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EDITORIAL TEAM

AIMS AND SCOPE

The **Nurse Media Journal of Nursing (NMJN)** is an international nursing journal which publishes scientific works for nurses, academic people and practitioners. NMJN welcomes and invites original and relevant research articles in nursing as well as literature study and case report particularly in nursing.

This journal encompasses original research articles, review articles, and case studies, including:

- Adult nursing
- Emergency nursing
- Gerontological nursing
- Community nursing
- Mental health nursing
- Pediatric nursing
- Maternity nursing
- Nursing leadership and management
- Complementary and Alternative Medicine (CAM) in nursing
- Education in nursing

PUBLICATION INFORMATION

The **Nurse Media Journal of Nursing (NMJN)** is published twice a year every June and December.

For year 2018, 2 issues (Volume 8, Number 1 (June) and Number 2 (December) are scheduled for publication.

The NMJN is published by the Department of Nursing, Faculty of Medicine, Diponegoro University and available at http://ejournal.undip.ac.id/index.php/medianers. It has been indexed and abstracted in Google Scholar, Directory of Open Access Journal (DOAJ), Indonesian Publication Index (IPI), Science and Technology Index (SINTA), ASEAN Citation Index (ACI) and EBSCO.

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PREFACE

The Nurse Media Journal of Nursing (E-ISSN: 2406-8799, P-ISSN: 2087-7811) is an open access international journal which publishes the scientific works for nurse practitioners and researchers. The journal is published by the Department of Nursing, Faculty of Medicine, Diponegoro University and strives to provide the most current and best research in the field of nursing. The journal has been indexed in the Google Scholar, Portal Garuda/Indonesian Publication Index (IPI), Indonesian Scientific Journal Database (ISJD), Directory of Open Access Journal (DOAJ), Science and Technology Index (Sinta), ASEAN Citation Index (ACI) and EBSCO. NMJN has applied for indexation in Scopus and is currently under review.

It is also with pleasure to inform you that the Nurse Media Journal of Nursing (NMJN), has received accreditation from the Directorate General of Research Strengthening and Development, the Indonesian Ministry of Research, Technology and Higher Education. This accreditation is based on the decree number 60/E/KPT/2016 dated on 13 November 2016 and will be valid until November 2021. Upon this achievement, the NMJN would like to thank all people (the NMJN editorial team, reviewers, authors) who have given their support and contribution in achieving this accreditation.

This issue (NJMN, Vol 8(2), 2018) has published seven articles, consisting of four original research articles, a case study and two integrative reviews. This issue was authored and co-authored by the researchers and professionals from diverse countries, including Indonesia, Philippines, Japan, Saudi Arabia, Australia and USA. All papers have been doubled-blindly reviewed by the editors and reviewers of this journal.

The first article describes a cross-sectional study conducted by Abalos-Fabia, Khadrawi and Ellasus (2018). The study was a survey to 104 healthcare providers (HCPs) assessing the cultural diversity experience, cultural competence behavior (CCB) and cultural awareness and sensitivity (CAS) of HCPs in a hospital setting of Saudi Arabia. The results showed that there were high cultural competence and moderately high cultural awareness and sensitivity among health care providers. Significant differences were only identified between CCB scores and three demographic variables (racial/ethnic identification, the area of discipline and years of experience). No significant result was found between CAS scores and demographic variables as well as between CCB and CAS scores.

The next article is a quasi-experimental study investigating the effects of progressive muscle relaxation with music and aromatherapy on decreasing the level of stress among teachers (Dewi, Margawati & Mu'in, 2018). Fourty-six teachers were evenly assigned to the intervention group and the control group. The intervention group received progressive muscle relaxation with music and aromatherapy for four sessions in four days; each lasted for 20 minutes. The result showed that there were significant differences in the stress levels between the intervention and the control group. Therefore, this intervention could reduce the level of stress among teachers.

The third article (Arisudhana, Sodro, & Sujianto, 2018) is a correlational study which examined antiretroviral side effects on adherence in people living with HIV/AIDS (PLWHA). Data were obtained from patients' reports and pill count adherence rate. The result of this study revealed that the side effects of antiretroviral therapy influenced the antiretroviral adherence. In addition, nausea and dizziness were the most of the side effects of antiretroviral reported by participants.

Another quasi-experimental study was also conducted by Novelia, Sitanggang and Yulianti (2018). This study aimed to examine the effects of yoga relaxation on anxiety levels among pregnant women at the third trimester and involved 30 pregnant women. The result showed that there was a significant difference in the anxiety levels after the intervention between the experimental and control group. Hence, yoga relaxation had an effect on reducing anxiety levels among pregnant women at the third trimester.

The fifth article is authored by Kashiwagi (2018). This research was a case study of a 80-year-old man who developed acute myocardial infarction and aimed to study the development of myocardial infarction during the chemotherapy of colorectal cancer. Based on this study, it was thought that cetuximab + FOLFIRI synergistically induced hyper thrombogenicity, coronary plaque erosion, and acute myocardial infarction on the patient. The study urges the importance of doing such interventions as monitoring the risks in daily living by the medical care providers and guidance on risk avoidance behaviors.

The next article is conducted by Panes, Tuppal, Reñosa, Baua, and Vega (2018). This study is a meta-synthesis which explored the family experiences of mental illness. Five qualitative studies and one thesis dissertation published between 2001-2016 were used in the study. The grand theme in this study was family empowerment with three sub-themes perceived effects: emulating the burden and loss, process of coping, and perspectives on family empowerment. Therefore, empowering family to appreciate, acknowledge, and affirm the wholeness of a family member with mental illness is very important.

The last article is an integrative review examining the factors which influence fatigue among nurses employed in a hospital setting (Alahmadi & Alharbi, 2018). The result of this review revealed that the nurse fatigue was influenced by organizational factors, nursing work characteristics, psychosocial factors as well as individual characteristics and demand. It is recommended that healthcare organizations and policymaker develop strategies that mitigate fatigue among nurses.

Finally, the NJMN would like to thank the respectful authors, reviewers, and editors for their contribution and collaboration in publishing this current issue. Furthermore, the editors would like to appreciate and call for academic papers from the nurse-practitioners, academicians, professionals, graduates and undergraduate students, fellows, and associates pursuing research throughout the world to contribute to this international journal.

Semarang, December 2018

Sri Padma Sari

Editor-in-Chief
The Nurse Media Journal of Nursing

Author Guidelines

General Guidelines

Articles sent to the journal are not yet published. To avoid double publication, NMJN does not accept any articles which are also sent to other journals for publication at the same time. The writer should ensure that all members of his/her team have approved the article for publication. Any research report on humans as subject should enclosure the signed informed consent and prior ethical approval was obtained from a suitably constituted research ethics committee or institutional review board. If any financial support was received, or relationship(s) existed, the authors should mention that no conflict of interest of any financial support or any relationship or other, exists during a research project. Those points should mention in the Cover Letter to Editor of NMJN.

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Website
World Health Organization. (2008). *The global burden of disease: 2004 update*. Geneva, Switzerland: World Health Organization. Retrieved from: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf

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Sri Padma Sari (Editor-in-Chief)
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Author Index

Nurse Media Journal of Nursing, 8(2), 2018, 58-70
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Behavior, Awareness, and Sensitivity of Healthcare Providers in a Multicultural Environment

Russel Salvador Abalos-Fabia[1], Shadia Mohamed E. Khadrawi[2], Rosanta O. Ellasus[3]

[1, 2, 3]*Nursing Department, College of Applied Medical Sciences, Shaqra University, Saudi Arabia*
Corresponding Author: Russel Salvador Abalos-Fabia (ruz.tik24@gmail.com)

ABSTRACT

Background: The healthcare workforce of Saudi Arabia is characterized by diverse cultural backgrounds as a consequence of the employment of expatriate workers from various countries. The heterogeneity of both providers of health services and clients results in cultural barriers that affect the delivery care. It is paramount to evaluate the cultural competence of healthcare providers (HCPs) to maintain quality holistic care.
Purpose: This study aimed to assess the cultural diversity experience, cultural competence behavior (CCB) and cultural awareness and sensitivity (CAS) of HCPs in a hospital setting of Saudi Arabia.
Methods: This was a cross-sectional study involving a survey of 104 HCPs from medical, nursing and laboratory technology disciplines that were taken based on a total sampling procedure. Data collection was conducted using the Cultural Competence Assessment (CCA) tool that measured cultural diversity experience, CCB, and CAS. Data analysis was performed and presented in descriptive statistics, and significant findings were computed using independent samples t-test, analysis of variance (ANOVA), and Pearson correlation coefficient.
Results: The characteristics of the respondents resulted in mean age of 38.7±10.4 who were predominantly Asians and nurses. The majority had working experience of 10 years and below, with more than half who had prior diversity training. Reported cultural diversity experience included all HCPs caring for Arab Middle Easterners and Asians and encountering at least one or more special population groups. There was an overall high cultural competence (5.28±0.46), high CCB (5.84±0.56) but only moderately high CAS (4.72±0.35). Significant differences were only identified between CCB scores and three demographic variables (racial/ethnic identification, the area of discipline and years of experience). No significant result was found between CAS scores and demographic variables as well as between CCB and CAS scores.
Conclusion: Despite high CCB, the HCPs responded with lower CAS scores. Interventions should be initiated to increase CAS such as cultural diversity training and availability of cultural care resources.

Keywords: Cultural competence; cultural awareness and sensitivity; cultural competence behavior; healthcare providers; Saudi Arabia

BACKGROUND

Culture and health are two essential dimensions of a person's well-being. Culture, which is often reflected in a population's behavior, attitudes, practices, and ideologies, is described by Schein (2010) as stable and rigid that has resulted from the social order formed from the perception, feelings, and actions of society through various socialization experiences. Culture, according to Davey (2018), is "a framework of behavioral patterns, values, assumptions, and experiences shared by a social group" (p. 1). Whereas, health is defined by Bircher (2005) as "a dynamic state of well-being characterized by a physical and mental potential, which satisfies the demands of life commensurate with age, culture, and personal responsibility" (p. 336). The connection between culture and health had been immensely recognized especially in culture-centered approaches to health communication and health care delivery.

In a more complex scenario, health care is delivered in a multicultural setting with carers from diverse cultural backgrounds. Expanding globalization and movement of people whether because of education, pleasure, health reasons or job opportunities had consequently exposed healthcare workers to culturally different patients or vice versa. A closer look at the Kingdom of Saudi Arabia, for example, depicts a multicultural pool of people in almost all sectors. From Saudi Arabia's 31.5 million inhabitants in 2015, one-third of them were foreign workers (Ministry of Health [MOH], 2015). There are around 85.6% of the expatriates who came from the countries of India, Pakistan, Bangladesh, Egypt, Philippines, Yemen, Indonesia, and Sudan. A few numbers of these expatriates originated from other South Asian, Middle-East Asian and African countries as well as from the United States and Europe (Saudi Gazette, 2014). When it comes to healthcare, 60% of the country's health services are provided by the Ministry of Health through 274 hospitals and 2282 primary health care (PHC) centers. Pharmacists (79%), physicians (74%), and nurses (61.7%) comprise the large percentage of expatriates in hospitals and health centers with Saudi Arabian occupying more allied health positions (74.3%) (MOH, 2015).

The current composition of the health workforce is a challenge in delivering quality health care services to culturally diverse consumers. More than managing the illness itself, restoration of health in all its aspects is a preferable way of treating a patient as health transcends from curability to wellness. Usually, medical care aims for the promotion of health, prevention of disease, palliation, and treatment but cultural care is trained to provide a culturally sensitive, culturally appropriate and culturally competent approach to holistic care (Hanson & Callahan, 1999). Achieving such a goal corresponds to the profound understanding of the patient's culture. In as much as cultural diversity is dealt with by "knowing the values, beliefs, practices, customs, racial classification and national origin" it also addresses a person's "religious affiliation, language, physical size, gender, sexual orientation, age, disability (both physical and mental), political orientation, socioeconomic status, occupational status, and geographical location" (Campinha-Bacote, 2003, p. 1). Moreover, health is also affected by cultural phenomena as identified by Giger and Davidhizar (2008) such as environmental control (traditional health practices, folk medicines, healers), biological variations (body structure, skin color, genetic variations), social organization (family-type, religious/ethnic group), communication, space and time orientation. HCPs and patients' cultural conflicts are

believed to arise from these cultural phenomena that are apparent in most multicultural health settings (Spector, 2017).

Studies had been continuously pursued to find solutions to current issues surrounding the diversified health care environment. Certain situations tend to interpose with discernment of cultural differences. Thinking that own beliefs and practices are the right ways, ethnocentrism exhibits influence on one's behavior to render care (Riley, 2017). Each health professional has individual and personal view as he was raised in his culture that may affect his judgments and create biases on his decisions when it comes to the patient's care, the same as the patient has unique understanding on his illness, its cause, treatment and expectations from the healthcare services (Klein, 2004). In another point, a lesser quality of care, poor comprehension, and unsatisfied patients may result from difficulty in language and communication between the healthcare provider and patient (Georgetown University, 2004). Aldossary, While and Barriball (2008) believed that impedance to the delivery of holistic care includes difficult health education due to the absence of a shared culture and language. Communication patterns also vary to a great extent from one culture to another in respect to personal space, touch, eye contact and methods of greetings (Riley, 2004). Religion is also a significant determinant of one's behavior and beliefs where problems surface from lifestyle, the manner of dressing, modesty values, prayer practices, food choices and use of medications (Harvey & Allard, 2015; The Royal Australian College of General Practitioner, 2011). Other cultural barriers to effective delivery of care are gender concern and familial structure. Different cultures present gender differences in role activities and expectations from essential aspects such as decision-making, family roles and employment opportunities (Bird & Rieker, 2008).

Health in the midst of all of these different cultural concerns brings about challenge to all healthcare professionals' capabilities to heal beyond the physical boundaries of medicine. Saudi Arabia which is dominated by Muslims (96%) is strictly governed by the teachings of Islam (D'Avanzo, 2008). Dilemmas occur as interactions between HCPs and patients transpire in a different ethical perspective brought by their differences in culture and practice of faith. There were studies reviewed related to cultural competence in Saudi Arabia. However, to the best of knowledge of the researchers, there were limited local studies that focused on cultural diversity experience and specific aspects of cultural competence of HCPs. Thus, this study intended to reduce this knowledge gap through appraisal of HCPs working in Saudi Arabia, who came from different nations and races, with different religious affiliations and beliefs, and with distinct cultures and languages, in catering to the medical needs of a heterogeneous population.

PURPOSE

This study aimed to assess the cultural diversity experience, cultural competence behavior (CCB) and cultural awareness and sensitivity (CCA) of health care providers in a government hospital setting.

METHODS

Research design

This study was tailored in a descriptive research design through a cross-sectional study.

Samples and setting

Participants were recruited from a government hospital situated in Riyadh Province of Saudi Arabia. These were comprised of and limited to HCPs who were frequently in contact with patients such as doctors, nurses and laboratory technologists. The total sampling procedure was applied including all willing and available HCPs without any restrictions to age, gender, nationality/ethnicity/race, and religion. HCPs who belonged to the professions mentioned above but with decreased to no contact with patients were excluded from the study (e.g., assigned to administrative positions and hospital support units such as a dispensary, medical records, supply office, and others). Of the 121 eligible respondents, there were a total of 104 HCPs who participated in this study with 24 doctors, 76 nurses and four laboratory technologists. Others were either unable to complete the survey or did not participate due to lack of time and conflict of schedules (e.g., vacation, night shift).

Research instrument and data collection

The primary approach for data gathering was the survey method. The Cultural Competence Assessment (CCA) tool (Doorenbos, Schim, Benkert, & Borse, 2005) was utilized to collect data from the participants. To answer the objectives of the study, the three original cultural competence dimensions (cultural diversity experience, CCB, and CAS) were included in the latest version. The cultural diversity experience was assessed by the number of racial/ethnic groups and special populations that the respondents had cared for the last 12 months. The CCB subscale is measured using a 7-point Likert scale described as always, often, somewhat often, often, sometimes, few times and never. Meanwhile, the CAS subscale was also responded through a 7-point Likert scale described as strongly agree, agree, somewhat agree, neutral, somewhat disagree and strongly disagree. Both scales were described with the following equivalent ratings of cultural competence: very high, high, moderately high, moderate, moderately low, low and very low. The demographic characteristics of the HCPs consisted of information about their age, racial/ethnic identification, the area of discipline, years of experience and training on cultural diversity.

Data collection was initiated through the personal distribution of the questionnaires with clear instructions to the participants in each unit of the hospital. Recollection of the questionnaires was carried out after they completed answering which took around 20 to 30 minutes.

Data analysis

Microsoft Excel 2010 and IBM Statistical Package for Social Sciences (IBM SPSS) v.20 were utilized for data analysis. Frequencies and percentages computed most demographic characteristics and items on cultural diversity scales. Age, CCB and CAS were presented in means and standard deviations (*SD*). Independent samples t-test and analysis of variance (ANOVA) were applied to determine significant differences, and the Pearson correlation coefficient was performed to measure associations.

Ethical consideration

The ethical review and approval were sought from the hospital administration. A letter addressed to the participants was attached to inform the purpose of the study and ensure

the anonymity and confidentiality of their identity and responses. Both implied and verbal consent were elicited from them with clear information about their right to participate voluntarily, withdraw or decline and with emphasis that their completion of the survey indicated their informed consent to participate. The utilization of the questionnaire was obtained for permission and approval from the original authors via email. All necessary ethical practices were undertaken in the completion of this study.

RESULTS

Demographic characteristics

Characteristics of the HCPs were detailed in Table 1. The mean age of 38.7 years (*SD*±10.4) was found among the participants. More than two-thirds (73.1%) identified themselves as Asian consisting of Filipinos, Indians, and Indonesians. Middle Easterners such as Saudi Arabians, Egyptians, and Syrians comprised 21.2% of the samples. There were very few Black Africans (4.8%) and only one percent of the HCPs were of European origin. Nurses represented the largest number of participants with 73.1% followed by 23.1% doctors and 3.8% laboratory technologists. Regarding experience, the majority (67.3%) was working for ten years and less while 32.7% was in service for more than ten years. Attendance to cultural diversity training was expressed by over half of the respondents (55.8%) with others without prior training (44.2%).

Table 1. Demographic characteristics of the healthcare providers (n=104)

Demographic Characteristics	*n* (%)
Age (in years), mean (*SD*)	38.7 (10.4)
Racial/Ethnic Identification	
Asian	76 (73.1)
Middle Eastern	22 (21.2)
European	1 (1)
Black African	5 (4.8)
Area of Discipline	
Medicine	24 (23.1)
Nursing	76 (73.1)
Laboratory	4 (3.8)
Years of Experience	
10 years and less	70 (67.3)
>10 years	34 (32.7)
Training on Cultural Diversity	
No	46 (44.2)
Yes	58 (55.8)

Cultural diversity experience

The cultural diversity experience of the HCPs as summarized in Table 2 indicated that all of them had at least came across people from different racial or ethnic groups for the last 12 months. All participants (100%) reported having cared for Arab Middle Easterners and Asians (e.g., Asian Indian, Filipino, Pakistani, Nepalese and other Asians). Nearly three-quarters (71.6%) managed care for Africans and very few numbers (3.8%) with White Europeans/Americans. Similarly, the entire samples had contact with special population

groups for the past 12 months. This had varied from people who were physically challenged/disabled (76.9%), mentally or emotionally ill (38.5%) and with the different religious/spiritual background (42.3%).

Table 2. Cultural diversity experience

Variable	*n* (%)
Racial/ethnic groups of people encountered in the past 12 months	
Arab Middle Easterner	104 (100)
Asian	104 (100)
African/Black	74 (71.6)
White European/American	4 (3.8)
Special population groups encountered in the past 12 months	
Physically Challenged/Disabled	80 (76.9)
Mentally/emotionally ill	40 (38.5)
Different religious/spiritual background	44 (42.3)

Cultural competence behavior

The findings on the cultural competence behavior translated an overall high competence of the HCPs with a mean of 5.84 (*SD*±0.56). They specifically displayed very high practice on *acting to remove obstacles for people of different cultures when clients and families identify such obstacles and welcoming feedback from co-workers on how to relate to others with different cultures* with the highest means of 6.69 (*SD*±1.05) and 6.23 (*SD*±1.00), respectively. Lowest means were computed from responses on *having resource books and other materials available to help learn about clients and families from different cultures* (*M*=5.38, *SD*±1.01) and *use a variety of sources to learn about the cultural heritage of other people* (*M*=5.38, *SD*±1.01). In most items, culturally related behaviors were practiced very often demonstrating high competence as delineated in Table 3.

Table 3. Cultural competence behavior

	Indicators	Mean	*SD*
1.	I include cultural assessment when I do client or family evaluations.	5.92	1.09
2.	I seek information on cultural needs when I identify new clients and families in my practice.	5.90	1.10
3.	I have resource books and other materials available to help me learn about clients and families from different cultures.	5.31	1.09
4.	I use a variety of sources to learn about the cultural heritage of other people.	5.38	1.01
5.	I ask clients and families to tell me about their own explanations of health and illness.	6.02	1.03
6.	I ask clients and families to tell me about their expectations for care.	5.77	0.92
7.	I avoid using generalizations to stereotype groups of people.	5.88	0.96

	Indicators	Mean	*SD*
8.	I recognize potential barriers to service that might be encountered by different people.	6.04	0.86
9.	I act to remove obstacles for people of different cultures when I identify such obstacles.	5.94	0.93
10.	I act to remove obstacles for people of different cultures when clients and families identify such obstacles to me.	6.69	1.05
11.	I welcome feedback from clients about how I relate to others with different cultures.	6.12	0.94
12.	I welcome feedback from co-workers about how I relate to others with different cultures.	6.23	1.00
13.	I find ways to adapt my services to client and family cultural preferences.	6.13	0.81
14.	I document cultural assessments.	5.52	1.12
15.	I document the adaptations I make with clients and families.	5.50	1.07
16.	I learn from my co-workers about people with different cultural heritages.	6.12	0.85
	Overall CCB	5.84	0.56

Cultural awareness and sensitivity

Further results (Table 4) described the HCPs with a moderately high level of cultural awareness and sensitivity with a mean of 4.72 (*SD*±0.35). The highest score was drawn from the respondents' *enjoyment of working with people who are culturally different from them* with a mean of 6.10 (±0.93). Although the majority of the items showed a high level in the CAS subscale, the respondents displayed the lowest level of cultural awareness and sensitivity in two statements. They believed that *race is the most important factor in determining a person's culture* (*M*=2.46; *SD*±1.17) and that *people with a common cultural background think and act alike* (*M*=2.58; *SD*±0.84). Finally, no significant relationship was derived between the means of CCB and CAS subscales with *r*=0.19, *p*=.053.

Table 4. Cultural awareness and sensitivity

	Indicators	Mean	*SD*
1.	The race is the most important factor in determining a person's culture.*	2.46	1.17
2.	People with a common cultural background think and act alike.*	2.58	0.84
3.	Many aspects of culture influence health and healthcare.	5.98	0.98
4.	Aspects of cultural diversity need to be assessed for each individual, group, and organization.	5.87	0.92
5.	If I know about a person's culture, I do not need to assess their personal preferences for health services.*	3.17	1.06
6.	Spirituality and religious beliefs are important aspects of many cultural groups.	6.06	1.07
7.	Individuals may identify with more than one cultural group.	5.52	0.98
8.	Language barriers are the only difficulties for recent expatriates to Saudi Arabia.*	2.29	0.97

	Indicators	Mean	*SD*
9.	I understand that people from different cultures may define the concept of ‘‘healthcare’’ in different ways.	5.92	0.92
10.	I think that knowing about different cultural groups helps direct my work with individuals, families, groups, and organizations.	6.00	0.92
11.	I enjoy working with people who are culturally different from me.	6.10	0.93
	Overall CAS	4.72	0.35

*Reversely-coded items

Differences and relationship between cultural competence variables and characteristics of HCPs

The comparison of mean scores of the samples' CCB and CAS according to their characteristics generated varied findings (Table 5). Significant differences were computed when CCB scores were compared among and between racial/ethnic identification ($p<.05$), the area of discipline ($p<.01$) and years of experience ($p<.001$) variables. Asian participants responded with the highest mean score (M=5.93, SD±0.55) in CCB than HCPs from other racial/ethnic groups. Nurses scored higher in CCB (M=5.94, SD±0.52) than HCPs from laboratory and medicine. Meanwhile, more experienced HCPs (M=6.11, SD±0.42) behaved more culturally competent than those with lesser years of experience. On the other hand, no significant result was generated between demographic variables and CAS subscale.

Table 5. Cultural competence mean scores across characteristics of healthcare providers

Characteristics	CCB		CAS	
	Mean (*SD*)	*p*	Mean (*SD*)	*p*
Age (*r*, *p)*	0.028	*0.18*	0.779	*0.067*
Racial/Ethnic Identification[a]				
Asian	5.93 (0.55)		4.76 (0.34)	
Middle Eastern	5.68 (0.57)	*0.007*	4.56 (0.35)	*0.053*
Black African	5.23 (0.31)		4.80 (0.19)	
Area of Discipline				
Medicine	5.52 (0.64)		4.72 (0.35)	
Nursing	5.94 (0.52)	*0.005*	4.74 (0.34)	*0.055*
Laboratory	5.91 (0.11)		4.32 (0.16)	
Years of Experience				
10 years and less	5.71 (0.58)	*0.000*	4.71 (0.41)	*0.676*
>10 years	6.11 (0.42)		4.74 (0.17)	
Training on Cultural Diversity				
No	5.79 (0.47)	*0.383*	4.75 (0.37)	*0.449*
Yes	5.89 (0.63)		4.70 (0.33)	

a. One ethnic group (White European/American) was excluded in the computation because of only one participant.

DISCUSSION

Cultural components of health delivery support the holistic approach to patient care. With this study, outcome found diversified HCPs who deliver care to an equally heterogeneous

group of patients. High CCB level was observed with the participants, but CAS was identified at a moderately high level. Nonetheless, this resulted in an overall high cultural competence. Racial/ethnic identification, area of practiced discipline and length of experience were significant factors on CCB whereas, CAS was uninfluenced by any demographic characteristics.

Culture in Saudi Arabia is dominated by Islamic practices where The Two Holy Mosques are located (Saudi Arabian Cultural Mission [SACM], 2017). However, more than 30% of the population are expatriates from Philippines, India, Pakistan, other Asian countries and some from US, UK, EU, and Canada (MOH, 2015), who have different religious beliefs and cultural practices. This was reflected in the findings of the study that the largest groups of HCPs identified themselves from the Asian region and who were predominantly Christians and Muslims. The composition of the HCPs in this study was consistent with the previously discussed report that physicians and nurses were among the most numbered foreign professionals in the health sector of the country (MOH, 2015).

There was an evident diversity in the types of patients the HCPs had encountered in this study. Hence, there was a considerable experience with cultural diversity as attested by caring for people from at least one or more different races and delivering health services to special groups who were either sick physically, mentally or emotionally as well as patients with varying religiosity. Such multiculturalism within the clinical workplace had existed both locally (Almutairi, McCarthy, & Gardner, 2015) and in many parts of the world like in Africa, Canada, Mexico, and United States which are recognized with diverse cultures (Almutairi, Adlan, & Nasim, 2017; Morin, 2013).

The present study had substantiated high competence level through the assessment of CCB among the healthcare workers with a mean of 5.84 (*SD*±0.56). This finding was congruent with the results of a study conducted in the US using similar CCA tool (Schim, Doorenbos, & Borse, 2006). Another interesting finding is that the level of CAS was evaluated moderately high with a mean of 4.72 (*SD*±0.35). This mean value was lower than the participants' CCB level. The difference had obtained a significant relationship between the two subscales. Although a comparable result was established in one study (Dabney et al., 2015), the pattern was dissimilar in mostly reviewed cultural studies. There was lower cultural competence in the behavioral domain as investigated in Italy, Canada, Taiwan, Ethiopia and US (Aragaw, Yigzaw, Tetemke, & G/Amlak, 2015; Colini et al., 2015; Debiasi & Selleck, 2017; Lin, Mastel-Smith, Alfred, & Lin, 2015; Starr & Wallace, 2009). This outcome implies that in this current set of health workers, they maintained and conducted actions that were culturally positive when caring for their patients despite decreased CAS. This further highlights the necessity of providing for the training needs of the HCPs to enhance their CAS, whom nearly half of them admitted having not attended any cultural diversity training.

Another key finding in the CCB subscales is that respondents highly acted to remove obstacles identified by the clients and families and welcomed feedbacks from clients, but they are least likely to have reading resources about other's culture. These were identical findings in the previous study of Schim et al. (2006) and a recent study of Debiasi et al. (2017). This translates a desirable characteristic of healthcare workers to maintain the

standard of care by responding to the needs of their patients regardless of cultural difficulties. Moreover, accessibility and availability of materials and resources related to cultural care are paramount in all healthcare facility setting. Meanwhile, in the CAS subscale, the race was connected to essentially predetermine one's culture which had contributed to the low CAS score. This issue occurs when one categorizes a group of people in one culture because they share similar physical traits or biological features. Delivery of health care services should not be attributed based on race alone. Many people nowadays had multiracial and multicultural background brought about by migration and interracial marriages. Therefore, care should be communicated with intercultural competence which is not only effective but also appropriate (Messner & Schäfer, 2012).

Lastly, the researchers identified demographic factors that are essential determinants of CCB scores. In this research work, racial differences had significantly played an influence on CCB. However, the opposite result was reported in the study of Schim et al. (2006). Race/ethnicity was only significant when computed with cultural competence entirely (Almutairi et al., 2017; Lampley, Little, Beck-Little, & Xu, 2008). Thus, further studies are required to achieve generalization which is specific to CCB. Meanwhile, experience had also impacted the CCB in this study. The publication of Cicolini et al. (2015) likewise found an association between length of experience and CCB resulting to more experienced nurses displaying a more favorable behavior culturally. Another study supported the profession of the HCPs as a significant factor, but the result identified physicians as more culturally skillful than nurses (Casillas et al., 2014). Both CCB and CAS mean scores were not significantly associated with age and cultural diversity training variables. In disagreement, results of other works established the relationship of age, and cultural competence that identified older-aged HCPs tend to demonstrate higher competence skills culturally (Almutairi et al., 2017; Bunjitpimol, Kumar, & Somrongthong, 2018). On the other hand, prior cultural diversity training created an effect on CCB scores only (Schim et al., 2006) and both CCB and CAS scores (Starr & Wallace, 2009).

There are certain limitations that necessitate acknowledgment in this study. Some factors can probably restrict the generalizability of the results. First, the setting of the study was conducted in a single hospital facility. Second, the demographic characteristics of the samples included mostly Asians, women, and nurses. Third, the cultural diversity experience was limited to encounter with mostly Middle Easterners and Asians with least to no exposure to other racial/ethnic groups such as White Caucasians/ Europeans/ Americans or Hispanics/ Latinos. Hence, future research works may broaden the setting to collect data from a more diverse group of HCPs.

CONCLUSION

The HCPs were considered highly culturally competent especially in the behavioral aspect. However, crucial interventions should be performed to improve their awareness and sensitivity while working with diverse patients. Hospital management should carefully look into designing and planning effective diversity and culturally care-centered programs for training their health care workers. Availability and accessibility of accurate and updated sources of information related to cultural care are also essential to continuously deliver overall quality healthcare services.

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DECLARATION OF INTEREST
None

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Effects of Progressive Muscle Relaxation with Music and Aromatherapy on Decreasing Stress Levels among Teachers

Claudia Fariday Dewi[1], Ani Margawati[2], Muhammad Mu'in[3]

[1]*Postgraduate Program in Nursing, Department of Nursing, Diponegoro University, Indonesia*
[2]*Department of Nutrition, Diponegoro University, Indonesia*
[3]*Department of Nursing, Diponegoro University, Indonesia*
Corresponding Author: Claudia Fariday Dewi (claudiasiwe@gmail.com)

ABSTRACT

Background: Stress among teachers has a significant relationship with the psychosomatic and depressive symptoms. Progressive muscle relaxation with music and aromatherapy is an intervention which can be implemented to reduce the level of stress among teachers.
Purpose: This study aimed to investigate the effects of progressive muscle relaxation with music and aromatherapy on decreasing the level of stress among teachers.
Methods: This study employed a pre-posttest quasi-experimental design with a control group. The samples were 46 teachers recruited by purposive sampling and were evenly assigned to the intervention group and the control group. Progressive muscle relaxation with music and aromatherapy was given to the intervention group for four sessions in four days; each lasted for 20 minutes. The data were collected using the Teacher Stress Inventory and analyzed using the t-test to know the effects of the intervention.
Results: The results showed that the mean of stress level among the teachers in the intervention group decreased from 50.65±3.761 to 32.78±8.426 after the intervention. Meanwhile, in the control group, the mean of stress level slightly decreased from 49.87±3.348 to 49.17±4.868. The t-test obtained a p-value of 0.000, indicating that there were significant differences in the stress levels between the intervention and the control group.
Conclusion: Progressive muscle relaxation with music and aromatherapy reduced the level of stress among teachers. Based on the findings, it is recommended that community nurses promote this relaxation therapy to decrease the stress level among school teachers.

Keywords: Aromatherapy; music; progressive muscle relaxation; teacher stress

BACKGROUND

Work stress is one of the health problems that often occurs in teachers. International Labour Organization in 2016 mentioned that one of the highest prevalence of work stress occurs in the education sector (International Labour Organization, 2016). Furthermore, the Health and Safety Executive (2016) reported that in the teaching profession, there are about 2,530 cases of stress per 100,000 teachers. It means that among 465,112 teachers of high school and vocational school in Indonesia, there are approximately 11,767 cases of stress (The Central Statistic Agency, 2015). The high number of cases of teacher stress indicates that there is a problem in the society's mental health that should be solved.

Teachers indeed have a very important role in improving the quality of education of a nation (Seth, 2016). However, when teachers experience stress, there will be some unfavorable effects on the learning process and the quality of the educational institution. Results of a study conducted in Turkey showed a significant negative relationship between stress levels of teachers and the health of educational organizations (Sabanci, 2015). Moreover, another study by Mclean and Connor (2016) reported that teachers who had depressive symptoms caused poor quality of learning in the classroom. Teachers' emotional fatigue affects the teachers' perceived support and the teachers' depersonalization with the development of student motivation (Shen, Mccaughtry, Martin, Garn, Kulik, & Fahlman, 2015). Teacher work stress can also affect the physical and mental health of teachers. Results of previous studies indicated that increased work stress raised psychosomatic problems and depressive symptoms (Chang & Min, 2009; Madhura, Subramanya, & Balaram, 2014). Teachers who experience work stress will try to protect themselves by self-withdrawal, absent, decreased performance, loss of commitment, dissatisfaction at work, and interpersonal conflict (Seferoğlu, Yıldız, & Yücel, 2014).

Community nurses can help teachers address the problem of stress at work. In this context, the nurses may provide psychosocial support to the teachers to deal with the issue of occupational stress in the form of prevention which focuses on individual workers. One of the efforts which can be made is through nursing complementary interventions (Snyder & Lindquist, 2006). A common complementary intervention which has been widely used to deal with the problem of work stress is progressive muscle relaxation (PMR). A study by Sundram, Dahlui, and Chinna (2016) reported a significant reduction in the level of stress among male workers after given the PMR. Similarly, progressive muscle relaxation with music was reported to increase the focus of attention and reduce mental tension (Robb, 2000). The reduction in stress levels showed the potential of PMR therapy as a coping strategy at the workplace.

In addition to PMR, other complementary therapies which can reduce stress include music therapy and aromatherapy. Listening to music prior to a standardized stressor predominantly affects the autonomic nervous system (in terms of a faster recovery) and a lesser degree the endocrine and psychological stress response (Thoma, la Marca, Brönnimann, Finkel, Ehlert, & Nater, 2013). Music affects the body relaxation by reducing the activity of alpha-amylase and systolic blood pressure (Linnemann, Ditzen, Strahler, Doerr, & Nater, 2015). Aromatherapy describes the use of essential oils from various plants which are beneficial to improve the physical and psychological state of an individual (Mccabe & Jacka, 2001). Previous studies reported that aromatherapy improved mood (Linnemann et al., 2015) and decreased stress (Toda & Morimoto, 2011). Unfortunately, there have been limited studies which investigate the effects of progressive muscle relaxation with music and aromatherapy to cope with work stress. Thus, it is necessary to conduct a study which explores the effects of such combination of interventions on teachers' stress.

PURPOSE

This study aimed to examine the effects of progressive muscle relaxation intervention with music and aromatherapy on decreasing the level of stress among teachers.

METHODS

This study used a pretest-posttest quasi-experimental design with a control group. The samples were 46 teachers from two vocational high schools in Manggarai regency in East Nusa Tenggara, Indonesia. The samples were assigned into two groups: the intervention group that received progressive muscle relaxation with music and aromatherapy (n=23), and the control group which did not receive such intervention (n=23). The samples were recruited using purposive sampling. The inclusion criteria included teachers who were favorable to lavender aromatherapy and relaxation music and experienced a moderate level of stress. The exclusion criteria were teachers having other stress management therapy, and experiencing severe and acute heart disease, pain, infection or inflammation of the musculoskeletal, and hearing loss.

Prior to the study, the researchers conducted an initial screening using the Teacher Stress Inventory (TSI) to determine the level of stress in teachers subjectively. The TSI questionnaire was administered to 75 teachers in two vocational high schools. Results indicated that the respondents who met the inclusion and exclusion criteria were 46. Objective measurement of stress was also conducted using a cocoro meter to check the alpha amylase concentration in the saliva as an indicator of stress. If the result is 0-30 KU/L (kilo unit per liter), it means that the respondent is happy and does not have stress. A result of 30-45 KU/L means the respondent is slightly stressed; 45-60 KU/L means the respondent experience stress, and 60 KU/L means the respondent has severe stress (Ariyanto, Wahyuning, & Desrianty, 2015).

The intervention in this study was progressive muscle relaxation intervention with music and aromatherapy which was administered for four sessions in four consecutive days. The duration of each session was 20 minutes. Aromatherapy through inhalation works best using a vaporizer or diffuser. The use of diffuser was preferable in this study as it can spray different molecules at the same time. A 3% concentration of lavender oil was used. In total, 20 drops of lavender oil were mixed with 50 ml of water. The diffuser containing aromatherapy was turned on half an hour before the intervention. In this research, the researcher also played the music of Pachelbel Canon in D Major. This music had a regular rhythm, less than 80 beats per minute, lacked extreme tones, smooth and flowing melodic sounds. During the intervention, the music was also played for 20 minutes. Objective and subjective measurement were performed before and after the intervention. The collected data were analyzed using the t-tests.

The study was approved by the research ethics committee of the Faculty of Medicine, Diponegoro University, and the schools where the study took place. All respondents were informed of the purpose of the study and consented for their participation in the study.

RESULTS

The characteristics of respondents included age and years of teaching, sex, education, and marital status. Based on Table 1, the majority of teachers were males, bachelor degree holders and married. Most of them were employed by the school foundation. The mean of age in the intervention and control group was 32.43 and 32.83, respectively. The mean of years of teaching in the intervention and control group was 6.43 and 6.78, respectively.

Table 1. Characteristics of respondents (n=46)

Variable	Intervention Group		Control Group		Total	
	n	%	n	%	n	%
Sex						
Male	14	60.9	13	56.5	27	58.7
Female	9	31.9	10	43.5	19	41.3
Education						
Associate degree	1	4.3	1	4.3	2	4.3
Bachelor degree	22	95.7	22	95.7	44	95.7
Status of Marriage						
Single	7	30.4	6	26.1	13	28.3
Married	16	69.6	17	73.9	33	71.7
Status of Employment						
Honorary	2	8.7	2	8.7	4	8.7
Government employees	1	4.3	2	8.7	3	6.5
Employees of foundation	20	87	19	82.6	39	84.8
Age (*M*±*SD*)	32.43±6.88		32.83±7.63			
Years of teaching (*M*±*SD*)	6.43±5.84		6.78±6.22			

Table 2. The mean of stress among teachers in the intervention group and control group using cocoro meter

Group	Time of measurement	n	Mean	*SD*	Min-Max	CI
Intervention	Pre test	23	50.65	3.761	45-59	49.03-52.28
	Post test	23	32.78	8.426	21-54	29.14-36.43
Control	Pre test	23	49.87	3.348	45-57	48.42-51.32
	Post test	23	49.17	4.868	36-58	47.07-51.28

Table 2 shows that the stress value among teachers before the intervention in the intervention was 50.65 kU/L, while in the control group was 49.87 kU/L. After the intervention, the stress value among teachers in the intervention group decreased to 32.78 kU/L, meaning that teachers did not experience stress. Meanwhile, in the control group, the stress value slightly decreased (49.17 kU/L).

Table 3. Mean difference of teacher stress after the intervention in the intervention group and control group

Group	n	Mean	*SD*	Variants	*p-value*
Intervention	23	32.78	8.426	0.013	0.000
Control	23	49.17	4.868		

Based on Table 3, there was a significant difference in the level of stress among teachers after the progressive muscle relaxation with music and aromatherapy on in the intervention group and control group (p=0.000). It indicates that the intervention was effective to decrease teacher stress.

DISCUSSION

The results of this study proved that there was a significant effect of progressive muscle relaxation with music and aromatherapy on decreasing the level of stress among teachers. This is in line with a previous study which reported that progressive muscle relaxation could reduce cortisol levels by an average decrease of 0.013 units per 15 days (p=0.039) (Linnemann, Ditzen, Strahler, Doerr, & Nater, 2015). Music therapy and lavender aromatherapy give effects on the stress management by decreasing the alpha-amylase activity (Hur, Song, Lee, & Soo, 2014). Muscle relaxation combined with music can increase the focus of participant attention and reduce mental tension; music encourages the body becomes more relaxed and able to motivate participants to follow a relaxation program (Robb, 2000). Meamwhile, aromatherapy has been proven to be a supportive therapy which improves mood and sense of comfort (Linnemann et al., 2015).

Another study by Robb (2000) also showed a decrease of the mean of State Anxiety Inventory (STAI) in the group receiving progressive muscle relaxation intervention with music by 15.54, whereas in only music and muscle relaxation intervention, the decrease of STAI is only 9.20 and 11.06. This proves that progressive relaxation techniques with music are more effective than using progressive relaxation or music techniques only (Robb, 2000).

Another study examining the combination of relaxation therapy showed that mindfulness intervention combined with room aromatherapy can decrease the stress by 32.9%. This study proves that aromatherapy increases awareness during meditation (Redstone, 2015). Similarly, Davis and Nurse (2005) reported that a combination of aromatherapy interventions in reducing muscle tension through massage therapy with music suggests a significant decrease in anxiety.

Progressive muscle relaxation is a relaxation technique aimed at reducing muscle energy use. Stress was related to the reporting of musculoskeletal pain which involved head pain (35.2%) and back pain (31.9%) (Østerås, Sigmundsson, & Haga, 2015). Through progressive muscle relaxation interventions, there is a relaxation of the skeletal muscle which impacts on the relaxation of visceral muscles so that the body's consumption of oxygen, the speed of metabolism, respiratory rate, muscle tension, systolic and diastolic blood pressure decreased (Bernstein, Borkovec, Hazlett-stevens, & Douglas, 2000).

The process of relaxation in skeletal muscles that impacts on visceral muscle relaxation becomes more leverage with the help of relaxation music. Music provides a stimulus to decrease muscle energy. The results of other studies showed that music could reduce the activity of alpha-amylase and systolic blood pressure (Linnemann, Ditzen, Strahler, Doerr, & Nater, 2015). Decreased alpha-amylase activity through music is influenced by the elements contained in the music. The type of music used by researchers in this study is the type of music Pachelbel's 'Canon' and stress relief that has a slow frequency, regular rhythm with a tempo less than 80 beats. Elements contained in the music used to affect the response of relaxation respondents. This is in line with studies that show an increase in brain-derived neurotrophic factor (BDNF) that functions in controlling

anxiety and emotions after being given intervention with a low rhythm and mild tempo of 50-60 dB (Angelucci, Ricci, Padua, Sabino, & Attilio, 2007).
The additional intervention other than PMR and music used in this study is lavender aromatherapy. Other studies showed that aromatherapy relaxed breathing muscles and made breathing rhythms more regular. Moreover, the use of lavender aromatherapy is effective in improving mood and provide a sense of comfort (Linnemann et al., 2015). Aromatherapy lavender can lower the level of salivary cortisol that indicates decreased stress (Toda & Morimoto, 2011).

The PMR intervention with music and aromatherapy performed in this study was conducted in 4 sessions for four days. The results showed that the effect of the intervention was seen to be significant between before and after the intervention within that period. The results of this study were supported by studies that showed a decrease in blood pressure, electromyography, anxiety, and fatigue after the provision of progressive muscle relaxation with music for four sessions of exercise (Jose & Almeida, 2013; Kyung, 2010).

CONCLUSION

The stress of teacher respondents decreased after given PMR with music and aromatherapy in the intervention group. Whereas in the control group, the level of stress remained almost similar before and after the intervention. Nurses can implement PMR with music and aromatherapy in the workplace as one of the occupational health services and work together with the educational authorities to open opportunities for nurses to implement relaxation interventions as an effort to prevent occupational stress.

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Antiretroviral Side Effects on Adherence in People Living with HIV/AIDS

Gede Arya Bagus Arisudhana[1], Muchlis Achsan Udji Sofro[2], Untung Sujianto[3]

[1]*Postgraduate Program in Nursing, Department of Nursing, Diponegoro University, Indonesia*
[2]*Faculty of Medicine, Diponegoro University, Indonesia*
[3]*Department of Nursing, Faculty of Medicine, Diponegoro University, Indonesia*
Corresponding Author: Gede Arya Bagus Arisudhana (aryabagus08@gmail.com)

ABSTRACT

Background: Antiretroviral therapy is a lifelong treatment in people living with HIV/AIDS (PLWHA). Adherence is the key to the effectiveness of antiretroviral therapy. The administration of antiretroviral has some side effects that may affect patient adherence.
Purpose: This study aimed to examine the impacts of antiretroviral side effects on adherence in PLWHA.
Methods: This study used a correlational research design. The samples were 78 patients receiving antiretroviral therapy at the tropical disease and infection polyclinic in a hospital in Semarang. Purposive sampling was used to recruit the samples. Data on side effects of antiretroviral were obtained based on the patients' reports, while data on adherence of pill consumption were obtained through the calculation of pills using pill count adherence rate. The collected data were analyzed using the Fisher's exact test.
Results: Results showed that the side effects of antiretroviral therapy influenced the antiretroviral adherence ($p<0.001$). Most of the side effects of antiretroviral reported by participants were nausea and dizziness. Some participants also reported weakness, difficult to concentrate, and diarrhea.
Conclusion: The side effects of antiretroviral had negative impacts on patients' antiretroviral therapy adherence. Therefore, nurses and health care providers of PLWHA should be able to recognize and give concern on antiretroviral side effect management.

Keywords: Adherence; antiretroviral; PLWHA; side effect

BACKGROUND

HIV/AIDS is still a global health problem since it was discovered. The report of Joint United Nations Program on HIV/AIDS (UNAIDS) in 2015 shows that the number of people living with HIV/AIDS (PLWHA) in the world reaches 36.7 million people with 2.1 million newly infected with HIV and 1.1 million deaths due to AIDS (UNAIDS, 2016). Indonesia is among the 12 countries in the Asia Pacific region with the fastest spread of HIV cases since 2001 up to 2015 (UNAIDS, 2016). In Indonesia PLWHA receiving antiretroviral therapy reached 130,577 people, consisting of adults (93.5%) and children (6.5%). Most of them were still on antiretroviral therapy (50.5%), while 2.6% were unknown, 15.6% were died, 8.7% were out, 2% stopped, 20.6% were lost to follow up (Directorate General of Disease Control and Environmental Health, 2016). The

number of PLWHA in Semarang City was 2,926 who were eligible for antiretroviral therapy and 987 people were still on antiretroviral therapy (Semarang City Health Office, 2015).

Antiretroviral can reduce the risk of HIV transmission, inhibit worsening of opportunistic infections, reduce the amount of virus (viral load) to be undetectable (Directorate General of Disease Control and Environmental Health, 2011). Treatment with antiretroviral is associated with a number of adverse events that have short-term and long-term consequences. The patients' perception that the medication has side effects may cause patients to be non-adherent to the treatment. Factors affecting non-adherence to medication among patients are complex. Few studies found that the side effects of treatment were associated with poor adherence and inspite of antiretroviral benefit, adverse effects are commonly the main reasons for skipping medication (Al-Dakkak et al., 2013).

Some studies reported high incidence of antiretroviral side-effects primarily at initial initiation of ART (Masenyetse, Manda, & Mwambi, 2015; Teklay, 2013). Other studies have shown that patients reporting higher adverse reactions to antiretroviral are more likely to be non-adherent to their antiretroviral regimen. This suggests that adverse reactions may cause treatment interruption and replacement in the prescribed regimen. High adherence (>95%) in antiretroviral is needed to avoid viral resistance to antiretroviral drugs, treatment failure, and lost to follow up (Ministry of Health Republic of Indonesia, 2012; UNAIDS, 2016).

Adherence is an important determinant of successful antiretroviral therapy (Teklay, 2013). Most patients get first-line antiretroviral which can be obtained freely while the type of antiretroviral given is based on the patient's condition. The side effects experienced by the patients are various with varying levels of adherence. Severe side effects of antiretroviral may have significant impacts on adherence. Even though nursing interventions have been given but there are still many inadequacies in the consumption of antiretroviral drugs due to the side effects of therapy. It is critical to understand the impacts of antiretroviral side effects on adherence in PLWHA.

PURPOSE

This study aimed to examine the impacts of antiretroviral side effects on adherence in PLWHA.

METHODS

Design and sample

This study used a correlational research design. The samples were 78 participants who were recruited by purposive sampling. The inclusion criteria were; patients aged >18 years, at 1st and 2nd clinical stages, use first-line antiretroviral therapy, and CD4 cell count >200 cells/mm3 when initiating therapy. Upon enrollment and during follow-up visits, data on socio-demographic factors were collected, including the number and doses of antiretroviral, durations of antiretroviral used, age, and employment status. Antiretroviral side effect symptoms were collected using the questionnaires. Participants were asked to bring their medication bottles to each study visit. Using a pill-count form, data on the

name, number of remaining pills in the bottle, and number of prescribed pills of each antiretroviral medication were collected at each visit.

Ethical consideration

The study was conducted at the tropical and infection disease polyclinic in a hospital in Semarang for 5 weeks in 2017. This study was reviewed and approved by the medical research ethics committee of the Faculty of Medicine, Diponegoro University, and Dr. Kariadi General Referral Hospital in Semarang.

Measurements

Pill counts were calculated as the number of pills taken (the number of pills dispensed – the number of pills counted). Pill Counts Adherence Rate (PCAR) was done by counting the number of pills or drugs that have been consumed divided by the number of medications prescribed for a certain period and then multiplied by 100% (Wu et al., 2015). The number of pills expected to have been taken was calculated by multiplying the daily dose (1/2, 1 or 2 tablets) by the number of days since the date dispensed (Achieng et al., 2013). Previous studies have found that pill count adherence assessment was able to show different adherence in treatment and indicated the rate of adherence so that it can detect non-adherence (Achieng et al., 2013). Adherence can be categorized into optimal adherence in which PCAR is ≥95% and suboptimal adherence in which PCAR is <95% (Joshi et al., 2014).

Data analysis

The univariate and bivariate analyses were applied. The univariate data were presented in frequency and percentage for categorical data, mean and SD for numerical data. Fisher's exact test was used as the bivariate analysis.

RESULTS

Participants characteristics

In the first table, the average age of the participants was 37.63 years with an average antiretroviral treatment duration of 4.13 years. Participants in this study were dominated by men as many as 51 (65%) people, and 51 (65%) participants had jobs. The side effects of antiretroviral experienced by participants were mostly dizziness (52.9%) and nausea (47.1%).

Table 1. Participants' characteristics (n=78)

Variable	Frequency (%)	Mean±*SD*
Age	78 (100)	37.63 ± 10.075
Durations of antiretroviral used	78 (100)	4.13±3.188
Level of adherence		88.77±3.35
Gender	51 (65)	
Male	22 (28)	
Experienced side effects	29 (37)	
Not experienced side effects	27 (35)	

Variable	Frequency (%)	Mean±*SD*
Female	12 (15	
Experienced side effects	15 (20)	
Not experienced side effects		
Employment Status		
Working	51 (65)	
Not Working	27 (35)	
Kind of side effects (SE)		
Gantrointestinal SE		
Nausea	16 (47.1)	
Vomiting	10 (29.4)	
Diarrhea	3 (8.8)	
Abdominal bloating	3 (8.8)	
Central nervous SE		
Dizziness	18 (52.9)	
Insomnia	6 (17.6)	
Difficult to concentrate	7 (20.6)	
Others SE		
Limp	6 (17.6)	
Rash	8 (23.5)	
Drowsiness	7 (20.6)	

Side effects on antiretroviral adherence

Table 2 explains the number of participants who experienced antiretroviral side effects as many as 34 (44%). Two participants had optimal compliance (2.5%) and 32 participants (42%) had suboptimal compliance. Participants who did not experience antiretroviral side effects but had optimal adherence were 35 (45%) and suboptimal were 9 (11.5%). The correlation between drug side effects and adherence to antiretroviral medication showed a p-value <0.001; with a *coefficient correlation* 0.590 (59%).

Table 2. Side effects on antiretroviral adherence (n=78)

Side Effect	Adherence			*r*	*p*
	Optimal (%)	Suboptimal (%)	Total (%)		
Experienced (%)	2 (2.5)	32 (41.0)	34 (44)	0.590	<0.001
Not experienced (%)	35 (45.0)	9 (11.5)	44 (56)		
Total	37 (47.5)	41 (52.5)	78 (100)		

DISCUSSION

The results of this study indicate there were 34 participants who experienced side effects after taking antiretroviral, 12 females and 22 males. A consistent finding explains that female sex has been shown to be at a higher risk factor for clinically relevant adverse drug reactions (Anderson, 2008). To assess the side effect of antiretroviral drugs, the patients' own report on adverse effects was used. After initialization of antiretroviral treatment subjects reported experiencing side effects such as dizziness and nausea. The mean level of adherence is reported to be in value 88.77% (Table 1). High adherence (>95%) is needed to prevent treatment failure (Ministry of Health Republic of Indonesia, 2012); UNAIDS, 2016).

This study showed correlations between side effects and nonadherence to antiretroviral. The correlations between side effects on adherence of antiretroviral was shown in Fisher's exact test with p-value <0.001. The level of correlation shown by a *coefficient correlation* 0.590. This suggests that drug side effects may explain its effect on non-adherence consuming ARV as much as 59%. Severity of medication adverse effects was related to an increased nonadherence. This is consistent with other studies that identified adverse effects as a predictor of nonadherence (Okoronkwo, Okeke, Chinweuba, & Iheanacho, 2013; Rudy, Murphy, Harris, Muenz, & Ellen, 2009; Wakibi, Ng, & Mbugua, 2011). The result of this study is consistent with the conceptualization of adherence as a multifaceted construct and influenced by a wide range of dynamic factors. This current study contributes to the understanding of the correlations between side effects and adherence to antiretroviral by identifying specific adverse effects related to nonadherence.

Drug-induced side effects are more common in PLWHA than in the general population. Side effects can be caused by immune hyperactivation factors, changes in metabolism in the body, cytokine profile, oxidative stress, and genetic predisposition (Latif, Maria, & Syafar, 2014). Antiretroviral side-effects generally occur within the first three months of treatment, but not all PLWHA will experience adverse effects after taking antiretroviral drugs (Latif et al., 2014). This is in line with a study conducted in Nigeria suggesting that drug side effects are more likely to occur in the first six months of treatment than with long-standing antiretroviral therapy (Eluwa, Badru, & Akpoigbe, 2012). Another study which is not in line with the results of this study explains that the period of time needed to undergo therapy and the time to suffer from the disease can increase the high risk of decreasing the level of adherence (Kammerer, Garry, Hartigan, Carter, & Erlich, 2007). It can be caused by the patient's perception about the medication side effects.

Thus, developing clinical interventions that address the self-management of side effects is needed. Interventions focus on psychosocial factors and reduce risk behaviors. Studies have shown that symptom management interventions have been effective at increasing self-care ability in managing medication side effects with HIV+ individuals (Chen et al., 2013). This study had certain limitation. It was performed in a small sample size, which might influence the significant differences in the level of adherence based on patient characteristics.

CONCLUSION

The results of this study showed that antiretroviral side effects have an impact on patient's antiretroviral therapy poor adherence. Antiretroviral adverse reactions were the single most common reason for poor adherence. Therefore, healthcare providers especially nurses should be able to recognize and give concern on antiretroviral side effect management. Identifying risk factors for the occurrence of non-adherence is of crucial importance to optimize the initial choice of antiretroviral regimen before initiating the therapy.

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Effects of Yoga Relaxation on Anxiety Levels among Pregnant Women

Shinta Novelia[1], Tantri Wenny Sitanggang[2], Afnita Yulianti[3]

[1,3] *Faculty of Health Sciences, Universitas Nasional, Indonesia*
[2]*Ichsan Medical Centre Institute of Health Sciences, Indonesia*
Corresponding Author: Shinta Novelia (cdrchinta@yahoo.com)

ABSTRACT

Background: Self-reported maternal mood symptoms during pregnancy have been related to poor birth outcomes, including low birth weight, increased risk of premature delivery, and pre-eclampsia among pregnant women. A non-pharmacological method is needed to overcome mood symptoms such as anxiety during pregnancy.
Purpose: This study aimed to evaluate the effects of yoga relaxation on anxiety levels among pregnant women at the third trimester.
Methods: This study employed a quasi-experimental research design and involved 30 pregnant women at the third trimester who were equally divided into two groups. The levels of anxiety were measured by using Hamilton Anxiety Rating Scale (HARS). Data were analysed using the independent t-test and the paired sample t-test.
Results: The results showed that there was a significant difference in the anxiety levels before and after the intervention in the experimental group (t=7.56, p=0.005), and there was a significant difference in the anxiety levels after the intervention between the experimental and control group (t=-9.289, p=0.005).
Conclusion: Yoga relaxation had an effect on reducing anxiety levels among pregnant women at the third trimester. It is expected that pregnant women use yoga relaxation to decrease anxiety.

Keywords: Anxiety; pregnant women; yoga relaxation

BACKGROUND

Maternal anxiety usually occurs in pregnancy, especially at the third trimester. Pregnant women respond differently to identical stressful stimuli, depending on personality traits, previous experience, genetic factors, and social support. Furthermore, normal pregnancy is associated with physical alterations, hormonal changes, and anxiety toward labor or fetal outcome, and all of which potentially worsen the stress response (Barber & Starkey, 2015). The interaction among all these factors allows evidence-based stress research with difficult and complicated pregnant women.

Anxiety and stress have some effects on the body that may progress into chronic conditions if left untreated. Psychological stress has been linked to deleterious effects on the immune system, while anxiety has been linked to coronary heart disease, decreased quality of life, and suicidal behavior (Olatunji, Cisler & Tolin, 2007; Roest, Martens, de Jonge, & Denollet., 2010; Segerstrom & Miller, 2004). Furthermore, anxiety in pregnancy has been associated with an increase in obstetric complications including

stillbirth, low birth weight infants, postnatal specialist care for the infant and susceptibility to more adverse neurodevelopmental outcomes including behavioural, emotional and cognitive problems (Bonari, Pinto, Ahn, Einarson, Steiner, & Koren, 2004; Glover, 2011; Talge, Neal, & Glover, 2007).

One of the midwifery care performed to reduce anxiety toward labor is physical exercise, such as meditation or prenatal yoga or yoga relaxation. Prenatal yoga or yoga relaxation is one of the solutions that support the process of pregnancy even until delivery. Yoga during pregnancy also contributes to a reduction in pain of labor and improved adequacy of childbirth (Jahdi et al., 2017). Yoga techniques aim to build and retain a healthy balance between all aspects of body and mind. During pregnancy, prenatal yoga or yoga relaxation will focus its attention on the rhythm of the breath, giving priority to comfort and safety in practice so that it provides many benefits (Bribiescas, 2013).

Some studies demonstrated the significant effects of yoga relaxation technique on reducing anxiety levels. A study showed that yoga could be used as a treatment for Obsessive Compulsive Disorder (OCD) (Javnbakht, Kenari, & Ghasemi, 2009). When it was used as an adjuvant to drugs, yoga led to the better improvement of symptoms. In addition, Khalsa's review of papers over the past three decades concluded that Yoga demonstrated efficacy for psychopathological (e.g., depression, anxiety), cardiovascular (e.g., hypertension, heart disease), respiratory (e.g., asthma) diseases and diabetes (Jeter, Slutsky, Singh, & Khalsa, 2015). Furthermore, yoga also was found as a relaxation technique to reduce labor complication (Rakhshani, Nagarathna, Mhaskar, Mhaskar, Thomas, & Gunasheela, 2012). A study conducted by Nerendran (2005) found that from 169 pregnant women, 14% pregnant women who did not practice yoga experience premature births compared to 29% pregnant women who practiced yoga. Also, the results found that relaxation during pregnancy could reduce the incidence of premature birth and other labor complications.

Beside the advantages of yoga relaxation which were reported in the previous studies, some limitations were acknowledged such as a lack of control group, non-randomization, lack of exclusion criteria, or large standard deviations associated with the data (Banerjee et al., 2007; Rao et al., 2009). Based on the data in Rumah Puspa Clinic in Jakarta, Indonesia in 2016, it was found that more than 64% of pregnant women frequently faced anxiety at the third trimester. Yoga was found to be as effective as relaxation in reducing stress, anxiety and improving health status (Smith, Hancock, Blake-Mortimer, & Eckert, 2007). Helpful psychological interventions during pregnancy are rare and expensive, and usually only available for a small percentage of those suffering or deemed to be at risk. Thus, the implementation of yoga relaxation to overcome anxiety among pregnant women is needed.

PURPOSE

This study aimed to evaluate the effects of yoga relaxation on anxiety levels among pregnant women at the third trimester.

METHODS

This study used a quasi-experimental research design. Rumah Puspa Clinic and Aulia Assokabah Clinic in Bekasi Regency, West Java, Indonesia were selected as the study sites because they had prenatal yoga program and were accessible. This study was conducted from June 25 to July 16 in 2017. The ethical clearance was gained from Universitas Nasional (Letter No. 249/D/FIKES/V/2017) and was approved by the clinics where the study took place. The population was 78 pregnant women at the third trimester who attended the yoga relaxation program in Rumah Puspa Clinic during the study period without any documented psychological disorders or specialists' recommendation for taking this therapy. Thirty-five participants were needed to reach the minimum sample size using the Yamane Taro formula (Singh & Masuku, 2014). However, only 15 pregnant women agreed to participate in the study. Thus, 15 women in Rumah Puspa Clinic were purposively selected and assigned into the experimental group. At the same time, 15 pregnant women in Aulia Assokabah clinic were randomly selected and assigned into the control group. Data were collected using the Hamilton Anxiety Rating Scale (HARS) to assess the anxiety levels.

Yoga relaxation treatment was given two times for two weeks with a duration of 90 minutes. All pregnant women did the yoga exercise led by a yoga instructor. The yoga instructor performed a 9-step *Suryanamaskar* movement modified with other movements. The literal meaning of *Suryanamaskar* (a group of yogic Asanas) is a salutation to the sun (Sinha, Ray, Pathak, & Selvamurthy, 2004). *Suryanamaskar* is a group of yogic exercise which consists of a set of twelve postures which are performed rhythmically with controlled breathing. The entire yogic exercise consisted of *Hatha Yogic Asanas*, *Pranayama* and meditation. This sequence of *Asanas* was developed in the much later period as compared to the other *Hatha Yogic Asanas*. It is an effective way to stretching many muscles and performing movements at many joints of the body. The control group received routine care in the form of antenatal care and health education around the preparation before delivery without yoga relaxation. The time range between the pre-test and post-test was two weeks.

Data were analyzed by the descriptive and inferential statistics. The paired sample t-test was used to analyse the difference of anxiety between pre and post intervention within the experimental group. Additionally, the independent t-test was used to analyse the difference of anxiety post-intervention between the experimental and control group.

RESULTS

Demographic characteristics

Table 1 shows that the mean age of respondents was 29.13. Additionally, the majority of the respondents graduated from senior high school and were multiparas.

Table 1. Demographic characteristics of the participants (N=30)

Characteristics	M (SD)	n	%
Age	29.13 (5.58)		
Education levels			
Junior high school		7	23.3

Characteristics	M (SD)	n	%
Senior high school		19	63.3
University		4	13.3
Parity			
Primipara		14	46.7
Multipara		16	53.3

The levels of anxiety pre and post-test in the experiment group

The result showed that the majority of respondents in the experimental group had a low level of anxiety before the intervention (40%), and the majority of the respondents had no anxiety after the intervention (86.7%) (Table 2).

Table 2. The levels of anxiety pre and post-test in the experimental group

Anxiety level	Pre-test		Post-test	
	f	%	f	%
No anxiety	3	20	13	86.7
Low	6	40	2	13.3
Middle	3	20	0	0
High	3	20	0	0
Total	15	100	15	100

The levels of anxiety pre and post-test in the control group

The result showed that the majority of respondents in the control group had a medium level of anxiety in the pre-test (46.7%) and the majority of the respondents had a medium level of anxiety in the post-test (60%) (Table 3).

Table 3. The levels of anxiety pre and post-test in the control group

Anxiety level	Pre-test		Post-test	
	f	%	f	%
No anxiety	0	0	0	0
Low	4	26.7	2	13.3
Medium	7	46.7	9	60
High	4	26.7	4	26.7
Total	15	100	15	100

The difference of levels of anxiety pre and post-intervention in the experimental group

Table 4 shows that there is a difference of anxiety levels before and after intervention within experiment group (t= -7.56, p= .005).

Table 4. The difference in the levels of anxiety between pre and post intervention in the experimental group

	M	*SD*	95% Confidence		*t*	*p*
			Lower	Upper		
Pre-post anxiety level	9.87	5.05	7.06	12.67	-7.56	0.005

The difference in the anxiety levels post-intervention between the experimental and control group

The result showed that there is a difference in the anxiety levels between the experimental and control group after the intervention (t= -9.83, p= 0.005) (Table 5). It can be concluded that there was an effect of yoga relaxation on the levels of anxiety among pregnant women at the third trimester.

Table 5. The difference in the anxiety levels post-intervention between the experimental and control group

	Levene's Test		Mean	95% Confidence		*t*	*p*
	F	Sig	difference	Lower	Upper		
Anxiety level post intervention	0.014	0.907	-15.4	-18.61	12.20	-9.83	0.005

DISCUSSION

The levels of anxiety among the respondents in the experimental group

The results showed that the majority of respondents had a low level of anxiety before the intervention and the majority of the respondents had no anxiety after the intervention. These results indicate that there is a significant change in anxiety levels between before and after yoga relaxation.

Pregnant women experience significant changes in physiological and psychological functions that often cause anxiety disorders (Glynn, Schetter, Hobel, & Sandman, 2008). Anxiety experienced by pregnant women is due to increased progesterone hormone during pregnancy. In addition, an increase in adrenaline hormone leads to physical tension that causes tired, angry, anxious, difficult to concentrate and hesitate. It is also assumed that anxiety in pregnant women will increase at the third trimester (Bastani, Hidarnia, Kazemnejad, Vafaei & Kashanian, 2005).

The result of this study was similar to a previous study which found that normal pregnant women in the face of childbearing are most likely to have mild anxiety and moderate anxiety (Celedonia, 2010). Additionally, Bannet (2004) found that anxiety in the third trimester of pregnancy is more severe than the first trimester. It was revealed that when the women were at the third trimester of pregnancy, the physical changes have reached the peak, and the psychological perception is also increasing such as excessive anxiety before the delivery process.

The levels of anxiety pre and post intervention in the control group

The results of this study showed that the majority of respondents both before and after the intervention had a medium level of anxiety. There were no respondents who had no anxiety either before or after the intervention.

This result is supported by a previous study which found that from 158 respondents, 52.5% of pregnant women experienced anxiety (Astria, Nurbaeti, Rosidati, 2012). In addition, another study also found that a substantial number of pregnant women screened in obstetrics settings had significant symptoms of anxiety (Marcus, Flynn, Blow, & Barry, 2003). This indicates that the level of anxiety during pregnancy at the third trimester of pregnancy is still high.

This study found that the level of anxiety in the control group did not change significantly because the control group only received routine care in the form of antenatal care and health education about preparation before delivery and not given information about the handling of anxiety, including the yoga relaxation. There is a tendency that pregnant women feel anxious because of difficulties to adapt to pregnancy and insufficient information. Pregnancy causes discomfort and anxiety due to physical and psychological changes (Hawari, 2010). Pieter and Lubis (2010) also found that pregnant women will experience forms of psychological changes such as emotional changes, tend to be lazy, sensitive, easily jealous, ask for more attention, feelings of discomfort, depression, stress, and anxiety.

The difference in the levels of anxiety pre and post-intervention in the experimental group

The results of the study showed that there were differences in the anxiety levels before and after the intervention in the experimental group. Yoga relaxation in this study was given two times for two weeks with a duration of 1.5 hours. The participants were reported to experience a significant change between the pre-test and post-test. This happened because the yoga relaxation instructor also performed a 9-step *Suryanamaskar* movement modified with other movements. *Suryanamaskar* has positive physiological benefits as evidenced by improvement of pulmonary function, respiratory pressures, hand grip strength, and endurance, and resting cardiovascular parameters (Bhavanani, Udupa, & Madanmohan, 2011). Also, yoga reduces perceived stress and improves adaptive autonomic response to stress in healthy pregnant women (Satyapriya, Nagendra, Nagarathna, & Padmalatha, 2009).

The results of this study were in accordance with a study conducted by Aprilia and Ritchmond (2014) which found that the movement of 9-step Suryanamaskar conducted for 30-60 minutes per day will optimize the relaxation movement of yoga. The results of this study were supported by another study such as Gupta, Khera, Vempati, Sharma, and Bijlani (2006) which found that yoga exercise is a physical treatment in which *bermayata* can provide psychological effects that help to reduce anxiety due to the relaxing effect. In addition, another study found that participation in a two-month yoga class can lead to significant reduction in perceived levels of anxiety in women who suffer from anxiety disorders (Javnbakht, Kenari, & Ghasemi, 2009). Chen, Yang, Chou, Li, Chang, and Liaw (2017) revealed that prenatal yoga reduced the stress hormone and enhance the immune

biomarker Ig A during pregnancy. Its outcome variables were biological markers of both salivary cortisol and Ig A and were sensitive enough to detect the immediate and long-term effects of prenatal yoga. The study evidence recommends that practicing yoga positively influences pregnant women's health. It is suggested for pregnant women to practice yoga relaxation during pregnancy to overcome their anxiety to prevent labor complications.

The difference in the anxiety levels post-intervention between the experimental and control group

The results showed that there is a difference in the anxiety levels between the experimental and control groups after the intervention, meaning that there was an effect of yoga relaxation on the levels of anxiety among pregnant women at the third trimester. This result indicates that the changes in anxiety levels in the experimental group were due to the intervention.

This study is supported by the previous study which found that the element in yoga could reduce anxiety if one relaxes on his body (Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005). According to Sun, Hung, Chang, and Kuo (2010), one way to overcome anxiety and discomfort of pregnancy is practicing yoga relaxation. In addition, prenatal exercise is safe and beneficial for the fetus. The maternal exercise was associated with reduced odds of macrosomia (abnormally large babies) and was not associated with neonatal complications or adverse childhood outcomes (Davenport et al., 2018).

Yoga is one solution that helps the process of pregnancy and childbirth. Yoga is a kind of bodywork, mind and mental that really help pregnant women flex muscles and joints and soothe the mind, especially during the third trimester. Prenatal yoga or yoga relaxation has five ways of physical exercise of yoga (*asanas*), breathing (*pranayama*), position (*nidra)*, meditation (*dhyana*) and deep relaxation that can be used to help to smooth pregnancy and childbirth naturally and help to ensure the baby is born in good health (Curtis, Weinrib, & Katz, 2012). Also, building a positive way of thinking about childbirth is one of the treatments given in the prenatal yoga or relaxation of yoga in the deep stage of relaxation. Thus, it is expected that the anxiety and tension in labor will decrease and even disappear. Therefore, the women can develop a sense of courage to face the physiological process that every woman will pass by (childbirth).

CONCLUSION

The study revealed that there was an effect of yoga relaxation on the anxiety levels among pregnant women at the third trimester. This study provides evidence that Yoga relaxation has an effect on reducing the anxiety levels among pregnant women. It is expected that nurses and midwives in Indonesia could enhance the health education regarding psychological intervention such as yoga relaxation for pregnant women to overcome anxiety. It is also suggested that pregnant women practice yoga relaxation. Future research is needed to conduct the yoga relaxation using the specific instrument such as Anxiety Scale for Pregnancy (ASP) to enhance the validity. Clinical outcomes are also needed to be measured as the effect of anxiety disorders such as vital signs.

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A Case of Acute Myocardial Infarction during Chemotherapy of Advanced Rectal Cancer

Yoshiyuki Kashiwagi[1]

[1]*Graduate School of Health Sciences and Welfare, International University of Health and Welfare, Kanagawa, Japan*
Corresponding Author: Yoshiyuki Kashiwagi (newstyle.clubana@gmail.com)

ABSTRACT

Background: Cetuximab, irinotecan, levoforinate, and 5-FU (FOLFIRI) are medicines commonly administered to advanced colorectal cancer patients through chemotherapy. Although this regimen is standardized for recurrent metastatic colorectal cancer, the emerging of myocardial infarction is rare.
Purpose: The purpose of this study was to consider the development of myocardial infarction during the chemotherapy of colorectal cancer.
Methods: A retrospective case study was conducted to one patient. An 80-year-old man who developed acute myocardial infarction was in chemotherapy with cetuximab + FOLFIRI with multiple lung metastases after rectal cancer surgery. Data were collected from the patient's medical and nursing records as well as the physiological function test results.
Results: Three days after the 38th administration, the patient visited an emergency outpatient mainly with complaints of dyspnea and back pain. Electrocardiogram showed that the lower wall infarction was suspected. The patient was transferred to a specialized cardiovascular hospital. Emergency coronary angiography was performed in the diagnosis of acute myocardial infarction, and percutaneous coronary intervention was performed. The patient was discharged on the 10th of disease day.
Conclusion: In this case, it was thought that cetuximab + FOLFIRI synergistically induced hyper thrombogenicity, coronary plaque erosion, and acute myocardial infarction. It may also be necessary for interventions such as monitoring the risks in daily living by the medical care providers and guidance on risk avoidance behaviors.

Keywords: Acute myocardial infarction; chemotherapy; rectal cancer

BACKGROUND

Colorectal cancer is the third most common cancer in Japan. Colorectal cancers above stage 3 are recommended to be treated by drip infusion chemotherapy. Some chemotherapy regimens are used; however, most regimens consist of oxaliplatin or irinotecan as the key drug (Endo, Kato, & Matsui, 2017). Genetic analysis has advanced along the time, therefore drug selection based on genetic analysis results is mainstream for today's clinical practice. RAS gene is one of the key genes for colorectal cancer, and if the patient has wild type RAS gene, the patient can use the molecularly targeted drug (Endo, Kato, & Matsui, 2017; Komatsu, 2014). Consequently, Cetuximab and irinotecan, levoforinate, 5-FU (FOLFIRI) are administered to advanced colorectal cancer.

Cetuximab is administered in combination with FOLFIRI for the wild type RAS gene. It is an approved treatment for colorectal cancer in both adjuvant and metastatic cases in Japan (Endo, 2011; Hatake, 2005).

Adverse events of the chemotherapy drugs such as dermal and gastrointestinal toxicity were present in the past, but in rare cases, it was reported that acute myocardial infarction and angina pectoris also emerged during treatment. Among them, many drugs reported to be bevacizumab, cisplatin, 5-FU (Ito & Mukai, 2018; Komatsu, 2014; Okamoto & Sasaki, 2015; Takahashi, Tanaka, Tamura, Yamazoe, & Shibata, 1999; Tsutsumi, Ozawa, Kawakami, Fujii, & Asamoto, 1990). The onset of cardiovascular disease during chemotherapy is very rare and there are no many cases reported in Japan. However, the onset of cardiovascular disease tends to increase due to the aging of patients and prolonged cancer treatment (Minami, 2010). It is also pointed out that the history of cancer treatment may be a strong risk factor for the onset of heart disease (Armstrong, 2014). In the view of the prognosis of cancer patients and the maintenance of the quality of life, efforts for reducing cardiovascular disease complications are regarded as important (Ito & Mukai, 2018).

A case of acute myocardial infarction during cetuximab plus FOLFIRI therapy that had rarely been reported in previous studies would be reported through this case report. This report wants to share the development of myocardial infarction during chemotherapy in the clinical practice.

PURPOSE

The aim of this study was to consider the development of acute myocardial infarction during chemotherapy of colorectal cancer.

METHOD

A retrospective study of cases in which myocardial infarction developed was conducted. An 80-year-old man who developed acute myocardial infarction was in chemotherapy with cetuximab + FOLFIRI with multiple lung metastases after rectal cancer surgery. Data were collected from the patient's medical and nursing records as well as physiological function test results. The ethical approval was obtained from the target hospital's research ethics committee.

RESULT

An 80-year old male patient, height 168 cm, weight 53 kg, started chemotherapy with cetuximab plus FOLFIRI (Figure. 1) in April 2016 and obtained a total of 76 doses administered until March 2018. Patient's bloody stools were seen in December 2016; then he visited a hospital. As a result of the examination, a diagnosis of rectal cancer with multiple lung metastases, stage IV was made in January 2016. The patient then had lower anterior colon resection in February 2016. Patient had a past history of hypertension (intrarenal calcium antagonist) with coronary risk factors, including smoking history (40 years up to 18 years ago), drinking history (about two cups daily until 2015), no diagnosis of diabetes but high value of HbA1C was pointed out (5.3 in April 2016). The patient had a habit of 1-hour walking everyday.

Table 1. Chemotherapy regimen

Drugs/day	1	8	15
Cetuximab	√	√	√
Irinotecan	√		√
Levofolinate	√		√
Fluorouracil (bolus)	√		√
Fluorouracil (48hours)	√		√

Three days after the 76th administration, dyspnea and back pain occurred during walking in the early morning; then the patient was carried to an emergency department by ambulance. According to the blood biochemical examination (Table 1), a decline in hematopoietic stem function and a high value of white blood cells/neutrophils were observed. Creatine Kinase MB (CK-MB) showed a mild increase of 14.7. Electrocardiogram showed a sinus rhythm with a heart rate of 62 beats per minute with elevated ST segments on Ⅱ, Ⅲ, and aVF, and depressed ST segments on V2 - V4. Consequently, the patient was diagnosed with a lower wall acute myocardial infarction, then was transferred to a specialized hospital for the circulatory system.

Table 2. Blood test results

Components	Value
BUN	21mg/dL
Creatinine	0.75mg/dL
Bilirubine	0.3mg/dL
AST	34IU/L
ALT	31IU/L
LD	268U/L
γ-GT	42U/L
CK	183 U/L
Amylase	114 U/L
Natrium	143mEq/L
Kalium	3.7mEq/L
Chloride	107mEq/L
Albumin	4g/dL
CK-MB	14.7IU/L
CRP	0.05mg/dL
WBC	10400/μL
RBC	365×10^4/μL
Haemoglobin	11.6g/dL
Haematocrit	35%
Platelets	15.3×10^4/μL
Neutrophils	78.9%
HbA1C	7.1

After trans-placement, an emergency Coronary Angiography (CAG) was performed, finding a complete occlusion of right coronary artery #2, and 75% confinement accompanied by strong calcification in #6-7. For # 2, PCI percutaneous coronary intervention was performed, and the stent was placed. The patient was discharged from the hospital with good progress after one week of PCI implementation.

DISCUSSION

There are a number of drugs that have cardiovascular toxicity in chemotherapy drugs (Shirakawa, Kusaba, Odashiro, & Baba, 2011). Therefore, it might develop acute myocardial infarction during treatment of malignant tumor in daily clinical practice (Suzuki, 2014). Report of cardiovascular events in cetuximab and FOLFIRI used in this case is very few as one case of pulmonary embolism (Goto et al., 2010). However, compared with non-cancer patients, the cardiovascular occurrence is 6.7 times for cancer patients, 28 times for blood tumors, 22.2 times for lung cancer, 20.3 times for gastrointestinal cancer, and for colorectal cancer, it is reported as 16.4 times (Goto et al., 2010).

It is reported that the rate of hospitalization for coronary artery disease within six months of diagnosis of malignant tumor is as high as 1.7 times compared with the non-cancer group. However, in this case, its onset at one year and 11 months, and it decreases as suggested by previous studies (Goto et al., 2010; Suzuki, 2014). Also, the frequency of venous thromboembolism for non-resectable colorectal cancer is generally reported as 0-8% (Machials, Sempoux, Scalliet, Coche, & Humblet, 2007). In chemoradiotherapy using cetuximab, venous thromboembolism is reported to be 3 out of 40 as a serious side effect. As a basis for this, although it is in vivo, inhibition of Epidermal Growth Factor Receptor (EGFR) signaling leads to inhibition of Vascular Endothelial Growth Factor (VEGF) secretion, the relationship between cetuximab and thrombus formation cannot be denied (Pore, Jiang, Gupta, Cerniglia, & Kao, 2006). Depending on cancer, tissue factor of the coagulation system is expressed abundantly on the cell surface, and various cytokines such as angiogenic factors are produced. In the process, it is said to be in a hypercoagulable state, which is said to be prone to atherosclerotic artery thrombosis (Ito & Mukai, 2018).

Besides drug thrombus formation, the relationship with conventionally said dangerous risk factors in everyday life was also considered. Compared with chemotherapy, the patient had an increase of about 10 kilograms in weight during chemotherapy before the onset of myocardial infarction. Moreover, high levels of HbA1C were also seen after chemotherapy. Generally, the patient who used steroid might be having impaired glucose tolerance (IGT) (Takano, 2017). As a factor related to high levels of HbA1C, drug-induced glucose tolerance abnormality due to the use of steroid which is a premedication for chemotherapy may be considered, but an overdose of sugar was routinely observed. Because it was palliative chemotherapy, even though grasping such lifestyle habits did not make teaching so severe, it is considered to be a factor causing cardiovascular events. However, in the case where a long-term response state is observed as in this case, factors such as lifestyle such as diet and exercise and aging may combine to develop cardiovascular disease (Ito & Mukai, 2018).

Due to the improvement of antiemetic drugs, there is an individual difference, but the risk of nausea and vomiting is extremely decreased, so the idea that chemotherapy with nausea and malaise decreases meal volume is considered to be in the past. There are no nausea like in this case, and there are patients who eat various things freely. Therefore, ordinary things are needed to be instructed e.g. that it is not the idea that "patients can eat anything any number" by palliative chemotherapy, but to eat proper amounts and maintain appropriate weights (Komatsu, 2014).

When surgery is performed for colon cancer and overcoming the acute phase, it is possible to improve the prognosis for 36 months by performing chemotherapy. Although this will result in death after 36 months, patients will enter a chronic phase of living with cancer. Perhaps, a paradigm shift is needed for the guideline that our cancer patients follow. It is easy to think that myocardial infarction-like this case develops due to complex factors of chemotherapy, malignant tumor, and daily life habits (Ito & Mukai, 2018; Minami, 2010).

Through this case, it is important to conduct daily living guidance and monitoring for the prevention of cardiac diseases and to make efforts to continue safe chemotherapy. To that end, it is thought that it is necessary to identify and intervene the risk factors that are present or latent in patients through the clinical team such as nurses, doctors, pharmacists, and administrative nutritionists.

CONCLUSION

In this case, it is thought that cetuximab + FOLFIRI synergistically induced hyper thrombogenicity, coronary plaque erosion, and acute myocardial infarction. It may also be necessary for interventions such as monitoring of risks in daily living by the medical care provider and guidance on risk avoidance behaviors.

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Family Experiences of Mental Illness: A Meta-Synthesis

Iril I. Panes[1], Cyruz P. Tuppal[2], Mark Donald C. Reñosa[3], Ma. Elizabeth P. Baua[4], Paolo D. Vega[5]

[1]*Sultan Kudarat State University, Tacurong, Sultan Kudarat City, Philippines*
[2,4] *St. Paul University Philippines System, Tuguegarao, Cagayan, Philippines*
[3]*Department of Epidemiology and Biostatistics, Research Institute for Tropical Medicine - Department of Health, Philippines*
[5]*Mount Sinai St. Luke's Hospital, New York, USA*
Corresponding Author: Cyruz P. Tuppal (drcyruztuppal@gmail.com)

ABSTRACT

Background: Caring for a family member diagnosed with mental illness requires a holistic support system. However, some families experience the feeling of burden, loss, and stigma affecting the entire family structure. Therefore, exploring the studies on the family experiences of mental illness is crucial.
Purpose: This meta-synthesis explored the available literature on the family experiences of mental illness.
Methods: An initial comprehensive search was conducted in the following databases such as Web of Science, Scopus, PsycINFO, CINAHL and Ovid-based MEDLINE using the keywords like mental illness, mental disorder, family, family member, qualitative studies and phenomenology. A total of five qualitative studies and one thesis dissertation published between 2001-2016 that elicited views of family members on their experience of mental illness were reviewed. A thematic analysis was used to identify, analyze, and report patterns among the data, allowing for specific organization and description and interpretations.
Results: Family empowerment emerged as the grand theme from the perceived effects of mental illness on the family, the process of coping and their perspectives on family empowerment grounded on family experiences.
Conclusion: Despite caring for a family member diagnosed with mental illness imposes threats, it further offers openness, readiness, and acceptance that empower each family to appreciate, acknowledge, and affirm the wholeness of a family member with mental illness.

Keywords: Family burden; family empowerment; mental health; meta-synthesis

BACKGROUND

The World Health Organisation (WHO, 2001) defines mental health as a state of social well-being where an individual realizes one's potentials, copes with the normal stresses of life, works productively and fruitfully, and contributes to the community. However, mental illness interferes with the person's thinking, feeling, social and daily functioning. As a result, a family member diagnosed with mental illness becomes a burden to the family. Mental illness comprises 12% of the total disease burden and has far-reaching effects on the family as members of the social system (WHO, 2013). Some mental

disorders acquired early in life, become chronic, recurrent and generate immense health burden. Individuals diagnosed with severe mental disorders cannot fulfill the societal roles expected from them at their age and intellectual ability (Borgo, Ramos-Cerqueira, & Torres, 2017). Severe mental illness is stressful, not only for the individual but also for the entire family as they live with their family rather than in mental health institutions and becomes a burgeoning family concern (Kizilirmak & Küçük, 2016; Mulud & McCarthy, 2017).

Mental illness has been an emerging phenomenon and a global burden (Charara et al., 2017; Elias & Paradies, 2016). Although addressing mental health problems is one of the functions of the government, the burden of care falls onto family members and the communities (Hsiao, Klimidis, Minas, & Tan, 2006). Family support provides caregiving roles to the mentally ill member from the admission to discharge (Zauszniewski, Bekhet, & Suresky, 2009). Stuart and Laraia (2005) mentioned that approximately 65% of mentally ill live with their families. Families provide caregiving support, long-term assistance with housing, financial needs, and rehabilitation. Hence, family support is an essential aspect of recovery and community integration, but the family also has specific needs to be considered – psychological, physical, emotional, social and financial. If these needs are not fulfilled, it leads to caregiver burden. Indeed, caring for a mentally ill person is very burdensome and has a tremendous impact on the caregivers' well-being and quality of life (von Kardorff, Soltaninejad, Kamali, & Eslami, 2016).

This meta-synthesis was conducted to explore the experiences among families having a family member with mental illness. Mental illness, which is widely stigmatized, does not have a much social support system as compared to physical ailments, victims of disaster or deaths. Therefore, caregivers have no choice but to carry their physical, emotional, spiritual and financial needs solitarily. Although few studies confirmed burden among the family of mentally ill relatives in general, there is still insufficient description about the family's perception about the illness and their specific process of coping and perspectives of the effect of the illness in the family system. Thus, it is essential to better understand the family's experiences in taking care of a family member diagnosed with mental illness to provide a broader insight into their shared experience.

PURPOSE

This meta-synthesis aimed to explore the family experiences of mental illness.

METHODS

Meta-synthesis is a technique for combining the results of multiple qualitative studies to produce new insight and understanding (Beck, 2009; Sandelowski, 2008). The purpose of meta-synthesis is to identify similarities and differences of the findings and delve deeper into the phenomenon from various studies illuminate an integration of language as a "structure of artifact or culture that must be itself interpreted" (Sandelowski, 2008, p. 18). This interpretive meta-synthesis portrays a distinct, state of the art and direction for highlighting the emerging phenomenon grounded on experiences of family members that offer a novel interpretation of an emerging concept of family empowerment in mental health.

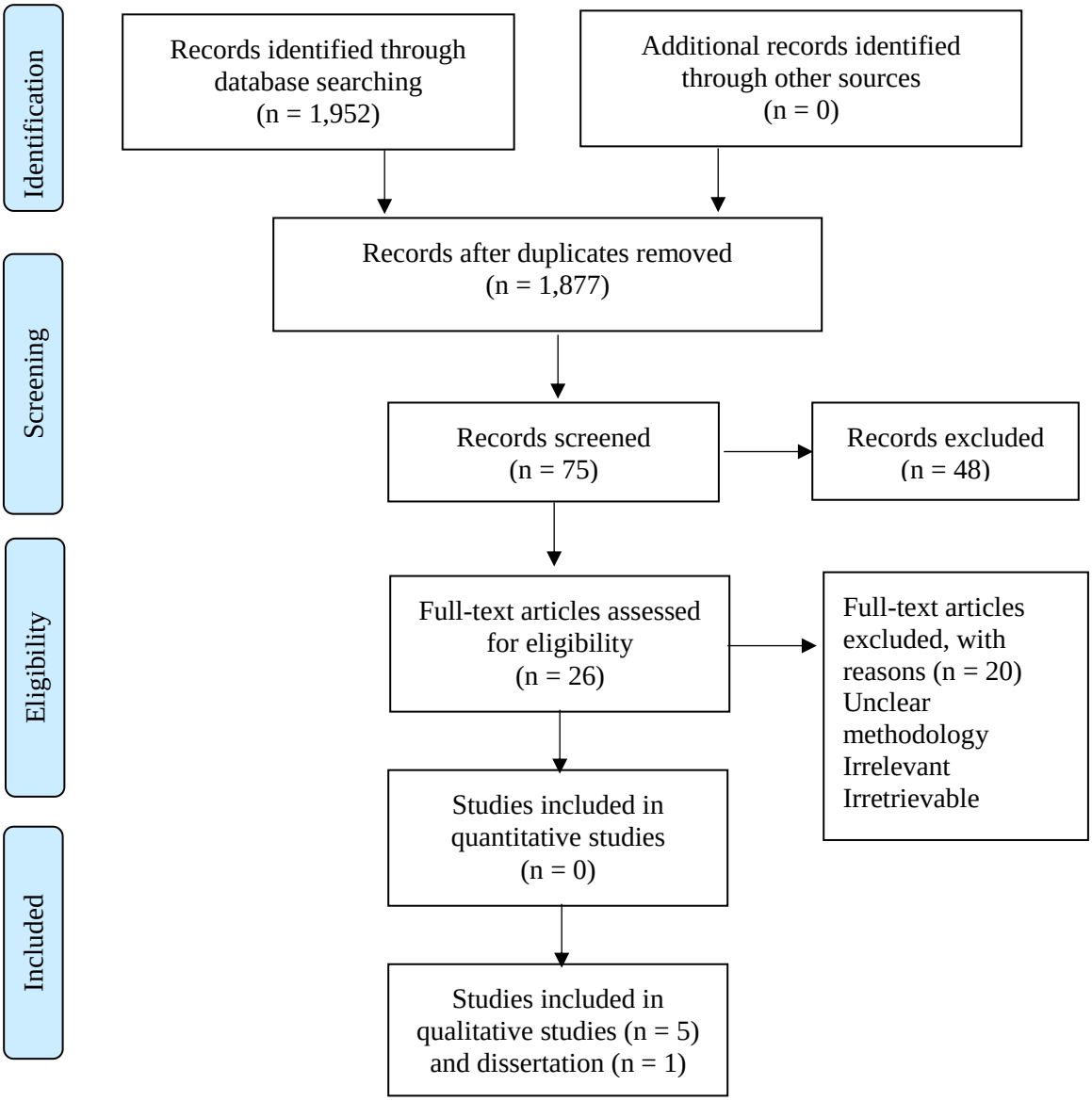

Figure 1. The search strategy selection of the included studies

An initial comprehensive search was performed in the following databases such as Web of Science, Scopus, PsycINFO, CINAHL and Ovid-based MEDLINE. The keywords were mental illness, mental disorder, family, family member, qualitative studies and phenomenology. A total of 1,952 studies were uploaded in the reference manager, and 1,877 were removed as duplicates. An additional manual search was also performed, but there were no available articles that accounted for the phenomenon of interest. There were seventy-five articles were further screened for general review which resulted in 26 eligible articles. Twenty articles were removed that did not meet the selection criteria including quantitative, book reviews, book chapters, editorial materials, proceeding paper, and commentaries. Also, there were irrelevant studies that did not reflect the experiences of family members and unclear methodology. For the final review, there were five qualitative studies published between 2001-2016 and one thesis dissertation that elicited family experiences of mental illness. The researchers extracted all the themes

from the reviewed articles and encoded using NVivo Plus 11 as shown in Table 1 in appendix (QSR International, 2016).

The approach to synthesizing the findings in a meta-synthesis is an iterative process to generate new insights about the phenomenon of interest. Various researchers surmised that summarising qualitative results can be aggregative or interpretive (Beck, 2009; Sandelowski & Barroso, 2008). In this meta-synthesis, the researchers used an interpretive approach in conjunction with a "holistic understanding and theory development" (Aguirre & Bolton, 2014, p. 281). A thematic analysis was used to identify, analyze, and report patterns among the data, allowing for specific organization and description of a series of foci and interpretations of the various aspects of the subject matter. The analysis was performed to recognize the themes and the following attributes via codes/descriptors in the disciplines and contexts to justify or express the idea.

RESULTS

The interpretive summary of metaphors of the selected qualitative studies are the hallmark findings of this meta-synthesis. The grand theme emerged as *Family Empowerment* with three sub-themes *Perceived effects: Emulating the burden and loss, Process of coping, and Perspectives on family empowerment* as shown in Figure 2.

Figure 2. The grand theme of the reviewed studies

Perceived effects of mental illness: burden and loss

There are multifaceted effects of mental illness on the family including burden and loss. These perceived effects also impose threats to the quality of life and relationships within the family structure.

Social burden and stigma

These are the most commonly reported experience of the family that resulted in ineffective social relationships and poor interpersonal interaction. Social exclusion and withdrawal are central to a stigmatizing experience of the relative (Angermeyer, Schulze, & Dietrich, 2003). The majority of the respondents observed that friends, neighbors and even relatives gradually withdrew from the patient or the whole family. Some caregivers also reported that their social relationships are affected because they are not in the position to move and interact freely with others (Ae-Ngibise, Doku, Asante, & Owusu-Agyei,

2015). Over one in ten caregivers avoided social events (Girma et al., 2014), while other families reported that aside from the burden of caring for the patient, they felt ostracised and isolated (Marimbe-Dube, 2013). On a different note, guilt is one of the most spiteful experiences specifically among mothers having the responsibility for their children's upbringing (Angermeyer et al., 2003). One mother with two schizophrenic sons reflected, "professionals always ask for childhood experiences… which causes guilt and… is stigmatizing" (Angermeyer et al., 2003, p. 596). Another mother commented that parents' upbringing could also be a "contributing" factor to the illness (Stein & Wemmerus, 2001, p. 735). For adults who derive a strong sense of personal and social identity from their role as parents, this condition has challenged them what it means to be parents. They question their actions, recalibrate their expectations and even self-inflicting guilt on their child's illness.

Emotional and psychological burden

Sleeplessness, endless worrying, the feeling of embarrassment and exhaustion are some of the reported emotional disturbances. Some families developed depression and somatic illnesses (e.g., hypertension) due to severe emotional and psychological distress. Intense fear is another factor that affects the emotions. In the process of caregiving, some respondents described an experience of verbal and physical harm from those who are violent, assaultive and combative. Despite such experience, some families still ensure that they can meet the patient's needs (Marimbe-Dube, 2013). Some families even claimed they suffer more than those who are ill because of a sense of frustration, in which they mentioned that only the "death of the patient a way out for the burden to end (Ae-Ngibise et al., 2015).

Financial and economic burden

For some families, the financial burden is a result of having to leave their jobs for the caregiving role. The responsibility of caring lies within the family, and they have to ensure that they finance the patient's upkeep (Marimbe-Dube, 2013). Families would always want their ill family member to benefit from the optimal treatment and other relevant services but afflicted with financial constraints (Angermeyer et al., 2003). Majority of the caregivers are not employed, or some though employed but cannot sustain the daily expenses. Some would resort to selling their belongings, livestock, personal clothing, and others to support the need of the mentally ill. Also, respondents mentioned that the illness led to problems with work integration. One participant said: "My boss showed little understanding for the loss of working hours" (Angermeyer et al., 2003, p. 598).

Pervasive loss

Families perceived mental illness as such because it does not only involved the affected individual, but its effect spreads throughout the entire family. In a qualitative study of six families in Northwestern Ohio, the authors described the impact of mental illness in the family as a loss of a healthy life. The family reported the lost aspects of their ill-members' normal life that includes loss of skills and abilities, personal relationships, prized possessions and place in society. Parents in the study expressed a broad sense of sadness and frustration in their inability to bring back their child to "normal" (Stein & Wemmerus, 2001).

Process of coping: concealment vs. openness

In the review of the different studies, most participants reported to either conceal the illness or being open about the situation.

Concealment

Being secretive and minimizing contact with the community is one way that some caregivers, particularly those from culturally diverse backgrounds, coped with their situation (McCann, Lubman, & Clark, 2011). Girma et al. (2014) noted that caregivers are worried that other people would discover the patient's condition and felt the need to keep the illness a secret and isolate themselves. The fear of experiencing stigma from others deterred caregivers from being open about the problem (Marimbe-Dube, 2013). To avoid discrimination, many families conceal the illness from neighbors, friends, and relatives or disguise the illness as a depression (Angermeyer et al., 2003). Denial and blame from others also resulted in illness concealment (McCann et al., 2011). Caregivers especially women reported being blamed for the illness of the family member (Marimbe-Dube, 2013). Loss of status is also expressed by some caregivers who adopted a secretive style of coping (McCann et al., 2011). Loss of status accompanied by feelings of embarrassment, mainly when disturbing and dramatic situations occur during acute attacks. Loss of status also includes a troubled relationship and problems with work integration.

Openness

Some families adopted an open approach to coping with their situation. From being open, some caregivers responded to their family members' illness by disclosing their status and having contact with others (McCann et al., 2011). This coping approach includes openness to family, friends, and community. By doing so, support is strengthened, recognized and accepted. The type of support given varies from emotional support, financial and shared responsibility for care. Families also reported that although they are cautious at times about sharing their experiences with others, they understood that there is no wrong for having a family member diagnosed with a mental disorder. As a result, it nurtures the feeling of being listened to. Furthermore, families who do not have doubts keep on receiving emotional, psychological and practical support. One participant reported: "I have friends that ring me often to see how we are going. I have not hidden it. I may have at first, but I certainly don't know...I do get a lot of phone support"(McCann et al., 2011, p. 549).

Perspectives on family empowerment

Support and care from family members during periods of illness are significant for people with mental disorders. Moreover, families perceive that they have substantial roles in coping despite the considerable negative consequences it imposed on their quality of life (Larson & Corrigan, 2008). Based on their experiences, respondents provided their perspectives on various interventions towards empowerment.

Addressing negative public image

The negative public image of mental disorders is one of the causes of stigma. Most of the relatives participating in the focus group believe that those people suffer from mental disorders are violent and dangerous (Angermeyer et al., 2003). Relatives claim that the

media is responsible for disseminating this negative view. Media coverage of mental disorders is almost exclusively limited to showing persons as being violent. One participant narrated: "The media never portrays persons with mental illness living a normal life or as being creative. It would be good to show mentally ill people trying to live a normal life, not only murderers or homicides" (Angermeyer et al., 2003, p. 597). Also, unequal acceptance or status of mental and somatic illness by the public poses another negative image of mental illness. There are limited information and advice for mental health practitioners; and, when there is, it is usually in the context of negative headlines. Families felt that this negative image could be addressed through education, information, and promotion in understanding the disorder (Ae-Ngibise et al., 2015; Angermeyer et al., 2003)

Improved mental health care

Some families described the poor quality of mental health care. According to Angermeyer et al. (2003) relatives felt health professionals are insensitive to their needs, fears, problems, and worries. Also, the relatives believe that professionals regard them as an additional burden or source of irritation. In a similar vein, Ae-Ngibise et al. (2015), almost all the participants unanimously agreed that there is no external or community support in taking care of the patients. There should be improvements and changes in mental health care service delivery such as cooperation between and among the professionals and relatives, better education and training, adequate supervision and equitable distribution of mental health services. Family members also strongly felt that support groups for people with mental disorders and family members would help in the coping process.

DISCUSSION

This meta-synthesis illuminated the experiences among families having a member diagnosed with mental illness. Three themes with corresponding sub-themes emerged such as perceived effect, the process of a family coping with the illness and perspectives towards family empowerment. Burden and loss were the subthemes identified based on the family's perceived effect of mental illness. Burden encompasses almost all aspects of family life – psychological or emotional which also resulted in physical problems, financial and social burden. Furthermore, loss – specifically the loss of healthy life emerged as one significant effect of mental illness on the family.

In the process of coping with the illness, families adopted either concealment or openness approach. In being open with the family and friends, family members acquired support in various aspects – emotional, financial and sharing responsibility of care. Openness and contact with others enable them to obtain greater support and acceptance and help in de-stigmatizing the illness. However, transparency also leads to stigmatization, exclusion, withdrawal, and concealment (Angermeyer et al., 2003; Krupchanka et al., 2016; Larson & Corrigan, 2008; Muralidharan, Lucksted, Medoff, Fang, & Dixon, 2016; van der Sanden, Pryor, Stutterheim, Kok, & Bos, 2016). McCann et al. (2011) mentioned concealment helps shield the caregiver and the patient from stigma and minimizes the likelihood of devaluation and exclusion. However, it denies the caregiver and family member from having contact with and receives support from others. Concealment reinforces social isolation and alienation from the community, and it heightens the family's overall burden of care. Concealment may also result in depriving the person to

access timely and adequate care of the illness (Krupchanka et al., 2016; van der Sanden et al., 2016).

Family empowerment is an essential indicator of a family's ability to access and effectively utilize the mental health system to meet their needs. In the family's perspective, their perceived burden of care and loss could be addressed through proper education and massive information dissemination about mental illness, thereby promoting empowerment. Family empowerment helps the family and community in solving the burden, loss and stigmatizing experiences with mental illness. Due to the paucity of evidence about family empowerment at a theoretical and philosophical underpinning, future scholarly work will be undertaken to explore this phenomenon of interest using various methodologies. Owing to the rigor of this meta-synthesis, the researchers maintained an audit trail, research team meetings for content validity, and expert peer review. Raw data from the quotations support the inferences drawn and grounded in the experiences of the family members.

CONCLUSION

Family caregivers of mentally ill patients experience high levels of burden and loss in which they cope with either positive (openness) or negative (concealment) attitude. From their perspective, family empowerment helps the family and community in addressing the burden, loss and stigmatizing experiences with mental illness. There is a need for the development of education campaign and information dissemination to understand better the concepts and therapeutic interventions for mental illness along with family empowerment. Through such campaigns, it will facilitate the development of tailored-fit strategies in addressing the burden of care and loss among the family members. The government should continue to assess, monitor, and evaluate their funded mental health programs to meet the needs of the patient and their family. The development of a community treatment program will also strengthen collaboration among healthcare providers, families, and the entire community.

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Appendix

Table 1. Summary of thematic metaphors

Study	Perceptions	Process	Perspectives
Angermeyer et al., 2003	Interpersonal interaction problems Financial burden	Concealing the illness	Changing negative public image Improving mental health care
McCann et al., 2011	Negative public image Poor access to social roles	Open disclosure approach secretive approach	Increase understanding of the mentally ill and their family
Girma, et. Al., 2014	Worried that people blame the parents for the illness of their children	Non-disclosure of the illness and avoided being seen with the patient to lessen self-stigma	
Stein, et al., 2011	Loss of a normal life		Support the family member to get back on track and to get along with the world
Al-Ngibise et al., 2015	Emotional disturbance Social relationships are negatively affected Economic Burden Not enough external support	Prayers Hoping for a miracle The anticipation of a new treatment	Community empathy Educational support from healthcare workers
Marimbe-Dube, Bazondlile, 2013	Psychological/ Emotional Impact Physical Impact Financial/ Material Impact Social Impact	Concealment Confrontation Resignation Alcohol use Seeking spiritual assistance	Financial subsistence Support groups Information and training for caregivers

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Work-Related Fatigue Factors among Hospital Nurses: An Integrative Literature Review

Bader Abdullah Alahmadi[1], Manal Fehade Alharbi[2]

[1]*Nursing Supervisor, The University of Sydney, Sydney-Australia; King Fahad Hospital, Madinah-Saudi Arabia*
[2]*Assistant Professor, Department of Maternity and Child Health Nursing, College of Nursing-King Saud University, Riyadh-Saudi Arabia*
Corresponding Author: Manal Fehade Alharbi (maalwahbi@ksu.edu.sa)

ABSTRACT

Background: Due to the demanding nature of nurses' work and the current shortage of nurses, hospital nurses often find themselves working extra shifts, extended hours, and taking on more responsibilities. However, this added pressure on the body and mind results in fatigue which adversely affects nurses' health status as well as their ability to provide optimal health care procedures. Preventing fatigue and reducing its adverse consequences require comprehensive awareness about its diverse contributing factors.
Purpose: This study aimed to examine factors which influence fatigue among nurses employed in a hospital setting.
Methods: An integrative review was conducted to assess the quality of the research evidence, to find minor and major gaps in current research and the main issues in the area of the research and finally to bridge the research gaps. This integrative review identified a total of 12 relevant research studies from Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, Embase, PsycINFO, and a manual search. Data were reviewed in May 2017, using an integrative review, and then interpreted, analyzed and synthesized to identify the key contributing factors that influence fatigue among hospital nurses.
Results: The review revealed that significant factors such as organizational factors, nursing work characteristics, psychosocial factors as well as individual characteristics and demand, influenced the nurse fatigue. Work shifts, specifically night shifts and extended work shifts without sufficient inter-shift recovery were linked to higher levels of fatigue.
Conclusion: This review identified the significant factors affecting fatigue among nurses in hospital settings in various countries all around the world. Findings from this study may help healthcare organizations and policymaker to introduce strategies that mitigate fatigue among nurses.

Keywords: Fatigue; hospital; integrative review; nurses; work-related factors

BACKGROUND

Hospital nurses who provide patient care service often experience temporal demand and heavier workload due to the shortage of staff and potential overtime. Nurses encounter nonstandard work schedules, long works hours and circadian adjustment to night shift which is physically, mentally and emotionally strenuous (Steege & Rainbow, 2017). Thus, work-related fatigue has become a significant risk for nurses working in hospitals

and has consequently led to poor outcomes such as reduced mental acuity, degradation in performance and errors (Canadian Centre for Occupational Health and Safety, 2017).

In hospitals, it is common for nurses to work extremely long shifts. The Australian Bureau of Statistics reported in 2010 that 75% of shift workers were health professionals. This high proportion of shift workers among nurses was also prevalent in the United States, where nurses account for roughly 60% of shift-work schedules (Bureau of Labor Statistics, 2015). According to the Canadian Centre for Occupational Health and Safety (2017), shift work can cover different work patterns, which include shift rotation or changes to a set schedule. Night shift work, day shift work, 12-hour, and rotational shifts are known to be associated with work-related fatigue for hospital nurses (Han, Trinkoff, & Geiger-Brown, 2014; Smith-Miller, Shaw-Kokot, Curro, & Jones, 2014).

Not surprisingly, the highest level of fatigue occurs among night-shift nurses (Winwood, Winefield, & Lushington, 2006). Some studies investigated the phenomena of fatigue among hospital nurses such as Palhares, Corrente, and Matsubara (2014) who confirm that the physiological impact of poor sleep quality and disturbances on nurses' circadian rhythms can lead to fatigue among hospital staffs. MacKusick and Minick (2010) reported that psychosocial factors were a part of the reasons why nurses leave their profession. Barton (1994) and Smith-Miller et al. (2014) examined a nurse's decision to work at night while Han et al. (2014) studied work and non-work factors on acute fatigue and chronic fatigue. Another study by Lockley, Barger, Ayas, Rothschild, Czeisler, and Landrigan (2007) assessed the effects of work schedules on sleep and performance. Several psychosocial factors play a role in fatigue among nurses. A better understanding of these contributing factors enables a broader view of previous studies related to fatigue. Thus, the generalizability of their outcomes to hospital nurses should be considered with caution.

PURPOSE

This integrative review sought a broader view of studying fatigue and explored the factors influencing work-related fatigue among hospital nurses.

METHODS

An integrative systematic literature review was the chosen methodology of this study which consisted of five main stages. The first was formulating a research question, and the second was conducting a systematic literature search using the terms specified in the formulated research question. The third was collecting data and literature needed to be evaluated. The fourth stage was to analyze the findings, and the final stage was to interpret and transparently present these findings. The advantages of an integrative literature review design are its ability to assess the quality of the research evidence, to find minor and significant gaps in current research, identifying the main issues and research gaps to be bridged (Whittemore & Knafl, 2005).

Search method

The search was performed in May 2017 using four electronic databases (e.g., Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, Embase, and PsycINFO), and a manual search. Three keywords were used (i.e., *fatigue*, *nurses*, and

hospital) and joined by the logical operators AND and OR (e.g., nurse OR nurses AND fatigue OR lack of energy AND hospital OR hospitals). The inclusion criteria for the three components were established, including the *fatigue* component which covers three types of fatigue including physical, mental, and emotional fatigue; *nurses* which cover nursing staff who work in hospitals for at least 24 hours a week; and finally, *the hospital* which covers all care units and departments in the hospitals, for instance, the medical-surgical unit, intensive care unit, and the emergency department. The exclusion criteria were: (1) the studies with trials in non-hospital settings, (2) studies that involved healthcare providers other than hospital nurses, (3) studies related to religious fasting, and (4) studies related to patients' healthcare outcomes.

Search outcomes

As shown in Figure 1, the literature search of the databases retrieved 1137 articles from Medline (*n*=443), CINAHL (*n*=363), Embase (242) and PsycINFO (89). One article was retrieved via manual search. Due to duplication, 751 articles were excluded, leaving 387 articles. Records were screened using the title and abstracts, and 308 were excluded under exclusion criteria 1, 2 and 3. Twenty-seven studies were assessed using full-text screening, and 67 articles were excluded under exclusion criterion 4. The 12 remaining papers were critically appraised.

Quality appraisal

The inclusion of high-quality papers will enhance the quality of the integrative review. It has been argued that an assessment of the quality of the included studies has no standard because any evaluation of the quality of research is complicated (Whittemore & Knafl, 2005). Nevertheless, the quality appraisal of the studies included in this literature review was performed. Different quality appraisal tools were used for different study designs. The Critical Appraisal Skills Programme (CASP) checklist was used to assess the quality of the included studies (cohort and cross-sectional). The CASP checklist consists of 12 questions which are based on the validity of the outcomes (questions 1-6), the outcome of the study (questions 7-9), and the internal significance of the outcomes (questions 10-12). Also, the CASP checklist for qualitative studies was used to assess the quality of one included study. It consists of 10 questions that cover the validity of the results, their significance, and their impact locally (Critical Appraisal Skills Programme, 2018). The qualitative study by Steege & Rainbow (2017) used in this integrative literature review was essential in addressing the issue of fatigue in relation to other health system factors or challenges. The overall quality of the included studies was good, as they had significant and strong outcomes. Tables 1 and 2 show the outcomes of the quality appraisal of the included studies using different appraisal tools for different study designs.

Data extraction

Data extraction was measured by the overall ability to identify the principal contributing factors that influence fatigue among hospital nurses. The methodology, participants and reported themes used to examine and assess the correlation between varying factors and fatigue among nurses in Steege and Rainbow's (2017) qualitative study are presented in Table 3. Nurse fatigue and underlying characteristics such as the country in which the study was conducted, study aim, research design, sample size, sample characteristics, the method of analysis, tools used and key results are summarized for all 11 quantitative

research studies in Table 3. A matrix illustrating the data gathered and collected was also compiled to enhance the visualization of data is presented in Table 4.

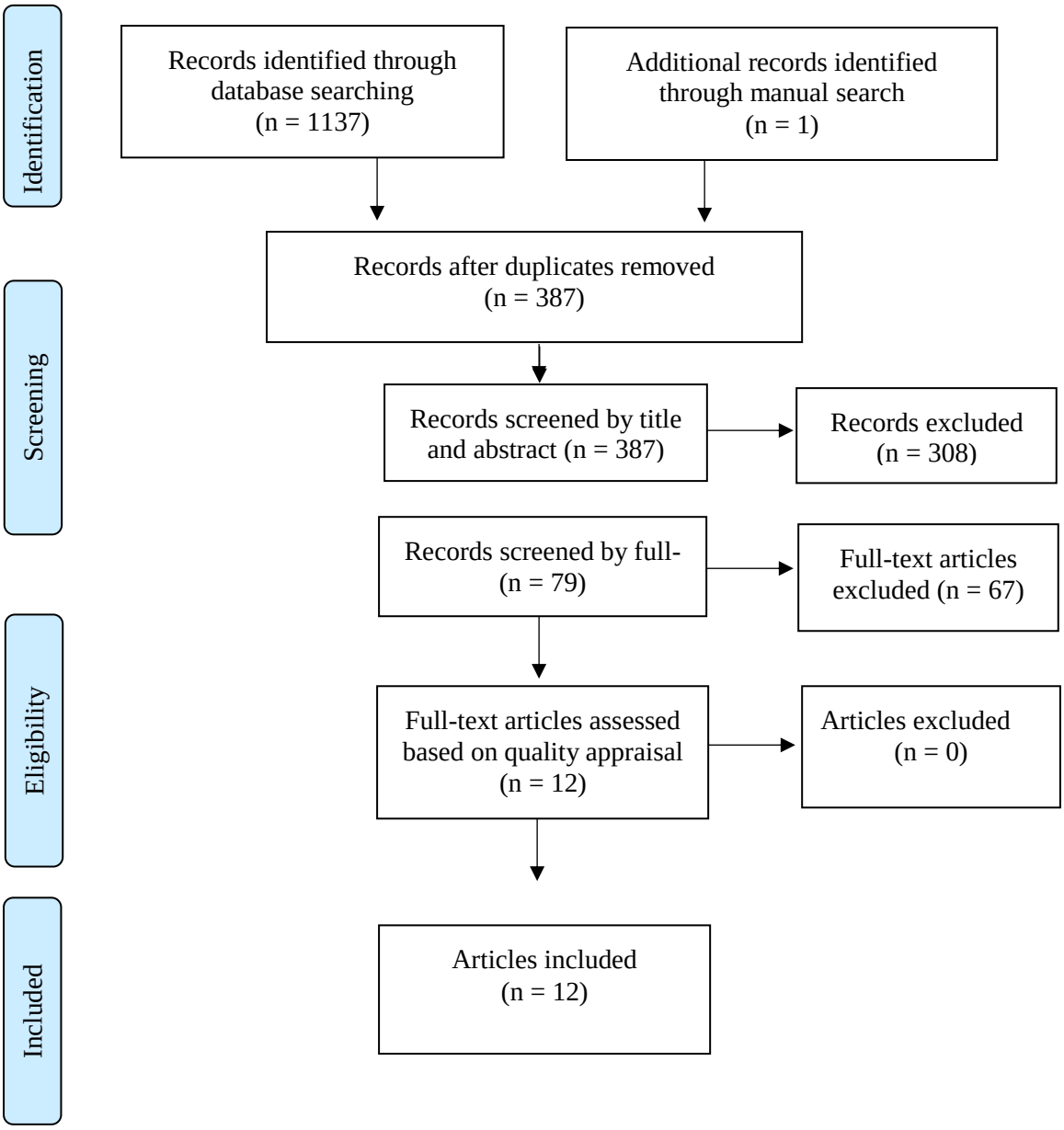

Figure 1. PRISMA flow chart for the article selection

RESULTS

Of the 12 studies examined, five were conducted in hospitals located throughout the United States (Chen, Davis, Daraiseh, Pan, & Davis, 2014; Han et al., 2014). The studies in the USA were conducted in Southern California (Kunert, King, & Kolkhorst, 2007), the Midwest (Steege & Rainbow, 2017), and Texas (Morelock, 2016). Five studies were conducted in Eastern Asia, specifically in hospitals in Brunei Darussalam (Rahman, Abdul-Mumin, & Naing, 2016), Chenghu City in China (Fang, Kunaviktikul, Olson, Chowtawan, & Kaewthummanukul, 2008), Ishikawa in Japan (Nagai et al., 2011), South Korea (Jung & Lee, 2015), and Taiwan (Yuan et al., 2011). The studies by Eldevik, Flo,

Moen, Pallesen, and Bjorvatn (2013) and Winwood et al. (2006) were performed in Norway and South Australia, respectively. Five studies employed a cross-sectional research design; however, the nature of the design varied as two of the quantitative studies used only a cross-sectional design (Han et al., 2014; Rahman et al., 2016). The other three quantitative cross-sectional studies were descriptive in nature, of which one utilized a descriptive cross-sectional research design (Chen et al., 2014), one had a descriptive cross-sectional, correlational study design (Fang et al., 2008) and one used a descriptive cross-sectional, exploratory, correlational research design (Jung & Lee, 2015). Two quantitative research studies, Eldevik et al. (2013) and Winwood et al. (2006), used questionnaires. An exploratory research design was inherent to two studies, one qualitative study (Steege & Rainbow, 2017) and one quantitative study (Morelock, 2016). Kunert et al. (2007) used a descriptive research design, while Nagai et al. (2011) used a longitudinal study design, and Yuan et al. (2011) utilized observational research. The only qualitative study (Steege & Rainbow, 2017) used semi-structured interviews to assess the consequences of nursing fatigue. Tools used are listed in Table 3.

Mental demands, physical demands, and workload influence fatigue among hospital nurses. Nurses who had more psychological demands at work and more quantitative work demands due to workload experienced high levels of acute fatigue, as shown in Table 3 (Han et al., 2014). A similar relational trend was observed between work demands and chronic fatigue. Psychological demands and quantitative work demands were correlated with chronic fatigue, as represented by t=2.10, p=0.04 and t=2.23, p=0.03, respectively (Han et al., 2014). Intensive care unit nurses often have a high level of physical and mental demands. According to Fang et al. (2008), intensive care unit nurses experience more acute and chronic fatigue compare to their colleagues in other general wards. Furthermore, working conditions and related factors explained an additional 0.2% of the variance relative to nurse fatigue (Jung & Lee, 2015).

An overview of all psychosocial factors, including job dissatisfaction, job stress, meaningfulness of work, and social support is provided. A significant correlation was established between various psychosocial factors and fatigue. Rahman et al. (2016) found a low to moderate association between psychological stressors related to work and fatigue. Using simple linear regression, a statistically significant relationship was shown across a total of 17 psychosocial variables (bullying, burnout, commitment to workplace, emotional demands, job satisfaction, justice and respect, meaning of work, physical violence, quality of leadership, reward, self-rated health, stress, superior social support, threats of violence, trust in management, and work-family conflict) and acute as well as chronic fatigue. Of these 17 psychosocial factors, a multiple linear regression showed that decision latitude, job stress, self-rated health, trust in management, and work-family conflict were the most significant variables that demonstrated a linear relationship with chronic fatigue at a significance level of p=0008, p<0.001, p=0.011, p=0.001 and p=0.013, respectively; however, only four significant variables, including burnout (p<0.001), commitment to the workplace (p=0.010), self-rated health (p=0.001), and trust in management (p=0.021) were associated with acute fatigue (Rahman et al., 2016). Job dissatisfaction, a negative attitude toward one's job, is common among hospital nurses. Lower levels of job satisfaction are associated with high levels of acute fatigue

and chronic fatigue (Han et al., 2014). Moreover, Fang et al.'s (2008) study showed that decreased job satisfaction is linked to increased chronic fatigue.

Job stress is characterized by the demands associated with a nurse's current role and responsibilities. Increased job stress occurs when hospital nurses are not supported by colleagues and supervisors, which impacts the meaningfulness of work and social support (Han et al., 2014; Jung & Lee, 2015). Meaningfulness at work is based on the significance a hospital nurse attributes to their perceptions of work (Han et al., 2014). Social support, a key factor known to influence nurse fatigue directly, is based on a nurse's interaction with colleagues and management (Jung & Lee, 2015). Social support by colleagues and management impacts a nurse's perceived level of comfort. The findings of this integrative review revealed that hospital nurses are exposed to various psychosocial factors, which define their mental, emotional, and physical status. Of all the factors identified, five psychosocial variables, including decision latitude, job stress, self-rated health, trust in management, and work-family conflict were significantly linked to chronic fatigue. Results also found that decreased levels of job satisfaction were linked to high levels of acute and chronic fatigue. Additional findings revealed that job stress and social support were positively associated with fatigue. Hospital nurses strive to be part of a team; however, less social support from colleagues and supervisors is correlated with more acute and chronic fatigue. Similar findings were noted as lower meaningfulness at work influenced more significant levels of chronic fatigue.

However, conflicting results were found by Winwood et al. (2006), who identified a significantly lower pattern of maladaptive fatigue among hospital nurses with partners and dependents (children). Additional findings (as reported in Table 3) show a relatively higher mean fatigue score among non-partnered hospital nurses with no dependents irrespective of shift compared to partnered hospital nurses with dependents (Winwood et al., 2006). Dependents are not deemed a key indicator of chronic fatigue scores among hospital nurses with partners. Additional findings demonstrate that the mean fatigue score of unpartnered hospital nurses with dependents is worse compared to unpartnered hospital nurses without dependents, as well as partnered hospital nurses both with and without dependents (Winwood et al., 2006). Such condition is reflective of the difficulties usually encountered by hospital nurses who are responsible for supporting families without assistance.

DISCUSSION

Generally, the findings indicate significant associations between various factors, including organizational, nursing work characteristics, psychosocial factors, individual characteristics, demand, and fatigue among nurses. The scheduling of shifts is an issue of great importance in determining productivity and alertness at work. Nursing work is highly taxing to the body and necessitates adequate rest, hence calling for the proper development of work schedules (Stimpfel, Sloane, & Aiken, 2012). In this regard, one of the factors that have been observed to have detrimental effects on the fatigue status of nurses is inter-shift recovery (Eldevik, 2013; Fang et al., 2008; Winwood et al., 2006). The shortening of such a period means reduced rest time. According to Yuan et al. (2011), acute fatigue due to low inter-shift recovery is linked to chronic fatigue. To understand the impact of chronic fatigue, it is essential to learn the circadian rhythms, influenced by

external and internal factors (Niu, Chung, Chen, Hegney, O'Brien, & Chou, 2011). Human beings are considered to be diurnal, which means that their "clocks" are similar to those of the 24-hour system that results from the spinning of the earth on its axis, causing day and night (Niu et al., 2011). Most behavioral, physiological, and biological processes, including the sleep-wake cycle, mood, and adrenaline release, consist of the interaction of cyclical circadian rhythms. The natural release of adrenaline, time-dependent corticosteroids, and sleep-dependent hormones is dependent on time (Niu et al., 2011). As such, the body releases high levels of adrenaline and corticosteroids during the day with a drop-in level occurring at night. Sleep-dependent hormones are increasingly secreted during the night (Morris, Aeschbach, & Scheer, 2012). Such biological rhythms are affected by any shift work that interrupts an individual's sleep time. This concept is an important consideration to define the impact of reduced inter-shift recovery time on sleep patterns and levels of fatigue. The findings of this study demonstrate such patterns, as multiple studies indicate that there is a distinct relationship between and among reduced time, nurses' shifts and fatigue (Eldevik et al., 2013; Fang et al., 2008; Winwood et al., 2006). The cyclical circadian rhythms, as noted earlier, are noteworthy in a review of shift-work patterns. It is clear that the therapeutic value of the sleep and recovery times of night nurses is reduced, given that they are expected to rest when the release of adrenaline is highest.

Conversely, reduced levels of adrenaline and corticosteroids during night shifts may result in reduced efficiency of nurses working such shifts due to increased fatigue (Boivin & Boudreau, 2014). Such association is echoed by the findings of Kunert et al. (2007) and Fang et al. (2008), which indicated increased levels of fatigue among evening and night nurses as compared to nurses who work during the day. The low levels of sleep-dependent hormones and the high levels of adrenaline and corticosteroids released during the day could explain the poor quality of sleep, reduced sleep efficiency and duration, and sleep latency among night nurses, as established by the findings of Kunert et al. (2007) and Morelock (2016).

Nurses are experiencing an increase in workload in the healthcare environment. This could be attributed to four main factors: an increase in demand for nurses, insufficient individuals entering the nursing profession, increased over time and decreased staffing, and a reduction in the length of stay among patients (Bae, Brewer, & Kovner, 2012). These factors are interconnected in a causative fashion, forming a cycle of events. To start with, the increase in demand for nurses may correspond to the increase in the aging population, as this population experiences increased demand for healthcare services. This increase in demand is, however, not met, as the supply of nurses remains inadequate. Such a shortage in the supply of nurses results in an increased workload for the nurses who are available (Stimpfel et al., 2012). Increases in the cost of health care have also led most healthcare institutions to reduce their staffing in order to increase their profit margins. Also, mandatory overtime policies have been put in place to compel nurses to work more, which has compounded an increase in nurses' physical and mental demands with an increase in workload. Most healthcare organizations also decreased the length of stay for patients due to the cost pressure, which has led to the admission of sicker patients and hence increased mental and physical demand to manage these patients (Bae et al., 2012). As a consequence of such demands, there is an increase in fatigue levels among nurses.

As established by Fang et al. (2008), Han et al. (2014), and Jung and Lee (2015), nursing job demands are positively correlated with both acute fatigue and chronic fatigue. This fatigue could be attributed to the reduced rest that nurses have as a result of the increased demands in the workplace. The hospital work environment presents various job stressors and increased caregiving demands, including rapid cycles for admission and discharge and increased levels of patient acuteness, which call for employment of high levels of complex occupational skills by nurses. Smith-Miller et al. (2014) mentioned that the mental, emotional, and physical demands associated with nursing work leads to burnout and sleepiness, which are indicative of fatigue. In this case, burnout is characterized by emotional depletion, depersonalization, and a developed sense of disconnectedness. The findings by Fang et al. (2008) indicate more fatigue among nurses who work in the intensive care unit than those in the other wards, which could explain the different levels of burnout in the two settings. The level of mental demand experienced by nurses working in the intensive care unit is high, as they are faced with critical decisions about the patients; hence their development of burnout, especially when they are overwhelmed by the mental and physical demands, and cases where they are confronted by adverse outcomes of care, such as the death of a patient. Numerous studies have examined the trauma and tragedy that patients and their families experience in the wake of illness and death, however, there has been limited research carried out to determine how nurses respond to continuous exposure to cases of premature death and profound loss. In his study of "compassion fatigue," Boyle (2011) established that nurses are also affected by the various traumatic events that they face in their daily activities. These events have a detrimental effect on their psychological well-being, which may result in burnout and related stress, especially in cases where they had developed an emotional attachment to patients under their care. As reported by Rahman et al. (2016), stress and burnout are positively correlated with fatigue among nurses. When nurses develop depersonalization and emotional exhaustion due to continuous exposure to traumatic events, they report increased fatigue that can be deleterious to the delivery of their services.

Factors influencing satisfaction with work are also a primary determinant of burnout and resultant fatigue. In most cases, as a result of reduced staffing and increased demand for healthcare, nurses are forced to work extra hours, with limited breaks and heavy workload, as the ratio of patients to nurses is high (Cimiotti, Aiken, Sloane, & Wu, 2012). Such factors contribute to an increased level of dissatisfaction among nurses, which leads to burnout, characterized by disconnectedness with the work and reduced commitment. Fang et al. (2008) and Steege and Rainbow (2017) reported a connection between nurse dissatisfaction and fatigue. Such dissatisfaction results from the increased demands and expectations about the role of nurses in practice and the related implications regarding their physical and mental wellbeing. Apart from their roles in providing health care, some nurses also have families that they are responsible for in different ways. As such, they are faced with challenges balancing the demands of their work and those of their homes (Chen et al., 2014).

In most cases, due to the various roles that they play at home, nurses fail to have enough sleep and rest, even when away from duty, which results in increased fatigue. This echoes the findings of Rahman et al. (2016), which established a correlation between chronic fatigue and work-family conflict. Moreover, concerning the need for self-actualization,

as defined by Maslow, nurses desire to be appreciated regarding their contribution to the healthcare process (Lester, 2013). Such appreciation allows for the development of a sense of belonging and a feeling of achievement, which facilitates increased commitment to the work. On the other hand, lack of appreciation for the contribution of nurses results in stress and burnout due to depersonalization, ultimately leading to increased rates of fatigue, while the nurses involved find their jobs increasingly burdensome. The findings of this review support such a relationship, as Han et al. (2014) demonstrated an association between lack of social support from both nurse supervisors and their co-workers and the development of acute fatigue. The demographic factors of different nurses, including age, gender, and experience, also contribute to the development of fatigue. Like other professions, nurses are more likely to obtain supervisory and managerial positions as they age, mostly owing to their experience and familiarity with the management of various nursing situations. Most of the responsibilities adopted in management are carried out during the day shift, reducing the chances of fatigue from working night shifts. Also, the roles adopted in supervision and management are less taxing, and hence less likely to lead to fatigue as with young and newly-employed nurses who hold junior positions within an organization. This is consistent with the findings of Winwood et al. (2006) and Rahman et al. (2016), who established that older nurses were less likely to develop fatigue than their junior counterparts as they worked in senior positions that entailed less physical work and fewer or no night shifts.

Nevertheless, older nurses who do not hold senior positions are likely to develop more fatigue than their younger counterparts due to physiological deterioration as they age. This is in line with the findings of Chen et al. (2014) and Kunert et al. (2007), who established that older nurses were more likely to experience acute fatigue compared to younger nurses. As mentioned earlier, nurses who have families also face different levels of responsibilities away from work, which may interfere with their ability to get enough rest (Chen et al., 2014). However, in the case where such nurses have partners, they are likely to experience less fatigue, as they receive both social and physical support from their partners, especially with regards to caring for dependents. This is demonstrated in the findings of Winwood et al. (2006), whereby they established that nurses with spouses receive the social support required to reduce fatigue.

The inclusiveness of the utilized research studies, as well as the recruitment of nurse participants from various hospital units all around the world (Australia, Eastern Asia, Europe, and the USA), serves as a strength of this study. The inclusion of these studies increases the sample representation, which increases the generalizability of research findings and provides a global view of the phenomena of interest. This study does however also have some limitations, including a lack of consensus in the definition of fatigue across the studies reviewed; the studies were also filtered by language, allowing only for those that were published in English. Also, most of the studies, including those by Chen et al. (2014), Eldevik et al. (2013), Fang et al. (2008), Han et al. (2014), and Nagai et al. (2011), involve female participants, which leaves the question of the relevance of the reported findings for male nurses, and impedes cross-gender generalizability of the conclusions that can be drawn. This integrative review is also limited by the fact that the majority of the research studies employ a cross-sectional design that identifies causal relationships between work and non-work factors related to

fatigue and recovery. Another significant limitation lies in the reported nature of the tools used to examine and assess levels of nurse fatigue (Winwood et al., 2006). This study provides an understanding of the factors that determine fatigue among nurses employed in a hospital setting, identifying the association between a number of night shifts and extended work shifts and acute and chronic fatigue. The Joint Commission (2011) has increased the focus on nurse fatigue and prolonged work shifts. This will enhance organizational awareness, thus enabling hospitals to develop policies and standards to increase the presence of social support in the workplace while reducing the possibility of nurse fatigue (e.g., developing health-promoting scheduling to ensures sufficient recovery time and providing support at work). Also, educational programs for nurses may be used, teaching them the best way of enhancing inter-shift recovery. Moreover, providing choices on scheduling pattern (e.g., length of shifts, number of shifts and starting time) would be a solution for better recovery (Grade et al., 2012). Due to the association between acute fatigue and chronic fatigue, organizations must focus on identifying and mitigating the possibility of acute fatigue.

CONCLUSION

This integrative review found that an amalgamation of factors, including organizational factors, nursing work characteristics, psychosocial factors, individual characteristics, and demand, influence fatigue among nurses in a hospital setting. As such, poor scheduling resulting in nurses working overtime and having fewer breaks is associated with increased levels of fatigue. On the other hand, night shifts were also established as contributing to increased fatigue, as they disrupt the circadian cycle and interfere with sleep. Psychological and social factors, such as stress and social support in the workplace, were also linked to fatigue. Demographic factors, such as age, marital status, and nursing experience, were also associated with fatigue. It is clear that nurse fatigue is a problem that could jeopardize the health of both the nurses and the patients. The findings of this integrative review may help policymakers to develop strategies that contribute to mitigating fatigue among hospital nurses.

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Appendix

Table 1. Outcomes of the quality appraisal of the cohort & cross-sectional included studies

Critical Appraisal Skills Programme (CASP) checklist for cohort studies													
	Questions based on the validity of the outcomes						Questions based on outcome of the study			Questions based on the internal significance of the outcomes			Quality
Author/Year	Q1	Q2	Q3	Q4	Q5 A B	Q6 A B	Q7	Q8	Q9	Q10	Q11	Q12	
Moreloc-k (2016)	√	√	-	-	- -	- -	NA	NA	√	√	√	Recommend changes	Good
Nagai et al. (2011)	√	√	√	√	√ √	√ √	NA	NA	√	√	√	Recommend	Good
CASP checklist of a cross-sectional study (CEBM)													
Eldevik et al. (2013)	√	√	-	√	√	-	√	√	√	√	√	√	Good
Rahman et al. (2016)	√	√	-	√	-	√	√	√	√	√	√	√	Good
Chen et al. (2014)	√	√	-	√	-	√	√	√	√	-	-	√	Good
Han et al. (2014)	√	√	√	√	√	√	√	√	√	-	√	√	Good
Fang et al. (2008)	√	√	-	√	√	√	√	√	√	√	-	√	Good
Kunert et al. (2007)	√	-	-	√	√	√	√	√	√	-	√	√	Good
Jung & Lee (2015)	√	√	-	√	-	√	√	√	√	-	√	√	Good
Winwood et al. (2006)	√	√	-	√	-	√	√	√	√	-	√	√	Good
Yuan et al. (2011)	-	√	-	√	-	-	√	√	√	-	√	-	Neutral

Table 2. Outcomes of the quality appraisal of the CASP checklist for qualitative studies

Author/year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Quality
Steege & Rainbow (2017)	√	√	√	√	√	√	√	√	√	Considered	Good

Table 3. Characteristics of quantitative studies

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
Chen et al. (2014) United State	To explore the status of acute-chronic fatigue & inter-shift recovery among12-hours shift nurses	Cross-sectional survey-Descriptive design.	130 female nurses working in acute care units of three hospitals.	Frequency & Descriptive Statistics.	Occupational Fatigue Exhaustion Recovery (OFER), short demographic questionnaire.	Mean age = 36.8, 42% had family caregiving. Responsibilities, mean score for acute fatigue = 65.6 (±18.6) Mean score for chronic fatigue = 47.3 (±21.8), Mean score for inter-shift recovery = 65.6 (±18.6)
Eldevik et al. (2013) Norway	To determine whether less than 11 hours of work between shifts (quick returns) is related to anxiety, depression, fatigue insomnia, sleepiness and shift work disorder among nurses.	Study (questionnaire).	1990 nurses Working in different hospitals.	2x2 chi-square logistic regression and adjusted analysis.	Bergen Insomnia Scale, Epworth Sleepiness Scale Fatigue Questionnaire, Hospital Anxiety & Depression Scale, Shift Work Disorder	Mean=33.2 quick returns within the last year. Increased number of quick returns correlated with an increase in Bergen Insomnia Scale, Epworth Sleepiness Scale, and FQ. Excessive fatigue was significantly linked to more than 30 quick

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
						returns. A high number of night shifts and gender were linked to Shift Work Disorder (men affected to a greater extent than women). Correlation between quick returns numbers & night shifts numbers in the last year was weak & negative ($r = -0.10$, $p < 0.05$).
Fang et al. (2008) China	To determine the most important contributors to acute and chronic fatigue.	Cross-sectional Descriptive, correlational design.	581 Female Nurses working in different hospitals.	*F* statistics and multiple regression.	OFER-JCQ- Exposure of Hazards in Hospital Work Environments modified version, Pittsburg Sleep Quality Index, -JOB Dissatisfaction Scale-Beck Anxiety Inventory - Beck Depression Inventory	Nurses (30-40 years old) experienced more acute fatigue than other nurses based on age. Experience differences of acute ($F=2.85$, $p=0.01$) & chronic ($F=5.26$, $p=0.00$). Hazards exposure contributed to acute fatigue ($B=0.15$, SE $B=0.06$, $\beta=0.08$, $p<0.05$), yet the exposure failed to contribute to chronic fatigue. Inter-shift recovery was the most important independent variable that influenced acute fatigue ($\beta=-0.42$). Exposure to hazard contributed to acute fatigue ($B=0.15$, SE. $B=0.06$, $\beta=0.08$, $p < 0.05$), yet the exposure failed to contribute to chronic fatigue ($B=0.01$, SE $B=0.06$, $\beta=0.00$).

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
Han et al. (2014) United States	To examine the link among work and non-work factors, inter-shift recovery and self-reported acute and chronic fatigue.	Cross-sectional study	80 female nurses working (12-hour shifts, not less than 36 hours per week) in a large teaching hospital	Pearson chi-square tests and Fisher exact test for cell sizes less than 5	OFER Physical demands adapted Job Content Questionnaire - Questionnaire plus additional nurse-related items Job Content Questionnaire	Increased acute fatigue linked to high psychological demands ($t = 2.92$, $p < 0.01$), greater quantitative work demands due to workload ($t = 2.51$, $p = 0.01$), reduced feedback from co-workers and supervisors ($t = -2.95$, $p < .01$) & reduced social support ($t = -2.75$, $p < 0.01$). Working rotating shifts higher acute fatigue than fixed shifts ($X^2 = 4.68$, $p = 0.04$). Chronic fatigue linked to low job meaningfulness ($t = -2.71$, $p = 0.01$), low social support ($t = -2.48$, $p = 0.01$) & low job satisfaction ($t = -3.74$, $p < 0.01$).
Jung & Lee (2015) South Korea	To investigate factors associated with shift work tolerance among nurses	Exploratory, descriptive, cross-sectional, correlational study	660 nurses doing shift work in a large hospital	Descriptive statistics and Hierarchal multiple regression	Diurnal Scale, Rosenberg Self-Esteem Scale, Multidimensional Scale of Perceived Social Support, Korean Occupational Stress Scale, Insomnia Severity Index, Patient Health Questionnaire - 9	Fatigue score M= 4.3 (SD=0.7), Individual, lifestyle and working factors account for an additional 6%, 5% & 0.2% of variance related to fatigue. Job-stress, self-esteem & social support had a significant positive correlation to fatigue.

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
Kunert et al. (2007) United States	To examine perceptions differences in for day-night-shift nurses.	Descriptive study design.	100 day-shift nurses and 90 night-shift nurses in hospital.	Descriptive and inferential statistics.	Brief Fatigue Inventory Pittsburg Sleep Quality Index	84% females & 16% males on night-shift (mean age 32.6). Night-shift had a higher Brief Fatigue Inventory mean total compared to day-shift ($p = 0.0001$). Night-shift nurses had higher Pittsburg Sleep Quality Index mean global score compared to day-shift nurses ($p = 0.0001$).
Morelock (2016) United States	To quantify the relationships between factors related to quality & safety by examining the difference in fatigue perceived overload and sleep quality among day-night-shift nurses.	Exploratory study based on Sustained vigilance model	45 nurses working in acute care units in a hospital.	Spearman's rho test	Brief Fatigue Inventory, Pittsburg Sleep Quality Index, Work overload scale, Perceived stress scale. Benner's Stages scale. Nursing work index-revised subscale Researcher-generated scale.	Fatigue was correlated with errors (correlation score = 0.48 $p = 0.001$), stress level and errors (correlation score= 0.41, $p = 0.005$) and Benner skill level and errors (correlation score = 0.31, $p = 0.037$). A directly proportional relationship exists between fatigue and errors. A significant difference was found between day-shift and night-shift.

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
Nagai et al. (2011) Japan	Investigate the impact of fatigue related to shift work on immune function.	Longitudinal study design	57 female Nurses working in a public hospital	Wilcoxon signed-rank sum tests	The questionnaire comprised of 25 items that subjectively assess fatigue Symptoms.	All fatigue scores progressively increased from the beginning of day shifts to the end of night shifts. Older and married nurses who had fewer hours of sleep demonstrate higher levels of fatigue.
Rahman et al. (2016) Brunei Darussalam	To explore and identify the correlation between psychosocial factors and work-related fatigue among critical care and emergency nurses.	Cross-sectional Study	201 nurses Working in different public hospitals.	Multiple linear regression analysis	Copenhagen Psychosocial Questionnaire Version 2 (COPSQ II)	Nurses employed for a shorter period of time experienced higher levels of acute fatigue (b = -0.35, 95% CL: -0.67, -0.02). Stress was most significantly associated with chronic fatigue (r = 0.45, p < 0.001) followed by work/family conflict and chronic fatigue (r = 0.44, p < 0.001) and lastly stress was associated with inter-shift recovery (r = -0.41, p < 0.001).
Winwood et al. (2006) Australia	To determine the relationship among a number of varying factors such as age, domestic responsibilities (dependents and significant others), recovery from fatigue-related to shift work	Questionnaire	1280 female nurses working in two hospitals	Pearson's r bivariate correlations, ANOVA and MANOVA	OFER and Three subscales: OFFER-AF, OFER-CF, and OFER-IR	Age and OFER-IR positively correlated, which is suggestive of better recovery among older nurses. Increased age is correlated with significantly lower levels of acute fatigue [F (4,832) = 3.75 (p = 0.005)] and chronic fatigue [F (4,832) = 3.79 (p = 0.005)]

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
	and maladaptive health outcome among full-time female nses.					compared to other age groups, except the ages of 35-45. Chronic-fatigue was associated with nurses in the fixed day or evening shifts was 45.00; the fixed-night shift was 48.50; multiple day & evening shifts was 53.50; & multiple shifts including night shifts was 54.50. The mean score associated with fatigue among non-partnered nurses without dependents who worked a single non-night shift was 48.30 (SD=23.87); a single shift with nights was 53.96 (SD=28.14); multiple shifts without nights was 53.78 (SD=19.08); and multiple shifts with nights was 56.26 (SD=23.00). These scores were relatively higher than the mean fatigue scores of nurses with partners and dependents who worked a single non-night shift (M=45.17; SD=23.48), a single night shift (M=52.85; SD=19.23); multiple non-night shifts (M=44.13; SD=23.31); and multiple shifts with night shifts (M = 50.50; SD = 24.20).

Authors, Year, & Country	Study Aim	Research Design	Sample Size and Characteristics	Method of analysis	Tools used	Results Related to Nurse Fatigue
Yuan et al. (2011) Taiwan	To compare fatigue-related symptoms and physiological indices between nurses who work in shifts & during the day.	Observational Study.	107 nurses working in a hospital (27 daytime workers and 80 shift workers).	Chi-square test and ANCOVA.	Questionnaire by the Japanese Association for Industrial Health Physiological indices.	Mean age of day-shift nurses = 31.0 Mean age of shift work nurses = 28.4. Nurses who worked in shifts were more fatigued than day- shift nurses (OR = 2.76; $p < 0.05$).

Characteristics of qualitative studies

Authors, Year, & Country	Phenomena of Interest	Methodology	Participants	Reported Themes
Steege & Rainbow (2017) United States	Nurses' experience	Qualitative exploratory	22	New construct: 'Supernurse' Subtheme: Alter ego, Cloak of invulnerability, Extraordinary powers used for the greater good, Kryptonite, No sidekick

Table 4. Factors influencing fatigue among hospital nurses

Factors Influencing Fatigue	Organizational Factors					Nursing Work Characteristics				Psychosocial Factors								vidual characteristics and Demand					
	Inter-recovery shift	Length of shift	Night-shift	Shift work/Shift work disorder		Workload	Mental demand	Physical demand	Hazards at work	Job dissatisfaction	Decision latitude	Meaningfulness of work	Quality/Trust of management	Skill direction	Social support at work	Support team	Work team	Age	Gender	Experience	Housekeeping	Marital status	Parenting/Family care
Chen et al. (2014)	√				√	√	√	√										√		√		√	√
Eldevik et al. (2013)	√			√																			
Fang et al. (2008)	√		√	√		√	√	√	√	√					√			√				√	
Han et al. (2014)	√	√		√		√	√	√		√					√			√					√
Jung & Lee (2015)						√	√								√								
Kunert et al. (2007)			√															√		√	√	√	
Morelock (2016)			√	√			√	√			√												
Nagai et al. (2011)			√	√																			
Rahman et al. (2016)							√	√		√	√	√	√	√	√	√	√	√		√	√	√	
Steege & Rainbow (2017)		√								√													
Winwood et al. (2006)	√		√	√				√	√								√	√	√	√	√	√	√
Yuan et al. (2011)				√														√				√	