of the studies conducted at a private university in the Northern Philippines. Results indicate that most faculty have little knowledge in conceptualizing a research problem, study design, and authoring academic papers associated with mentoring (Gacrama & Baptista, 2019). Limeri et al. (2019) described negative mentoring (i.e., absenteeism, abuse of power, interpersonal mismatch, lack of career support, lack of psychosocial support, misaligned expectations, and unequal treatment). Other factors that led to dissatisfaction or disengagement include limited funding, faculty buy-in, inadequate student experience, unequal access to resources, varying cultures, and diverse practices (Perrella et al., 2020). Also, the negative experiences contributed to high attrition, withdrawal, and intent to leave the education institutions (Harrison, 2006; Liou et al., 2013).

With this, the supervisor and school should support their students by employing a centralized infrastructure with a wide range of opportunities for the supervisors and students—for instance, timely research capacity building to cultivate teaching-learning outcomes and enhance institutional reputation. Also, funding should be provided to financially constrained students since all research projects from start to end require out-of-pocket contributions (e.g., printing, communication, logistics, thesis panel incentives, food during the proposal, and final defense).

Another opportunity that can be provided is student involvement in participatory health research to develop critical awareness and understanding of real-life situations affecting nursing practice (e.g., professional care, education, or civil society) (de Jong et al., 2018).

Alarcon et al. (2019) added that students could be provided valuable research opportunities using interactive strategies such as follow-up lecture series, research seminars, and research meetings. Also, long-term projects may broaden students' knowledge of their coursework, understand how research groups operate, and enable active students to develop deeper linkages early with research professors and students. A simple structural change is to create a *dean's list* for students published in journals or presented at conferences every semester. Students who participated may earn academic credit in every publication and incentives. Alarcon et al. (2019) recommend *class deloading credit* to address time constraints, overlapping teaching workloads, and faculty shortage. The nursing education institutions in the Philippines can learn from other countries best practices. For instance, Boston College introduced the Undergraduate Research Fellow Program (UGRF) to help students develop a research skill set. Also, an undergraduate research assistantship may provide students with hands-on experience to appreciate research value (Mitchell et al., 2020). Alarcon et al. (2019) assert that an Overseas Research Mentor Program can be introduced to achieve two aims: student mentorship and a research partnership. In this approach, local and international faculty supervise students, which may help establish best practices in mentoring while building academic partnerships with international higher education institutions. Sethares and Chin (2020) recommend using innovative learning activities such as music or popular songs to complete qualitative analysis in a research course.

The second theme—*re-cultivating quintessential requisites in doing research* conveys the most salient ingredients of effective undergraduate supervision. Students appreciated the new knowledge they acquired while doing their research from being supervised. Supervision from an expert in the field is a proactive method of exploring new ideas that enhance dialogue. When sustained, supervision contributes to student development in pursuit of scholarly inquiries. Students must be recognized as co-researchers or co-partners, making the experience interesting, rewarding, and enjoyable (Davis & Jones, 2020; Mendoza & Golden, 2019; Voelkel et al., 2018). Such experience opens multiple possibilities and broader perspectives about real-world issues concerning the practice locally and internationally, where students become more open-minded and pursue their learning-by-doing. Moreover, an evidence-based and experiential supervision framework can be developed for a more supportive learning environment.

The third theme—*re-envisioning the future — the AHA moment in doing research*, articulates that undergraduate research instills preparation for what is ahead once they become professional registered nurses. Students involved in undergraduate research reported more significant enhancement of cognitive and personal skills, higher engagement, increased academic success, greater satisfaction with their education, and confirmation of future career plans (Perrella et al., 2020; Wheeler et al., 2008). Also, it allows the students to fully immerse in the multifaceted research processes and become more committed to evidence-, research- or theory-based practice as future nurse scientists (Mitchell et al., 2020). Moreover, students will approach the practice-related problems holistically, validate their assumptions, construct arguments supported with insights, present their thoughts logically, and invoke awareness of evidence-based practice (de Jong et al., 2018). These attributes describe *Sciencing Nursing,* where students integrate research evidence, enhance clinical expertise, and value patient preferences anchored on science threaded into the nursing practice.

Findings show from other sources that nursing education focuses on clinical psychomotor skills acquisition, limiting students' understanding of nurse scientists' vital role in advancing nursing practice (Burkhart & Hall, 2015; Mitchell et al., 2020). Although students are expected to be more skillful at providing safe, effective, efficient, and quality patient care, caring must also be imbued in every aspect of their practice. As a result, students will be fully equipped to balance empirical, personal, and esthetic knowledge unique to nursing. Supervisors and schools must emulate caring in educational practice, including undergraduate research supervision. This situation becomes critical because caring is a ubiquitous concept and defined in various health or caring professions. Still, caring remains unique and distinct to nursing (Boykin et al., 1994; Boykin & Schoenhofer, 2001; Tuppal et al., 2019). In this regard, students and their supervisors should explore topics on caring. Various methodological approaches can be taught, such as creative review and synthesis, philosophical inquiry, videography, video analysis, storytelling,

photovoice, feminist-driven approaches, critical-reflective lens, ethnotherapeutic empathy, caring inquiry, and phenomenological, among others. These approaches can intensify caring research that embodies human science and caring science perspectives (Lea & Watson, 1996; Malinski, 2009; Tuppal et al., 2019; Wolf et al., 2014).

Undeniably, undergraduate research is a promising journey for students, supervisors, and schools. Supervision is a life-changing process. They cultivated evidence-based inquiry, novelty creation, and caring intuitiveness when both resonated. For this reason, it is imperative to facilitate student engagement, involvement, and participation in research that does not focus on academic fulfillment but also as co-partners. Hence, the so-called borderless learning environment is achieved to the fullest and develops future-ready nurse scientists or caring scholars responsible and committed to advancing nursing practice, science-art nexus, and a more value-laden discipline.

5. Implications and limitations

The undergraduate supervision contributes to the cultivation and nurturance of the students. The baccalaureate program in nursing although offers wide array of knowledge, research has been integrated into the curricular nomenclature ensuring that each student values and will continue to value of knowledge development, knowledge management and knowledge synthesis. Although several studies have been conducted about undergraduate research supervision, there is a limited number of studies owing to the nursing education. Hence, this study provides new insights for the future of nursing education and future of nursing students.

The only limitation about this study was the locale. In the Philippines, almost 400 nursing schools offer baccalaureate nursing programs with varying classifications (i.e., public, private, and non-sectarian), ranking, or performance, which may elicit different students' experiences. However, to address this limitation, researchers ensured that the study meets certainty in the findings' generalizability, which is augmented by the high level of constancy in the carefully analyzed results. Through this approach, the researchers collected data highlighting the students' experiences and, in turn, gathered these experiences and generated generalized meanings. The high consistency of key informants' responses implies that experiences are consistent and relevant to other student undertakings.

6. Conclusion

The students' narratives highlighted a need to address student-, supervisor- and school-related factors that may significantly impact a successful undergraduate research experience. Effective supervision is facilitated through dialogical encounters, learning-by-doing, and a supportive learning environment. The so-called AHA moment imbues how the process cultivates deeper meaning about the nursing profession's purpose while recognizing scientific knowledge and caring intuitiveness. Hence, from the students' lived experiences, undergraduate research supervision resonates with the mutual exchange of novel ideas in a dialogical encounter, collective learning, and participatory action where sciencing and caring thinking is imbued to develop critical inquisitiveness and caring intuitiveness further.

Future studies with students enrolled in a nursing research course should describe and explore their experiences in each phase of the research process (i.e., conceptualization, planning, design, empirical, analytical, and dissemination). Both local and international students may be included from registered schools and colleges of nursing in the Philippines. Future studies will involve supervisors, course faculty members, and administrators. Lastly, a creative synthesis of the findings from qualitative studies may shed light on developing an emerging model, paradigm, or theory of undergraduate research supervision anchored on human science or caring science perspectives.

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Author contribution

All authors contributed to the design and the analysis of the results and the manuscript's writing. CT and AN conducted the interviews. All authors reviewed and approved the final version of the manuscript.

Conflict of interest

There is no conflict of interest among authors.

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ORIGINAL RESEARCH

Assessment of Entrepreneurial Leadership among Undergraduate Nursing Students: The Case from Thailand

Chawapon Sarnkhaowkhom[1], Siriporn Santre[1], Payao Phonsuk[1], Nathatsanan Wongtawee[2], Siriwimol Piansamer[2], Ajjita Laohapisitpanich[2], Wiyada Suriyalerd[2], Natthakarn Supapote[2], Thunyathon Kaewmuean[2], Napakaed Hosangon[2], Siriphorn Mathaworn[2], Parichat Phikunthong[2]

[1]*Department of Health Education and Behavioral Sciences, Faculty of Public Health, Mahidol University, Bangkok, Thailand*
[2]*Faculty of Nursing, Saint Louis College, Bangkok, Thailand*

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Corresponding Author:
Siriporn Santre
Department of Health Education and Behavioral Sciences, Faculty of Public Health, Mahidol University, Bangkok, Thailand
Email:
siriporn.sar@mahidol.ac.th

Abstract

Background: Entrepreneurial leadership is the becoming concept in health, social sciences, business, management, and education that can influence and direct the performance and achievement of either staff or organizations. Unfortunately, entrepreneurial leadership has received limited attention in healthcare fields, especially nursing.
Purpose: This cross-sectional study aimed to explore entrepreneurial leadership and examine its associated factors among undergraduate nursing students.
Methods: A cross-sectional study was conducted among 410 nursing students who were recruited using a simple random sampling strategy. The data were collected using an online self-reporting survey and analyzed using descriptive statistics, Chi-square test, Fisher's exact test, and multivariate logistic regression analysis.
Results: This study's results revealed that most nursing students generally have entrepreneurial leadership at a high level (Mean=4.04, SD=0.49). The factors significantly associated with entrepreneurial leadership among the undergraduate nursing students were the level of study year class and parental income (p<0.05).
Conclusion: This study proposed critical factors influencing entrepreneurial leadership among nursing students and recommends that entrepreneurial characteristics and approaches be utilized to improve all educational aspects among undergraduate nursing students. Nursing students must learn, train, and practice entrepreneurial leadership for the development of professional skills, abilities and initiation of innovation.

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1. Introduction

Entrepreneurs are now widely acknowledged as the primary force behind economic development and prosperity in developing and developed countries (Hamdan et al., 2022). Entrepreneurship also involves many significant aspects, such as increased production, productivity, level of income, healthcare system improvements, education advancements, and technological developments (Kaya et al., 2017). Universities mainly produce young people and student entrepreneurs who can drive the economies of their countries (Salamzadeh et al., 2014). Education is crucial in creating a more entrepreneurial mindset in young people, since it enables people to improve their entrepreneurial skills and develop positive attitudes toward entrepreneurs, which benefits society more than just starting new businesses. Furthermore, entrepreneurship has been considered a practical solution to some societal problems, such as the rising rate of youth unemployment (Yang, 2017). According to the pieces of literature, students' decisions to become entrepreneurs are significantly influenced by their entrepreneurial behavior. In several countries, students are becoming more interested in entrepreneurship or are attempting to establish their businesses rather than working for others and are considering starting a new business as a planned career path (Kirby & Ibrahim, 2011; Suyudi et al., 2020).

Entrepreneurial leadership exists at the intersection of entrepreneurship and leadership. Entrepreneurship is the process through which people identify and pursue opportunities and put

useful thoughts into action. These roles need innovation, determination, and a willingness to take risks. Entrepreneurs have a strong sense of self-motivation, are persistent risk-takers, and are self-reliant (Barba-Sánchez et al., 2022). Leaders are often recognized for their constant learning behaviors that enable them to maintain and accomplish their goals (Villaluz & Hechanova, 2019). Leadership generally involves directing an organized group's actions toward achieving purposes. Passion, vision, concentration, and the capacity to motivate people are necessary for leadership (Kaya et al., 2017; Barth et al., 2007).

Entrepreneurial leadership is the influence and direction of team members' performance toward the achievement of organizational goals, which involves finding and capitalizing on entrepreneurial opportunities (Gupta et al., 2004; Renko et al., 2015). Entrepreneurship is a concept that is becoming increasingly relevant in the health and social care sectors, but the scope of its potential in nursing has not been well recognized until now (Boore & Porter, 2011). Education must develop flexible, innovative people with an entrepreneurial mindset who are capable of problem-solving (Salamzadeh et al., 2013). Nursing education incorporates administration and management and should ensure such skills. Nurses' leadership roles also constitute a chance to spread entrepreneurial culture in diverse sections of professional activity, such as intrapreneurship, social entrepreneurship, or even business entrepreneurship (Colichi & Jiménez, 2020). Nurses engage in social entrepreneurship when they want to promote social change in the workplace. Intrapreneurship refers to nurses who are motivated by the development of the company or organization with which they work. The autonomous practice of nurses, such as in clinics for treatment, home care, and private business, is classified as business entrepreneurship (Arnaert et al., 2018; Jofre et al., 2021). Nurses may have used entrepreneurship to improve the healthcare process and increase the nursing profession's recognition and social position (Copelli et al., 2017). Entrepreneurship plays an important role in modern nursing responsibilities and duties (Vannucci & Weinstein, 2017). Being an entrepreneur in nursing requires investing gradually in the development of a professional culture focused on entrepreneurial activities, particularly in the areas of knowledge, skills, and attitudes (Richter et al., 2019). With rapidly advancing medical and technological developments, as well as capital constraints in the face of nursing entrepreneurship, now is the time to focus on nursing entrepreneurship (Kirkman et al., 2018). Thus, the need to invest in scientific research on nursing entrepreneurship, particularly in the entrepreneurial leadership of nursing students, is highlighted (Copelli et al., 2017).

Since entrepreneurship has grown in significance recently, developing the skills, mindsets, and behaviors in adolescents that will enable them to seize opportunities is one of the most critical challenges confronting all economies. Personal competency, managerial competency, proactive competency, and technological competency are the four characteristics of entrepreneurial leadership among college students (Putsom et al., 2019). Interestingly, in many countries in recent years, there has been a substantial and increasing student interest in entrepreneurship (Kirby & Ibrahim, 2011). However, several empirical studies have been undertaken in some regions (for example, the United States, Canada, and the United Kingdom), whereas many other countries remain uninvestigated. Students' entrepreneurial leadership remained unanswered (Salamzadeh et al., 2014). Moreover, entrepreneurship topics have received limited attention in undergraduate healthcare curricula (Richter et al., 2019). Entrepreneurship topics have received little attention in undergraduate medical or health curricula, and no consensus exists on how to best effectively implement them into health training (Chan et al., 2021). Therefore, this study aimed to explore entrepreneurial leadership and examine factors associated with entrepreneurial leadership among undergraduate nursing students.

2. Methods

2.1 Research design

A cross-sectional study was employed to explore entrepreneurial leadership and examine its associated factors among undergraduate nursing students. This research design is the appropriate design to meet the purpose of this study.

2.2 Setting and samples

This study was conducted in a private university in Bangkok, Thailand, which provides education in healthcare fields, especially nursing sciences, either undergraduate or graduate level.

The samples of this study were the nursing students who were studying in the first to fourth year of the bachelor degree of nursing science (BNS) program during the 2020 academic year, able to communicate in Thai, and willing to participate in this research. The nursing students who were undergoing the exchange program, being on academic leave, and not enrolled in the 2020 academic year, were excluded from this study. The nursing students who were the samples of this study were approached by the main researcher through a personal meeting for their participation.

Simple random sampling was applied to recruit the participants from the study population of 539 nursing students in the faculty of nursing where this study took place. The sample size was calculated using the G*Power software (Faul et al., 2007) from the effect size of previous research, which was 0.30 (Li et al., 2020), with a 0.05 alpha level and 0.80 power. In anticipation of the missing data or responses, the researchers increased the sample size by approximately 30%. Therefore, the total sample size of this study was concluded at 410 nursing students.

2.3 Measurement and data collection

The entrepreneurial leadership of nursing student questionnaire in this study was the Thai version developed by the researchers that consisted of 36 items with a 5-point scale from 1 = "I do not agree at all" to 5 = "I completely agree." The total score ranged from 36 to 180, with higher scores indicated higher entrepreneurial leadership. The entrepreneurial leadership of nursing student scale was not found in previous studies in nursing students and the Thai context before. Therefore, the researchers had developed this questionnaire to explore and assess entrepreneurial leadership among nursing students by applying the methods for scale development of DeVellis (2017), which consists of eight steps: (1) clarifying the constructs; (2) developing a pool of items; (3) selecting the format of measurement; (4) reviewing the pool of items by the expert reviewers; (5) including validation items; (6) administering scale to the initial samples; (7) evaluating the scale; and (8) optimizing the scale. The questionnaire was also developed by applying the concept of entrepreneurial leadership (Putsom et al., 2019) which is composed of four components: personal competency (8-items), managerial competency (10-items), proactive competency (10-items), and technological competency (8-items). The survey questionnaire in this study had five sections: (1) demographic data of the participants (e.g., gender, age, study year class, Grade Point Average (GPA), parent income, stipends, part-time working); (2) personal competency; (3) managerial competency; (4) proactive competency and; (5) technological competency.

All research instruments in this study were validated by three experts in the fields of nursing management and education by determining the Index of Item Objective Congruence (IOCs). The content validity of the personal competency; managerial competency; proactive competency, and; technological competency questionnaires ranged between 0.80 and 1.00, which means that these questionnaires are highly valid. The instrument was tried out with 50 nursing students to come up with the reliability of the instrument. The reliability of the research instrument was performed by applying the Cronbach's alpha coefficient method. The Cronbach's alpha coefficient of the entrepreneurial leadership of nursing student questionnaire was 0.85.

The data collection was a self-reporting survey by applying a Google form distributed through QR code scanning and social media platforms, e.g., Line application, from October to November 2020. Prior to data collection, the nursing students who were the samples of this study were approached by the main researcher through a personal meeting. They were informed about the aims of this study, risks and benefits, and consent of the willingness for research participation.

2.4 Data analysis

Data were analyzed using Statistical Package for the Social Sciences or SPSS version 21 (SPSS, IL, USA). Descriptive statistics, i.e., frequency, percentage, mean and standard deviation, were conducted to analyze the demographic data (e.g., gender, age, study year class, Grade Point Average (GPA), parent income, stipends, part-time working), while the association between demographic data and entrepreneurial leadership was analyzed using Chi-square test, Fisher's exact test, and multivariate logistic regression at the setting of significance level at $p<0.05$.

2.5 Ethical considerations

This study was conducted after approval of the ethical reviews from the ethical committee of Saint Louis College (Code: E.027/2563). Informed consent was obtained from all participants before participating in this study.

3. Results

3.1 Demographic characteristics of the respondents

A total of 410 distributed questionnaires were 100% returned to the researchers. As shown in Table 1, among 410 respondents, 97.8% were female. Most of them (63.3%) were aged between 20 to 24. Participants were almost equally distributed by study years. More than half (61.9%) got a high-grade point average (GPA) above 3.00. The parent income of half of the participants (49.3%) was 15,001-30,001. More than 40% of students get paid by their parents 4,000-6,000 Baht per month. Some of them (8.3%) worked part-time jobs

Table 1. Demographic data of the participants (n=410)

Demographic characteristics	Frequency (f)	Percentage (%)
Gender		
Male	9	2.2
Female	410	97.8
Age (years)		
15-19	123	30.0
20-24	260	63.4
25-29	18	4.4
Above 30	9	2.2
Study year class		
First-year	110	26.8
Second-year	101	24.6
Third-year	99	24.2
Fourth-year	100	24.4
Grade Point Average- GPA (Score 0-4)		
2.01-2.49	15	3.7
2.50-2.99	141	34.4
3.00-3.49	210	51.2
Above 3.50	44	10.7
Parent income (Baht/month)		
≤ 15,000	126	30.7
15,001-30,001	202	49.3
30,001-45,000	47	11.5
> 45,001	35	8.5
Get paid by parents (Baht/month)		
≤ 4,000	84	20.5
4,001 – 6,000	169	41.2
6,001 – 8,000	59	14.4
8,001 – 10,000	58	14.2
> 10,001	40	9.8
Part-time working		
No	376	91.7
Yes	34	8.3
Part-time jobs		
Restaurant workers	5	15.2
Convenience store staffs	2	6.1
Online sales	10	30.3
Bakers/Baristas	2	6.1
Others	14	42.4

3.2 Overall scores of entrepreneurial leadership components

The overall mean score for entrepreneur leadership components was 4.04 (SD=0.49), which was in the high-level category. Technological competency had the highest average score at 4.15 (SD=0.53), followed by managerial competency, personal competency, and proactive competency with a score of 4.06 (SD=0.52), 4.02 (SD=0.59), and 3.94 (SD=0.57), respectively, as shown in Table 2. Table 3 presented detailed scores of each entrepreneurial leadership component.

Table 2. Overall scores of entrepreneurial leadership components (n=410)

Entrepreneur leadership components	Mean	SD
Personal competency	4.02	0.53
Managerial competency	4.06	0.52
Proactive competency	3.94	0.59
Technological competency	4.15	0.57
All components	4.04	0.49

Table 3. Agreement scores of each entrepreneurial leadership component (n=410)

Components	Mean	SD
Personal competency		
I explore an opportunity for business	3.44	1.11
I make a good decision when encountering problems	3.97	0.71
I have the knowledge to deal with a problem	3.88	0.74
I set up the goal based on my knowledge and understanding	4.14	0.70
I always cheer up myself	4.22	0.70
I control myself to be disciplined to achieve the goal	4.18	0.73
I control my emotions/feelings when faced with anxiety, worry, or distress	4.07	0.75
I accept my feeling when solving problems	4.23	0.70
I explore the opportunity for business	3.44	1.11
Managerial competency		
I have a good view of myself and others	4.12	0.67
I use all intellectual skills in various tasks	4.09	0.69
I monitor and perceive myself well	4.13	0.71
I am optimistic	4.15	0.77
I help others with their capacity building	3.82	0.77
I act right	4.02	0.81
I can control myself	4.26	0.68
I can stand all problems	4.26	0.70
I am resilient to dynamic situations	4.19	0.73
I have specialized skills	3.56	0.85
Proactive competency		
I am open to all opportunities for changes	4.11	0.66
I seek all opportunities to achieve my goals	4.05	0.71
I can be flexible in all situations	4.07	0.74
I can adapt myself to all changes nowadays	4.15	0.70
If I run a business, I can make it grow with innovations	3.90	0.78
I am creative in innovations	3.61	0.87
If I run a business, I can make use of innovations	3.85	0.82
I have a business advantage when I am innovative	3.84	0.83
If I have a business, I can do business more easily when there is innovation	3.90	0.82
I easily develop a working system when there is innovation	3.94	0.78
Technological competency		
I can use the necessary technology	4.27	0.72
I can use technology for my business in the future	4.18	0.71
I have various knowledge of technology	3.90	0.78
I make use of technology to develop myself	4.11	0.73
I can be flexible when there is a new technology	4.13	0.74
I use technology in business development for future success	4.11	0.72
I use technology for communication	4.40	0.71
I make use of technology to solve problems	4.10	0.71

3.3 Factors associated with the total score of all four entrepreneurial leadership components

A Chi-square and Fisher's exact test were used to determine the significant factors associated with the agreement of the statement for entrepreneur leadership components. Based on an overall mean score of all entrepreneur leadership components, participants who chose options 4 and 5 scores were classified as agreeing, whereas those choosing options 1, 2, or 3 scores were classified as disagreeing in the statement. Two factors, including the level of study year class and parental income, showed a significant association with agreement of entrepreneur leadership components as shown in Table 4.

Table 4. Association with agreement on entrepreneurial leadership components among nursing students -univariate analysis

Characteristics		Level of agreement (%)		*p*-value
		Agree	Disagree	
Gender [a]	Male	55.6	44.4	0.908
	Female	53.6	46.4	
Age group (years) [b]	15-19	53.7	46.3	0.407
	20-24	52.7	47.3	
	25-29	72.2	27.8	
	Above 30	44.4	55.6	
Study year class [a]	First-year	54.6	45.5	0.009*
	Second-year	59.4	40.6	
	Third-year	39.4	60.6	
	Fourth-year	61.0	39.0	
GPA (score 0-4) [a]	2.01-2.49	41.2	58.8	0.258
	2.50-2.99	50.7	49.3	
	3.00-3.49	54.3	45.8	
	Above 3.50	65.9	34.2	
Parent income [a] (Baht/month)	≤15,000	43.7	56.4	0.035*
	15,001-30,001	57.9	42.1	
	30,001-45,000	63.8	36.2	
	>45,001	51.4	48.6	
Get paid by parents [a] (Baht/month)	≤4,000	50.0	50.0	0.630
	4,001 – 6,000	52.7	47.3	
	6,001 – 8,000	62.7	37.3	
	8,001 – 10,000	51.7	48.3	
	>10,001	55.0	45.0	
Part-time working [a]	No	54.3	45.7	0.420
	Yes	47.1	52.9	

[a]Chi-square was used to test for significant differences between component statement agreement
[b]Fisher's exact test was used to test for significant differences between component statement agreement
*Significant difference ($p<0.05$)

The results from a multivariate logistic regression analysis presented that students who were 25-29 years old, studying in a third-year class, had a high GPA of more than 3.50, and their parents' income was more than 15,000 baht per month, were significantly associated with the agreement on entrepreneur leadership components as shown in Table 5.

4. Discussion

This study aimed to investigate entrepreneurial leadership and its associated factors in the context of nursing students at college. The key findings revealed that the participating nursing students agreed with the entrepreneurial leadership components with an average score of 4.04, which was considered a high level of agreement. Furthermore, the highest score was found in the

technological component, with an average of 4.15. The factors associated with entrepreneurial leadership were the level of study year class and parental income (p<0.05).

Table 5. Association with agreement on entrepreneurial leadership components among nursing students - multivariate analysis

Characteristics	OR	SE	95% CI	p-value
Gender				
Male (reference)	1.00			
Female	0.92	0.67	0.22 - 3.84	0.913
Age groups (years)				
15-19 (reference)	1.00			
20-24	1.40	0.50	0.69 - 2.83	0.349
25-29	4.07	2.54	1.20 - 13.85	0.025*
Above 30	0.64	0.51	0.14 - 3.02	0.577
Study year class				
Year 1 (reference)	1.00			
Year 2	1.13	0.41	0.56 - 2.29	0.724
Year 3	0.40	0.17	0.17 - 0.93	0.033*
Year 4	0.95	0.42	0.40 - 2.25	0.914
GPA				
2.01-2.49 (reference)	1.00			
2.50-2.99	1.48	0.81	0.50 - 4.35	0.480
3.00-3.49	1.78	0.96	0.62 - 5.15	0.287
Above 3.50	3.36	2.13	0.97 - 11.63	0.056
Parent income (Baht/month)				
≤ 15,000 (reference)	1.00			
15,001-30,001	1.93	0.48	1.18 - 3.14	0.009*
30,001-45,000	2.58	0.97	1.24 - 5.39	0.012*
>45,001	1.60	0.65	0.72 - 3.56	0.251
Get paid by parents (Baht/month)				
≤ 4,000 (reference)				
4,001 – 6,000	1.09	0.31	0.62 - 1.90	0.775
6,001 – 8,000	1.53	0.58	0.73 - 3.21	0.259
8,001 – 10,000	1.18	0.45	0.56 - 2.47	0.669
>10,001	1.11	0.46	0.49 - 2.52	0.801
Part-time working				
Yes (reference)	1.00			
No	1.33	0.53	0.61 - 2.90	0.478

*Significant level (p<0.05)

This research is one of few studies assessing the entrepreneurial leadership component among nursing students in Thailand. Entrepreneurial leadership is seen as one of leadership behavior that inspires subordinates by creating a vision, wins subordinates' commitment, and is dedicated to discovering and creating strategic value (Pu et al., 2022). Nurses can develop entrepreneurial leadership for their working and critical thinking skills. A number of research has found a positive impact of entrepreneurial leadership on work behavior, idea exploration (Bagheri & Akbari, 2018), effective commitment, and tacit knowledge sharing (Pu et al., 2022), which all skills are crucial for nurses.

The findings also showed that technological competency in the entrepreneurial leadership components received the highest score. Compared to the other studies, our findings are consistent with the previous results. Prior research on the performance of medical students' entrepreneurship education revealed that entrepreneurial leadership components in the form of technological competency are the most frequently found in students (Long et al., 2021). Another study in Thailand also confirms the importance of technological skills as hard skills for entrepreneurial leadership among nurses (Udomluck, 2021). Technological competence refers to an entrepreneurial leader's ability to use diverse technologies. Student innovation, economic success, and organizational competitiveness all benefit from technological competency.

Furthermore, the healthcare industry is becoming more reliant on electronic communication and technology. Technologically competent students have been identified as critical to nursing education success, which is consistent with the previous studies (Ahmed & Harrison, 2021). Technological competencies are different from other competencies because they change over time. Technological competency promotes innovation, profitability, and successful business operations (Putsom et al., 2019; Edwards & O'Connor, 2011).

The findings from the multivariate analysis revealed that three variables, including the level of study year class, age group, and family income, have a significant relationship with the agreement of entrepreneur leadership components. This study found that study year class was associated with the proportion of agreement on entrepreneur leadership components, especially for students in the third-year class who have a lower association on the agreement on entrepreneur leadership components when compared with the first- and second-year students. Our findings, however, were in contrast with previous research. A study from Brazil indicated that students in more advanced years perceived higher scores on the enterprising tendency test, particularly in the creative score (Soder et al., 2021). In our study, the score was higher among junior students. One explanation could be the intention to have a nursing career among senior nursing students. Since students are at a higher education level, their intentions and interests for suitable academic development will enable them to precisely seek specialized knowledge, which will finally benefit their future careers (Arifin & Gunawan, 2020). Nursing students in the third- and fourth-year are now nearly point of graduation and preparing for their professional practice as nurses. Literature indicates that nursing students have an obvious direction in their future nursing careers. Most nursing students have seen themselves working in clinical practice areas following their graduation and being registered nurses in their future careers. This shows the intention of nursing students to pursue their career path as nurses (McKenna & Brooks, 2018).

The findings of this study for the age group were significant with the agreement of entrepreneur leadership components. Previous research, however, revealed that the relationship between age and entrepreneurial success is complex and subject to the influences of multiple contingency factors, such as life stage and gender. Age has a weak linear relationship with entrepreneurial leadership (Navarro et al., 2022; Zhao et al., 2021). Likewise, it was discovered in Indonesia that age does not influence entrepreneurial leadership (Gunawan & Cahayani, 2022). Furthermore, family income has an association with entrepreneurial leadership, which is consistent with the previous study among medical students in Malaysia (Devi et al., 2020)

Another factor that may influence perceived attitude toward entrepreneurial leadership is the level of student performance or GPA, although it is not statistically significant in the models. According to a study of secondary school students, students with high GPAs have more positive attitudes toward entrepreneurship. This is because the students are motivated and eager to learn new subjects (Pihie et al., 2018). However, another study has shown a negative relationship between a higher GPA and an intention to entrepreneurship (Sun et al., 2020). A study from Italy also suggests that students who have previous low grades are more likely to start or pay attention to self-employed. New generations are willing to take high risks, which is one of the key components of entrepreneurial traits. Furthermore, creative students are mostly in lower GPA groups (Israr & Saleem, 2018). In our case, other factors, such as cultural and economic context, may influence the attitude and views of students toward entrepreneurial behaviors, which is needed for further study.

There are positive relations between parent income and entrepreneurial leadership. The behavior that students observe and learn from their parents significantly impacts their development. Parental role models are particularly important since children are highly exposed to their parent's behavior. Students from entrepreneurial households develop the need and desire to achieve independence from their parents, resulting in an increased tendency to pursue self-employment or an entrepreneurial mindset. This association was examined following previous research (Chlosta et al., 2012; Vladasel et al., 2021).

5. Implications and limitations

The findings of this study have some implications for nursing student leaders. The findings can help nursing student leaders recognize their critical roles in leading the innovation process in healthcare organizations, as well as develop procedures that provide nursing students with more opportunities for creative thinking, generating new ideas, and taking risks to put those ideas into

action. Entrepreneurship entails a significant learning process that fosters nursing students' ability to think outside the box in a broader health context and to challenge the existing nursing culture and role. The nursing culture can be changed to be more receptive to entrepreneurship by introducing entrepreneurial activities at the educational level, which can have a positive effect on nurse entrepreneurs' fear of making mistakes and resistance to change. More research is thus required to comprehend the impact of entrepreneurship on nursing students and entrepreneurial nurses in clinical practice.

This study has several limitations that should be addressed in future studies. First, this study concentrated on entrepreneurial leadership among nursing students in a single setting in Thailand. Future research should evaluate Thai nursing students in a variety of areas. Second, the authors focused on the impact of entrepreneurial leadership rather than the simultaneous influence of other leadership styles among nursing students. Third, because this study is a cross-sectional design, generalizable interpretations cannot be provided. Future experimental and longitudinal research should demonstrate the causality of the relationships discovered in this study. Further research should include evaluations of these variables from the perspectives of peers and teachers to provide a more comprehensive view of entrepreneurial leadership in nursing students.

6. Conclusion

Entrepreneurial leadership has been recognized as a strategy to influence performance, skills, and competency among individuals and has been widely studied in the nursing field. The four characteristics of entrepreneurial leadership were examined in this study, including personal competency, managerial competency, proactive competency, and technological competency. This study proposed critical factors influencing entrepreneurial leadership among nursing students, including the level of study year class, age group, and family income. Entrepreneurial characteristics and approaches may be utilized to improve all aspects of education among nursing students in institutional settings by influencing individual behaviors and task performance. Furthermore, students must learn and practice entrepreneurial leadership behaviors to develop their professional abilities and ease the process of student innovation. Identifying strategies for developing entrepreneurial leadership skills in nursing students would be highly valuable for future research. We also recommend more studies on nursing students' technological competency and approaches to implementing new health technologies. Additionally, policymakers, researchers, and higher education authorities should advocate necessary policies to develop students' entrepreneurial features and continue to strengthen their competencies to reach their future professional goals.

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Author contribution

Conceptualization, CS, NW, SP, AL, WS, NS, TK, NH, SM, and PP; methodology, CS, SS, and P.P1.; software, SS, and P.P1; validation, CS, NW, SP, AL, WS, NS, TK, NH, SM, and PP; formal analysis, SS, and P.P1; investigation, CS, NW, SP, AL, WS, NS, TK, NH, SM, and PP; writing—original draft preparation, CS, SS, and P.P1.; writing—review and editing, CS, SS, and P.P1.; visualization, SS, and P.P1.; supervision, CS; project administration, CS.

Conflict of interest

The authors declare that there is no conflict of interest for each author.

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