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Urban Community's Perceptions and Experiences about Social Distancing During the Covid-19 Pandemic

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Abstract

Social distancing is a policy taken as a form of minimizing and suppressing the spread of Covid-19 which increases from time to time. The purpose of this study was to describe people's perceptions and experiences about social distancing during the Covid-19 pandemic. This research is qualitative research with a phenomenological approach which is presented in a descriptive form. The location of this research is in Central Java Province. The method of data collection was carried out by in-depth interviews. The results showed that the respondents knew about social distancing well. Some respondents have applied social distancing in their daily lives. Information obtained on the behavior of sorting and choosing social distancing when in certain conditions and situations. Social distancing is applied when in public places and when meeting with strangers while when meeting with the closest people, social distancing is rarely applied. There was an attitude that appears when respondents meet perpetrators of social distancing policy violators, including letting them know, reprimanding, advising, and setting a good example. Most of the respondents have good knowledge about social distancing. The implementation of social distancing has been carried out in their daily lives, although it has not been comprehensive.

Introduction

Covid-19 is one of the health problems with global coverage. This case began with a report from the World Health Organization (WHO) on December 31, 2019, which stated that there were cluster cases of pneumonia with unclear etiology in Wuhan City, Hubei Province, China (Wu Z, 2020). The case continued to grow, and it was finally discovered that the cause of this pneumonia cluster was the novel coronavirus. This case continues to grow outside of China (Wang, 2020). On March 11, 2020, WHO finally declared Covid-19 a pandemic.

Coronaviruses are a large family of viruses that cause disease in humans and animals (Wilder Smith, 2005; Venkatesh, 2020). In humans, it usually causes respiratory tract infections, ranging from the common cold to serious diseases such as *Middle East Respiratory Syndrome* (MERS) and *severe acute respiratory syndrome (*SARS). The increase in Covid-19 cases in the community is supported by the rapid spread of the virus, either from animals to humans or between humans. Transmission of the SARS-CoV-2 virus from animals to humans is generally caused by the consumption of animals infected with the virus as a human food source, especially in bats.

This disease can spread through small droplets from the nose or mouth when coughing or sneezing (Baloch, 2020). Droplets in the air can then be inhaled by other nearby humans who are not infected with COVID-19

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through the nose or mouth. The droplets then enter through the lungs and the infection process in healthy humans continues (Shereen, Khan, Kazmi, Bashir, & Siddique, 2020; Wei et al., 2020). Clinically, the representation of SARS-CoV-2 virus infection in humans ranges from asymptomatic to very severe pneumonia, with acute respiratory distress syndrome, septic shock, and multiorgan failure, leading to death (Guan et al., 2020). About 80% of cases recover without the need for special treatment. About 1 in every 6 people may develop severe illness, such as pneumonia or difficulty breathing, which usually develops gradually. Although the mortality rate for this disease is still low (around 3%), older people and people with pre-existing medical conditions (such as diabetes, high blood pressure, and heart disease) are usually more susceptible to becoming ill. critical. Looking at developments to date, more than 50% of confirmed cases have been declared to be improving, and the cure rate will continue to increase.

Seeing the impact that has arisen from the dangerous Covid-19, almost every country in the world, including Indonesia, is taking preventive steps such as social distancing (Abel, 2020; Newbold, 2020). This policy is taken as a form of minimizing and suppressing the number of Covid-19 spreads that are increasing from time to time (Dalise, 2020; Lunn, 2020). Social distancing or what can be interpreted as social distancing restrictions, when referring to the article in the Public Health Department (Yusup et al., 2020), it is explained that social distancing means creating distance between oneself and others to prevent the transmission of certain diseases. Physical distancing behavior is expected to reduce the transmission rate of COVID-19 due to minimal contact (Syadidurrahmah et al., 2020; Widyaningrum et al., 2020). There are still many people who do not implement physical distancing behavior and continue to hold meetings or gatherings. This can happen due to several factors behind physical distancing behavior related to COVID-19 (Qian, 2020). In Indonesia, the term social restriction has been regulated in Articles 59 and 60 of Law Number 6 of 2018 concerning Health Quarantine. According to the law, social distancing *is* the restriction of certain activities of residents in an area suspected of being infected with a disease and/or contaminated in such a way as to prevent the possibility of spreading the disease or contamination. Referring to these rules, social distancing aims to reduce the potential for the spread of infectious diseases, where social distancing aims to limit people's social activities to stay away from physical contact and crowds (Bish, 2020).

The implementation of social distancing can be carried out with someone who is not allowed to shake hands and always pays attention and maintains a distance of at least 1-2 meters when interacting with other people, especially with someone who is sick or at high risk of suffering from Covid-19 (Guo, 2021). Some examples of the implementation of social distancing that are commonly carried out are working from home (*work from home*), studying at home for students and students, postponing meetings or events that are attended by many people, not visiting people who are sick but simply by phone calls or teleconferences. (Elran, 2020).

In addition to not understanding the concept of social distancing, there are still many urban communities (urban residents) who live by maintaining a collective lifestyle as in villages, so that they have a collectivistic character (Brooke, 2020; Marroquín, 2020). In this collectivistic society, togetherness in social groups is the main thing, so that the implementation of social restrictions is difficult to implement. Discussions on the perceptions and experiences of urban communities regarding social distancing during the Covid-19 pandemic are indeed necessary so that urban communities can behave appropriately in supporting the prevention of the spread of COVID-19 nationally.

Method

This research was qualitative research which was presented in descriptive form. The location of this research is in Central Java Province. The method of data collection was carried out by in-depth interviews. The data analysis technique used content analysis through the *ATLAS.ti* software which includes data collection, data reduction, and

categorization, data display, and concluding.

Results and Discussion

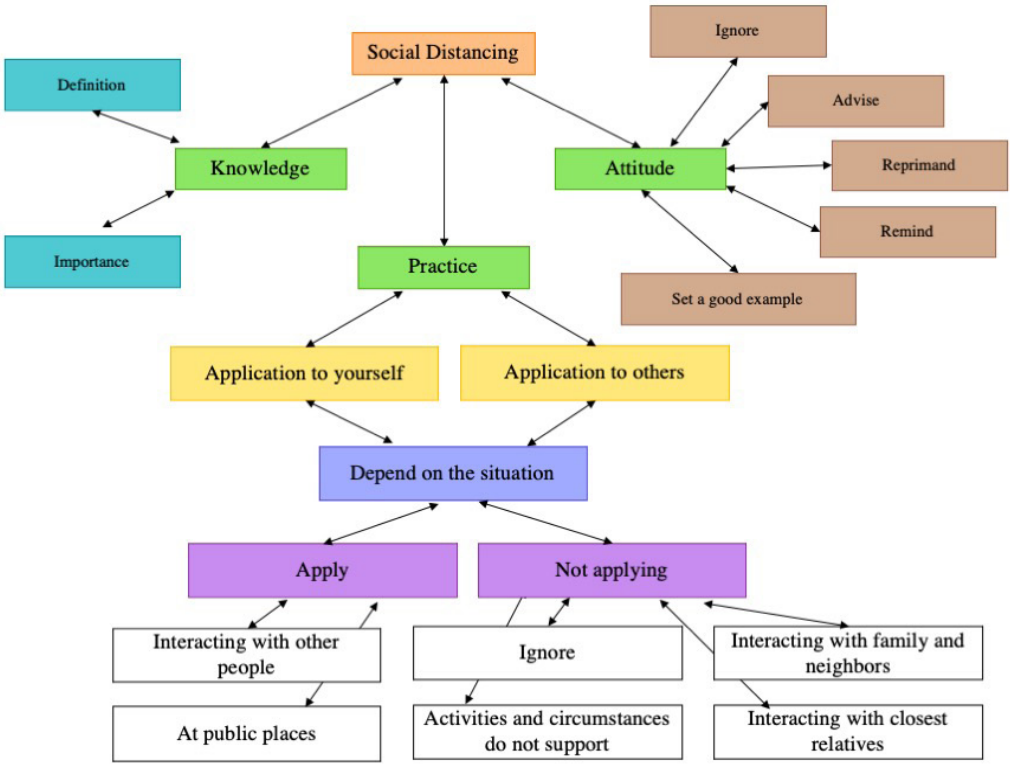
In this discussion, researchers will discuss and describe their findings through in-depth interviews with several respondents. Broadly speaking, this study will discuss 3 things related to social distancing, namely knowledge, application, and attitudes that need to be done when seeing social distancing *violators*. More details will be presented in the form of a graph below.

Knowledge about social distancing

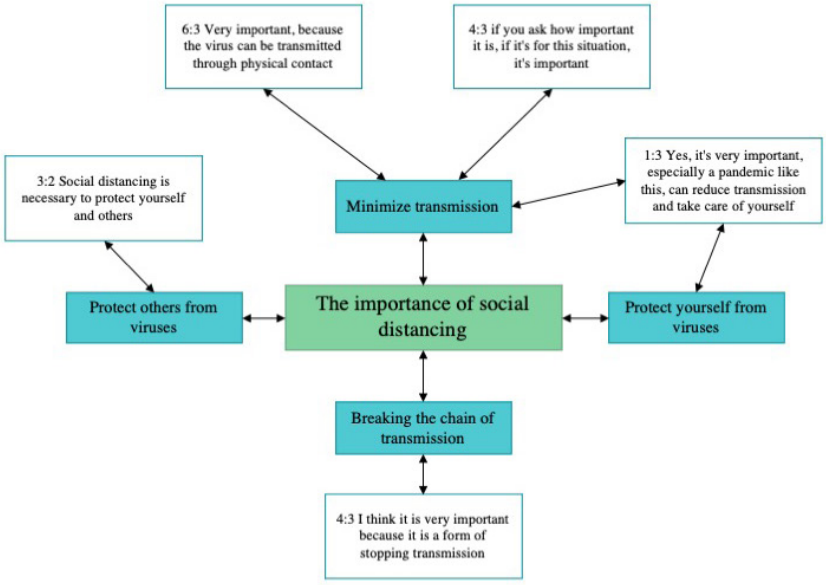
Social distancing or limiting contact with other people is the best way to break the chain of spreading the corona virus disease 2019 (COVID 19). Most people are certainly familiar with the term because, during the Covid-19 pandemic, certain policies were promoted to break the chain of the spread of Covid-19, one of which was about social distancing. Of the six respondents who have been interviewed by researchers, all respondents already know about social distancing or also known as social restrictions. The following is the narrative of Pandu, the respondent whose name has been changed by the researcher.

> *4:2 "Social distancing, so social distancing is one of the recommendations from the government to the community to carry out social distancing, especially to places that have the potential to cause crowds, now people have to do social distancing by keeping their distance, wearing masks, washing hands."*

Since the news of the coronavirus has entered Indonesia, the entire community has felt a tremendous panic. Corona virus has succeeded in weakening various sectors, ranging from the health sector to the economic field at once. To address this, the World Health Organization (WHO) issued a decision to implement social distancing. Wahyu, the respondent whose name is anonymous, presented information in interviews about social distancing. Here's his narrative.



Pictere 1. Qualitative Content Analysis



Pictere 2. Importance of Social Distancing

6:2 "Social distancing is a situation where we have to keep our distance from the people around us to break the chain of spreading the Covid-19 virus by reducing physical contact with others."

Based on the results of the interview above, the researcher can underline 3 important points, namely maintaining distance, reducing physical contact, and breaking the spread of the Covid 19 virus. This was also known by the respondent who the researcher disguised as Ayu.

1:2 "Social distancing means keeping a distance from other people, at least 1 to 2 meters. Social distancing is an effort to reduce the spread of the Covid-19 virus, especially during this pandemic, sis."

From some of the descriptions above, researchers can see that social distancing is well known by the public. But that is not enough, the researcher wants to get the more in-depth information to find out the extent of the respondent's understanding. Because basically knowledge is an important element in the formation of human behavior, in which knowledge-based behavior will last longer than non-knowledge behavior. Researchers dig up information about the importance of implementing social distancing during the Covid-19 pandemic, the following data were obtained.

Ayu, one of the respondents whose name has been said that change, social distancing plays an important role in minimizing the transmission of the Covid-19 virus. The full explanation is as follows.

1:3 "Yes, it's very important, sis, especially a pandemic like this. By implementing that, yes, we can protect ourselves from viruses. If we describe it as rich, for example, when we apply social distancing when we meet other people, we don't know whether the person close to us is exposed to the virus or not. Yes, the term is if you keep your distance, you can minimize the spread of the Covid-19 virus.

Based on the narrative above, the author agrees with the statement from sister Ayu that everyone must implement *state* social distancing because viruses are invisible creatures. Moreover, the virus can spread from person to person so everyone should try to avoid the disease as much as possible. Below is a narrative from Lala and Dinda.

3:2 "… social distancing is necessary for the protection of yourself and those

closest to you, ma'am, especially in my house there is also a grandmother, so I am also more vigilant…"
2:3 "I think it is very important because this is a form of our efforts to break the chain of transmission of COVID-19."

Thus, it can be seen several reasons for the importance of implementing social distancing during the Covid-19 pandemic, including being able to maintain and protect oneself from the virus, minimize transmission, and break the chain of the spread of Covid-19. Suppawittaya et al said that social distancing *was* carried out to minimize interactions between individuals who may be infected but do not *self-isolate*. This, of course, requires the awareness of each individual to always implement social distancing.

Implementation of Social Distancing

According to several respondents, some respondents comply with s*ocial distancing*, starting from carrying out activities at home (*work from home*) or limiting interactions with other people. Respondents believe that the application of social distancing is the self-awareness to break the chain of the spread of the Covid-19 infectious disease. This is by what was conveyed by one of the respondents named Ratna as follows.

5:4 "Yes, by doing any activity at home (work from home), also by limiting interaction with other people, the application of social distancing is our awareness to break the chain of the spread of infectious diseases such as covid-19distancing"

Although some respondents considered important social distancing, no party has been able to fully implement it. For example, they are still sorting and choosing to whom social distancing should be carried out. This is by the response of a respondent named Ayu.

1:4 "Yes, it depends on the situation, Ms. For example, people who are close to us, like family, don't keep their distance, because we know what their daily life is like. But when you meet other people, strangers, keep your distance, sis."

The fear of this disease that attacks the respiratory system seems to be defeated by the reality of meeting the needs of life, many of which have not been able to apply because of economic conditions, due to work reasons, or other reasons that require them to carry out activities and activities outside and cannot implement social distancing. maximally. This is by the following narrative of Lala.

3:3 "Yes, I did, Miss, but it's still not fully implemented. Because sometimes from activities and the surrounding conditions are less supportive to keep your distance. Also, sometimes I interact with neighbors and relatives who don't keep their distance."

The application of social distancing to the respondent still depends on who he interacts with and where he is. If he is in a public place and or meets with strangers, he applies social distancing. Meanwhile, if he already knows the people he invites to interact with, such as family, neighbors, or relatives, the application of social distancing is ignored. Perceptions like this, it turns out that some people around the respondent generally do. The following is a narrative from Pandu.

4:5 "For the people around it, it depends on who we are at that time, if we are in a public place or public service, it means that the place applies social distancing with a very strict protocol, but when we are in a place where is it? It's only natural, what's important is that we are healthy and apply that, they are welcome, but if it's still within reasonable limits, they think that it's healthy to wash our hands, so we have to adjust where we are."

Attitudes towards Social Distancing Violators

A policy or regulation is usually inseparable from obeying parties and violating parties. The policy is no exception

to social distancing to combat Covid-19. Compliance with a policy certainly cannot be separated from self-awareness and reflected attitudes. Violating behavior can certainly have a negative impact, both on yourself and others. Moreover, violations of policies regarding health protocols. The attitudes and behavior of each need to be controlled and considered.

Below is a graph of the attitude taken when respondents encounter perpetrators of policy social distancing *violators*.

Lala, a respondent whose name has been changed, explained her attitude when meeting social distancing *violators* as follows.

> *3:5 "If the people closest to me are like family or friends, sometimes I remind you to practice social distancing, only if it's people who are not very familiar with me, I let them go because I am a bit afraid, if I reprimand fewer familiar people, Ms. the response will be like that, so I prefer to leave it alone.*

From the narrative above, the author can see that there is an indifferent attitude in the respondents when facing social distancing *violators*. This is because there is a concern that there will be a bad response if Lala reprimands the violator of the policy. Dinda added that if someone does not dare to reprimand even in polite language, he should set a good example. The following is the narrative of Dinda.

> *2:7 "It would be nice if we could rebuke him with good and polite language, if we feel that people are not able to advise him, we should set an example by implementing social distancing starting with ourselves, we keep our distance from him and implement prokes other things that have been promoted by the government so that he will be aware and understand by himself, and grateful if he also implements it."*

The statement below is the narrative of Ratna, which the author adds as a complement to the information above.

> *5:6 "If I try to remind him not to forget the importance of maintaining social distancing because if you let it go it will make things worse. Of course, according to the portion that I can."*

From the results of the narratives of several respondents, the authors can conclude that the attitudes shown by individuals when encountering social distancing violators are mostly 1) reprimand if the violators come from family, relatives, or closest people 2) allow if the violator is a foreigner 3) advise in polite language 4) remind and 5) set a good example.

Conclusion

Based on the research that has been done, the researcher can conclude the following points. People know social distancing well. The community has implemented social distancing in their daily life although it has not been implemented comprehensively due to situations and conditions that are not possible. Social distancing needs a process for the community to adapt because it is a new policy that has emerged in this pandemic era. The involvement of various components of the government and the community needs to be increased so that the expectations of this policy social distancing can be realized. Good counseling from the government will encourage the emergence of knowledge and an active role from the community to implement social distancing during this COVID-19 pandemic.

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Life Skills Education to Improvement of Teenager's Knowledge, Attitude, Self-efficacy and Risk Health Behavior

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Abstract

IDHS data shows adolescent risky behaviors such as smoking, alcohol, drugs and free sex tend an increasing from year to year. The purpose of this study was to analyze the influence of life skills education on adolescents' knowledge, attitudes, self-efficacy and prevention of health risk behaviors.This study was a quasi-experimental design with non-equivalent pre-test post-test control group. Of 28 and 60 adolescents at the villages of Sembukan and Sukoharjo, Wonogiri were selected purposively to participate in this study. Life skills education were conduted for 3 months, every week for 6 hours. At the end of the intervention adolescent's ambassadors were formed called "Narsis" to share and educate their peers. Data were analyzed by univariate, independent t-test mann whitney and paired t-test. The findings show that there was significant influence on providing lifeskills education to adolescent's knowledge, attitudes, self efficacy and prevention health risk behaviour at the intervention group. Whilst, there was only a slight increase on knowledge and significantly decrease in attitudes and self-efficacy including the prevention risk behaviors of adolescents at control group. It is recommended that adolescents are necessary to provide intensive and comprehensive life skills education to prevent their risk behaviours.

Introduction

Adolescence is a period of rapid physical and psychological growth and development. At this time, adolescents have great curiosity, like challenging adventures, and even dare to take risks without careful consideration and understanding. If the decisions made by these adolescents are not correct, it is possible to fall into unhealthy behavior or lifestyles. Unhealthy lifestyles that arise since or during adolescence can have health impacts in the short and long term. These impacts can affect both physical and psychosocial health.

Based on the 2012 IDHS data, around 33.3% of girls and 34.5% of boys aged 15-19 years started dating when they were not yet 15 years old. At that age, it is concerned that they do not have adequate life skills. So they are at risk of having unhealthy date behavior, such as having premarital sex (Kemenkes RI, 2017). Premarital sex among adolescents is at risk for teenage pregnancy and transmission of sexually transmitted diseases, including HIV / AIDS. Unplanned pregnancies in female adolescents can lead to abortion and early adolescent marriage. Both will affect the future of the teenager, the fetus he is carrying, and his family. Indonesia is among the 37th country with a near high percentage of young marriages. Marriage at a young age poses a risk to health because it is not ready physically, mentally, emotionally, and socio-economically (Kemenkes RI, 2017).

Other unhealthy behaviors that often appear during adolescence include drinking and smoking. In 2016, the number of novice smokers increased to 8.8% from 7% in 2015. Data from the Ministry of Health shows the prevalence of smokers in Indonesia aged 15 years and under increased by 36.3% compared to 27% in 1995. It causes Indonesia to become

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the country with the 3rd highest number of smokers in the world. Teens are already familiar with smoking while in elementary school, even earlier. The worrying number of novice smokers in Indonesia will impact the health and quality of future younger generations Nutbeam, 2018).

Injecting drugs has contributed as much as 7.7% of the Indonesia HIV / AIDS rate in 2014. Although this figure is smaller than in previous years, the HIV / AIDS phenomenon is an iceberg phenomenon that needs efforts to overcome and prevent as early as possible. It is because most people with AIDS acquire HIV when they are teenagers (Bezerra & Sorpreso, 2016).

In 2013, the Indonesian Ministry of Health issued the ABAT (Aku Bangga Aku Tahu/I'm Proud I Know) program to prevent the development of HIV / AIDS in adolescents. This program targets adolescents aged 15-24 years to increase their knowledge of HIV / AIDS, such as how it transmits through sex and unsafe injection drug use (Bezerra & Sorpreso, 2016). The National Population and Family Planning Board (BKKBN) has also developed a GenRe (Generasi Berencana/ Planning Generation) program for unmarried adolescents aged 10-24 years, families, and communities who care about adolescents. This program provides information and promotion on reproductive health, such as the dangers of early / child marriage, the risk of having premarital sex, and the harm of using drugs, cultivation of life skills or self-concept development, providing information on family life planning and providing information on population and family development. (Uhl et al., 2019).

Lifes skills-based learning program is to develop youth learning abilities and self-potential to dare to face problems and find solutions. With life skills, adolescents can be more responsible for their health and understand the risks resulting from risky behavior. In the health sector, life skills aim to develop the skills needed, patterns of thought and action, behave physically, mentally, and environmentally to improve health status (Seangpraw et al., 2017). This study aims to provide life-skills education interventions to adolescents and to analyze the effect of life skills education on increasing knowledge, attitudes, self-efficacy, and adolescent health risk behaviors such as smoking, alcohol, drugs, and free sex.

Method

This study is a quasi-experimental study using a non-equivalent pre-test post-test control design group approach. Respondents were selected purposively with the following criteria: 15-19 years old, willing to participate in the research, and residing in Sembukan Village and Sukoharjo Wonogiri Regency. As many as 50 respondents were selected from Sembukan Village as the intervention area. Sixty respondents in the control area came from Sukoharjo Village. We calculate the sample size based on the Lemeshow formula. The intervention was carried out for three months every Sunday for 6 hours with the material life skills provision through lectures, simulations, role-playing, video giving, case studies, and testimonials. The measurement of the dependent variable consisting of knowledge, attitudes, self-efficacy, and risky behavior is measured before and after the intervention using a questionnaire that has been tested for validity and reliability. Of the 50 adolescents, only 28 were able to participate in the full intervention. As many as 22 respondents dropped out because they had school activities and had to help their parents. The data were analyzed using the univariate test to determine the frequency distribution of characteristic variables. The characteristics variables are age, education, occupation, amount of pocket money, length of smoking, religiosity, self-esteem, place of residence, curfew rules and sanctions, and dependent variables such as knowledge, attitudes, self-efficacy, and health risk behavior (smoking, alcohol, drugs, and free sex). The bivariate test used an independent t-test for numerical data. The Chi-square test was used for categorical data to see the homogeneity of the intervention and control groups. Meanwhile, the paired t-test was used to see the impact of an increasing intervention. The Research Ethics Commission of the Faculty of Public Health, Diponegoro University, had approved this research protocol under approval number 055 / EA / KEPK-FKM / 2018.

Result and Discussion

The results showed that most of the respondents in this study were aged less and equal to 16 years (53.4%). The average age of the respondents was 16.51 years. More than half of the respondents were male (52.3%), and nearly half were female (47.7%). All respondents (100%) stated that they had not worked. Most (63.6%) received pocket money from their parents of ≤ IDR 15,000, and the rest received an allowance of more than IDR 15,000 (32.4%). The most types of expenditure used by teenagers were for food / snacks by 36.4%; school activities / needs 29.5%; for entertainment 17.0%; buying clothes 11.4% and gasoline / transportation 5.7%.

Table 1. Respondent's Characteristics

Characteristics	f	%
Age		
≤16 years	47	53,4%
>16 years	41	56,6%
Gender		
Male	46	52,3%
Female	42	47,7%
Income Source		
Parents	88	100%
Working	0	0%
Pocket Money		
≤ Rp. 15,000,-	56	63,6%
> Rp. 15,000,-	32	36,4%
Major Expenditures		
Food/Snacks	32	36,4%
Clothing	10	11,4%
Entertainment	15	17,0%
School needs	26	29,5%
Gasoline/transportation	5	5,7%
Father's Education		
Junior High and below	62	70,5%
Senior High and above	26	29,5%
Mother's Education		
Junior High and below	66	75,0%
Senior High and above	22	25,0%
Father's Occupation		
Farmer/Worker	26	29,5%
Non Farmer/Worker	62	70,5%
Mother's Occupation		
Farmer/Worker	22	25,0%
Non Farmer/Worker	66	75,0%
Family Income		
≤ Rp. 2,000,000,-	52	59,1%
> Rp. 2,000,000,-	36	40,9%
Parent's Marital Status		
Intact	85	96,6%
Divorced	2	2,3%
Both Passed Away	1	1,1%
Current Residential Status		
Dormitory	3	3,4%
Rent	1	1,1%
With Parent	84	95,5%
Visiting Hour Rule		
Yes	47	53,4%
No	41	46,6%
Punishment/Sanction on Rule Violation		
Yes	40	45,5%
No	48	54,5%

Source: Primary data, 2018

When viewed from the level of education of the respondent's parents, there were more who graduated from junior high school and below (father = 70.5%; mother = 75%) compared to those who graduated from high school and above (father = 29.5%; mother = 25%). Parents work more as laborers (father = 70.5%; mother = 75%) than as farmers (father = 29.5%; mother = 25%). The average income of most (59.1%) parents of respondents was less than or equal to Rp. 2,000,000, - per month. When viewed from their education and occupation, most of the respondent's families fall into the middle to lower / low socioeconomic families. Almost all of the parents' marital status was still intact / not divorced (96.6%). Most of the respondents still live with parents (95.5%) who provide rules for visiting hours (53.4%) and do not impose punishment/sanctions for violating these rules of 54.5%. It means that parents allow their children to play at night. Previous research states that parental supervision greatly affects premarital sexual behavior in adolescents (Tlustos et al., 2016).

Table 2. Difference Test Result on Intervention Group and Control Group Before Intervention

Characteristics	Intervention		Control		p-value
	Mean	SD	Mean	SD	
Age	15,80	0,997	16,73	1,260	0,001
Religiousity	9,333	2,0899	6,900	1,6229	0,000
Pocket Money	12900	5743,662	15033,33	5784,159	0,076
Parent's Income	2.246.666,67	1.316.142,046	2.915.833,33	4.073.867,646	0,859
Self-esteem	26,7	4,4268	59,1	6,73644	0,000
Spare time usage	67,8333	5,50914	28,5167	3,60551	0,000
Knowledge	69,6333	13,81275	2,9	0,39915	0,000
Attitude	69,6333	7,77921	61	14,92921	0,008
Self-efficacy	56,5	8,93945	72,0833	6,79803	0,000
Risky Behavior Prevention	32,4	3,11393	32,8667	3,93794	0,050

Source: Primary data, 2018

Table 2 shows the results of the Mann-Whitney test. Showing that the variables age, religiosity, self-esteem, use of leisure time, there are differences between the control and intervention groups, with a p-value <0.05 (age = 0.001; religiosity = 0.000; self-esteem = 0,000; use of free time = 0,000) so that these variables are categorized as confounding variables. Meanwhile, knowledge, attitudes and self-efficacy also have significant differences between the control and intervention groups because they have a p-value <0.05 (knowledge = 0,000; attitude = 0.008; and self-efficacy = 0,000). So it can be interpreted that the two groups are not the same or not homogeneous before the intervention. It is likely because the intervention group was in areas closer to the mountains or rural areas while the control group was closer to urban areas. The region's difference allows the different adolescents' conditions, especially in terms of knowledge, attitudes, and self-efficacy towards health risk behavior. Meanwhile, pocket money and parents' income have a p-value of more than 0.05 (0.076 and 0.859, respectively). So the two variables are homogeneous in the two groups, namely that both have almost the same socioeconomic conditions.

Table 3. Characteristics' Variation Test Result on Intervention Group and Control Group Before Intervention

Characteristics	Intervensi		Kontrol		p-value
	n	%	n	%	
Gender					
Male	20	42,6	27	57,4	0,052
Female	10	23,3	33	76,7	
Religion					
Moslem	30	34,5	57	65,6	0,291
Christian	0	0	3	100	
Father's Education					
Junior High and below	25	39,1	39	60,9	0,070
Senior High and above	5	19,2	21	80,6	
Mother's Education					
Junior High and below	26	38,8	41	61,2	0,060
Senior High and above	4	17,4	19	82,6	
Father's Occupation					
Farmer	19	70,4	8	29,6	0,000
Non Farmer	11	17,5	52	82,5	
Mother's Occupation					
Not Working	9	29	22	71	0,530
Working	21	35,6	38	64,4	
Residence					
With Parent	27	32,5	56	67,5	0,429
Separate from Parent	3	42,9	4	57,1	
Nighttime Visit Hour Rule					
Yes	7	17,9	32	82,1	0,007
No	23	45,1	28	54,9	
Visit Rule Violation Sanction					
Yes	3	8,8	31	91,2	0,000
No	27	48,2	29	51,8	
Parental Completeness					
Complete	29	35,4	53	64,6	0,328
Single Parent	1	16,7	5	83,3	

Source: Primary data, 2018

Based on the results of the Chi-Square Test which can be seen in Table 3, it shows that the father's occupation, restrictions on nighttime visits and the imposition of rule violations, there are differences between the intervention and control groups with a p-value <0.05, so these variables are as follows: confounding variables in this study. While the variable gender (p-value = 0.052), religion (p-value = 0.291), father's education (p-value = 0.070), mother's education (p-value = 0.0.530), mother's occupation (p-value = 0.530), residence (p-value = 0.429) and parental completeness (p-value = 0.328) all did not differ between the intervention and control groups with p value> 0.05. So that all homogeneous in the two groups.

Table 4. Difference Test Result between Pre-test and Post-test on Intervention Group

Variable	Mean		p-value
	Pre-test	Post-test	
Knowledge	69,63	76,83	0,007
Attitude	69,63	72,03	0,109
Self-efficacy	56,50	57,46	0,544
Risky Behavior Prevention	32,40	33,43	0,008

Source: Primary data, 2018

Based on table 4, there are two variables found to have an average difference between the pre-test and post-test with a p-value <0.05, namely the knowledge variable (p-value = 0.007) and risky behavior (p-value = 0.008). In the knowledge variable, the post-test score (76.83) was higher than the pre-test (69.63), with an average delta of 7.2. It means that there is an increase in the knowledge value of adolescents by 7.2 points. Besides, though there was no statistically significant increase in attitude and self-efficacy, with p value> 0.05 (attitude: 0.109; self-efficacy: 0.544), both improved in the pre-test and post-test 2.4 points for attitude and 0.96 on self-efficacy. Meanwhile, the health risk prevention behavior shows a significant 1.03 points better before and after the intervention with a p-value of 0.008. It means that after the intervention, the risk behavior of adolescents decreased.

Table 5. Difference Test Result Between Pre-test and Post-test on Control Group

Variable	Mean		p-value
	Pre-test	Post-test	
Knowledge	61,53	65,33	0,104
Attitude	72,17	66,10	0,000
Self-efficacy	59,03	54,86	0,001
Risky Behavior Prevention	32,83	31,24	0,005

Source: Primary data, 2018

Table 5 shows the difference in the pretest to posttest scores in the control group. The paired t-test shows that there is an average difference between the pretest and posttest in the control group with a p-value <0.05 on the attitude variable (p-value = 0.000); self-efficacy (p-value = 0.001) and health risk behavior (p-value = 0.005). However, the three variables experienced a significant decrease in the pretest to posttest scores, namely the attitude variable from 72.17 to 66.10; self-efficacy from 59.03 to 54.86; and risky behavior from 32.83 to 31.24. Meanwhile, the knowledge variable experienced a slight increase from the pretest to posttest score though it was not statistically significant (p-value 0.104), which was 3.8 points.

Before the intervention, the control group had better scores for attitude, self-efficacy, and risky behavior prevention than the intervention. But after the intervention, the scores for these three variables decreased significantly. It is due to the control group was not given the slightest understanding in terms of preventing health risk behavior and was only given a pocketbook on a healthy diet. Besides, the religious factor may affect risky behavior. Indicate that the level of the two groups is significantly different. The intervention group has a better level of religiosity. Previous research

has stated that religiosity is related to sexual behavior in adolescents (Haluza & Jungwirth, 2015).

Adolescence is currently volatile in social and psychological aspects, including physical. The conditions do not all happen simultaneously. It makes adolescents often involved with health risk problems. Such as sexual behavior, smoking, drinking alcohol, drugs, and so on. Lack of knowledge and skills needed to make the right decisions in many conditions, makes adolescents meet their emotional needs with sudden thought without considering the impact. It is due to neurologically, under 20 years of age, the growth of the psychological aspects is still not complete. So decision-making and thinking for the future skill have not yet been developed (Santrock, 2011). Therefore, through education, life skills are expected to increase the adolescents' understanding in acting as regulators about the impacts and risks. Thus they become individuals who can be responsible for their safety and health.

In the life skills education process, the characteristics of current adolescents who tend not to want to be patronized, like playing, sharing experiences, need to be understood. So the provision of life skills education to increase adolescent knowledge, understanding, attitudes, and self-efficacy are more appropriate by using games and case examples. according to their experience and needs (Kai, Chu and Kwan, 2015).

Donkin et al. (2014) suggested when studying something, we must consider several individual characteristics. Such as age, family status, education, and economy (Donkin et al., 2014). Not much different from Mayo (2015) which states that information needs to depend on activities or disciplines, availability of facilities, motivational factors for information needs, the need to make decisions, they need to look for new ideas or get the correct information (Mayo and Issa, 2015). Webster said that one of the needs to be fulfilled is a cognitive need that aims to strengthen knowledge or understanding based on the desire to know and understand the environment (Webster and Kruglanski, 2011). In everyday life, it can be exemplified such as curiosity about everything that has happened, is happening, or will be happened (Bezerra & Sorpreso, 2016).

The results indicate that life skills education interventions significantly reduce the risk of smoking, drinking alcohol, drugs, and risky dating behavior. Aligned with research conducted by Abbasi Parvin et al. (2018), Parvaty V (2014), and Zulkifly A (2018) found that practicing life skills in adolescents can reduce drug use, especially in adolescents at risk, promiscuity, and smoking (Abassi, Ziapour and Kianipour, 2018; Valsala, Devanathan and Kuttappan, 2018). It is because a person's attitude relies on his cognitive level. For adolescents whose cognitive skills are not yet good, the information they put in their minds is the information they get from their environment. It is often wrong, but they think it is right to try. So, they try forbidden things and feel that by doing it, they are up to date with their friends, without thinking they will harm their health (including addiction) (Uhl, Koob and Cable, 2019).

The results also showed that the increase in knowledge between before and after the intervention was statistically significant. The knowledge increase was pretty high compared to attitudes, self-efficacy, and prevention of risky behavior. It is due to the intervention group provides life skills education using simulations, role-playing, and case study practices. Making it easier for adolescents to understand and improve knowledge in a comprehensive and youth-friendly manner (cases are adjusted to their situation).

Simulation and role-playing methods are learning methods by imitating and dramatizing behavior related to everyday problems. These provide opportunities to be creative, imagine, collaborate and appreciate it more. It will be easier for adolescents to believe in the impact of an object of negative behavior. Likewise, the case study or problem-solving method invites adolescents to be rational, active, and responsible for their behavior (Tlustos, Kirkwood and Wade, 2016; Punhagui, 2019).

According to Edgar Dale, his conical experience stated that learning methods and media determine the target achievement. The more involved a person is with their learning activities, the easier it is to understand, remember, and be sure and easy to practice

(Nutbeam, 2018). It is in line with Wahlund's research (2020) which states that there is an increase in knowledge in adolescents after intervention with extension methods followed on adolescent reproductive health and GenRe from an initial score of 11.43 to 14.90 with a p-value (0.000) (Wahlund, 2020). Saputri's research results (2015) explained the differences in the teenagers' knowledge in Semarang after the role-playing method intervention (Saputri and Azam, 2015). Inviting adolescents to learn by playing is a potential method for improving their attitudes (Bouris et al., 2015).

The intervention once a week, for three months, with 6 hours intervention created opportunities for adolescents to change their knowledge and improve their cognitive abilities (Wahlund, 2020). Align with the social cognitive theory put forward by Bandura stated that measuring changes in attitudes takes a relatively long time to consider the benefits and barriers of implementing these behaviors (Velasco and Harder, 2014; Beauchamp, Crawford and Jackson, 2018). Likewise, a person's self-efficacy (ability) to change towards a positive direction takes longer than time to increase knowledge. The theory of the transtheoretical model by Prochaska also says that changing positive attitudes, increasing self-efficacy, and implementing behavior require strengthening from oneself and assisted by a positive environment to anticipate unfortunate conditions that can cause relapse (Abassi, Ziapour and Kianipour, 2018; Valsala, Devanathan and Kuttappan, 2018).

This research has several limitations, namely because it was carried out from July to December 2019 at the same time as preparations for the Indonesian independence celebration. So many respondents were unable to attend during the intervention and eventually dropped out. According to Javanese culture, many people during these months also get married because it is considered a good month. Many teenagers are involved in helping community activities and their parents. Besides, the time for the research was coincided with the period for changing positions of village officials. This cause support from community leaders in the implementation is not sufficient when we carried out the need assessment at the beginning of the study.

Conclussion

Comprehensive cognitive life skills education has a significant effect on increasing adolescent knowledge in terms of the impact of health risk behaviors such as smoking, drinking, drugs, and free sex. Likewise, there was an increase in positive attitudes in prevention behavior. Yet the increase was not significant and not as high as knowledge. The self-efficacy variable also increased insignificantly with the lowest score increasing compared to the other three variables. Meanwhile, life skills education also has a significant effect on increasing risk behavior prevention behavior. In the control group, there was no significant difference in the knowledge. There was a slight increase in the average score. However, there are significant differences in attitude, self-efficacy, and preventive behavior. It leads to a decrease in the pretest to posttest scores. It means that the control group has more negative attitudes, self-efficacy, and behavior than before the intervention.

The characteristics of the two research groups are relatively the same. Particularly in socio-economy, parental education, and occupation. The religiosity of the intervention group was better than the control group. The average score of knowledge in the intervention group was better than the control group. The average score of attitude, self-efficacy, and prevention behavior in the control group was better before the intervention than in the intervention group.

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Behavior Paying Premium to the Independent Participants in Healthcare Social Insurance Administration Office

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Abstract

Premiums non-compliance leads to the Healthcare Social Insurance Administration Office (henceforth, will be referred to as BPJS Kesehatan) budget deficit, resulting in an accumulation of debt claims in various health facilities and an impact on the quality and quantity of health services in health facilities. As of March 2019, 38% of independent National Health Insurance (JKN) participants in Gorontalo City were not compliant to pay dues. This study objective to assess the relationship between willingness to pay with compliance behavior to pay premiums for BPJS Kesehatan independent participants. This study uses a cross-sectional study design. The population was 8,594 people who were independent BPJS Kesehatan participants with a sample of 95 people using accidental sampling techniques. Data were collected through interviews using a questionnaire, data analysis using Chi-Square test. The results showed that the distribution of the level of compliance paying BPJS premiums independently was still 64.2%. Distribution of the willingness to pay by 85%. There is a significant relationship between Willingness To Pay (WTP) with compliance paying dues with p = 0.031. There is a relationship between WTP with compliance to pay the premiums of BPJS Kesehatan independent participants in the inpatient installation at RSUD Prof. Dr. H. Aloei Saboe in Gorontalo City.

Introduction

JKN participants who are not recipients of premium assistance or non-PBI participants are self-employed (not wage earners) who earn income from their businesses and are not classified as poor or disadvantaged so they have to pay premiums every month. In Indonesia, up to March 2019 there had been 31,424,849 participants (BPJS, 2019). While in Gorontalo Province, based on secondary data from the BPJS Kesehatan in Gorontalo, BPJS Kesehatan participants as of March 2019, have reached 1,169,645 participants. The number of independent BPJS Kesehatan participants in Gorontalo Province being 60,643 participants (BPJS, 2019).

Increasingly independent membership is not in line with compliance in paying JKN premiums. According to Marzuki et al (2019), compliance in paying premiums means the behavior of someone who has willing to pay premiums on time. Based on secondary data from the BPJS Kesehatan in Gorontalo, as of December 2018, there were 30,482 Participants or 50.3% of the total irregular independent participants paying monthly premiums.

Based on secondary data from the BPJS Kesehatan obtained by researchers. The number of JKN participants in Gorontalo City per March 2019 reached 192,286 inhabitants. The number of independent participants in Gorontalo City per March 2019 is 18,375 people, which continues to increase every month. Of all the independent participants in Gorontalo City, as many as 7,030 were not compliant with paying JKN premiums (BPJS, 2019).

According to some opinions, several factors influence compliance in paying health insurance premiums. Based on the results of Rosmanely's research (2018), there is a

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relationship between the number of family members, perception, and risk of illness to compliance paying dues in ParangTambung Village, Kec. Tamalate. There is also a relationship between travel time and motivation with compliance paying dues.

Compliance paying dues for JKN participants is the most vital component to facilitate JKN participants in utilizing health services. Paying compliance is influenced by the willingness to pay from participants. 74.5% of workers do not have an excess household budget to pay BPJS from families who have an average family income of Rp. 1,500,000 each month with an average family of 6 (Nurbaeti and Batara, 2019).

The hospital is one of the advanced level referral health service facilities. RSUD Prof. Dr. H. Aloei Saboe is one of the public hospitals owned by the Gorontalo City Government. Currently, RSUD Prof. Dr. H. Aloei Saboe in Gorontalo City became the largest hospital in Gorontalo Province and became a referral center for health services in Gorontalo Province. RSUD Prof. Dr. H. Aloei Saboe is one of the hospitals with quite a lot of patient visits.

Methods

This type of research is a quantitative study with a cross-sectional study. The population was 8,594 people who were independent BPJS Kesehatan participants with a sample of 95 people. A sampling of research using accidental sampling method with inclusion criteria: 1) BPJS independent patients, 2) Head of the family or family member responsible for paying premiums, and 3) Patients or families of patients willing to become patients respondent and ready to be interviewed. The instrument used in this study was a questionnaire in the form of questions that refer to the guidelines and are filled out by the patient or patient's family in the inpatient installation of Prof. Dr. H. Aloei Saboe. We do the data collection technique by distributing questionnaires to them and then collecting them after they complete them. Then, the data were analyzed using chi-square.

Results and Discussions

The willingness of respondents to pay premiums is divided into two categories, namely willing and not willing. The results show of the 120 respondents, 102 people (85.0%) claimed to be willing to pay premiums. Meanwhile, 18 people (15.0%) stated that they were not willing to pay dues. One of the health problems in Indonesia is the difficulty to access health services due to limited resources. The out-of-pocket payment method requires the sick to have cash when going to a health care facility. This condition includes about 100 million people worldwide in Indonesia. As a solution to this problem, the Indonesian government has developed a National Health Insurance system, which is a social security scheme that allows people to access health services without financial difficulties. BPJS requires the public to pay a premium of IDR 22,000.00 per person per month to a third-party insurer. However, there are still people who do not pay for many reasons. For example, because they are unable to pay or do not want to pay premiums (Kutzin, 2001).

Willingness to pay for health care costs is beyond a person's financial means and has a multifactorial effect. The willingness to pay (WTP) can be affected by several factors, such as age, perception, income, education, household size dependency ratio, rural/urban locality, quality of health services, and ability to pay. However, other factors affect the PAP, namely the marginal cost (increase in prices and utility levels) of certain services or goods and access to available health services. The price level does not affect the WTP for health care (Aizuddin, Sulong and Aljunid, 2012; Darmawan, Satibi, and Kristina, 2019).

People who have health insurance contracts tend to be willing to contribute to paying high premiums. The level of education is associated with the willingness and ability to pay for health care expenses (Borges, Reis, and Anjos, 2017). People with tertiary education are willing to pay as much as 2 to 3 times as much as those without education in all health domains (Lew et al, 2020).

Indicators of respondents' pay compliance seen from the results of the interviews. Namely, compliance to pay BPJS premiums monthly. Respondents who pay a monthly fee are considered compliant. Non-compliant respondents are respondents who sometimes

fail to pay BPJS premiums every month. The results show that of the 120 respondents, there were 77 people (64.2%) who complied, while 43 people (35.8%) were less compliant in paying the independent BPJS premiums. The compliance rate is still too low. Premiums are contributions paid by the insured to the guarantor regularly up to the time specified as a substitute for the policy to guarantee protection against a person's risk that may occur in the future. Premiums are needed for the insurer (insurance) to meet the payment of health service claims every month. The National Health Insurance System (JKN) developed in Indonesia is a social insurance scheme that allows anyone to access health services without financial difficulties (Ramadhan, Rahmadi and Djuhaeni, 2015).

Compliance with paying premiums needs to be approached by looking at the characteristics of the participants. The primary consideration is the ability to pay because the ability and willingness to pay social health insurance premiums is a vital tool for developing health insurance policies (Lunenburg, 2012). The results found that 82.5 percent of respondents were willing to pay the BPJS premium set by the government. That is because most respondents' income is higher than the UMP in Gorontalo Province.

Most of the households support the national health financing scheme. Some have suggested that a government agency manage the scheme, whereby their salary is deducted every month as a contribution form. Willingness to pay for this national health financing scheme is significantly higher for younger people, women, rural areas residents, those with higher incomes, and the sick (Noor, Saperi, and Aljunid, 2019). People will seek treatment only when a complaint to their health has become evident. Some people view health insurance as a need, and they are willing to pay an annual premium from the insurance provider (Jain et al, 2014).

WTP is associated with compliance paying premiums for independent BPJS with the chi-square statistical test. The test results are presented in the following table.

Table 1. Relationship between WTP and Compliance Paying JKN Dues in the Inpatient Installation of RSUD Prof. Dr. H. Aloei Saboe

WTP	Compliance Paying				Total		Sig.
	Obedient		Not obedient				
	n	%	n	%	n	%	
Willing	70	58.3%	32	26.7%	102	85.0%	0.031
Not willing	7	5.8%	11	9.2%	18	15.0%	
Total	77	64.2%	43	35.8%	120	100.0%	

Source: Primary Data, 2019

Of the 120 respondents, there were 32 people (26.7%) who willing to pay dues but were less compliant in paying dues. Whereas respondents who were not willing to pay dues and were obedient in paying dues were 11 people (9.2%). Based on the Chi-square statistical test p-value was obtained = 0.031 ($p > 0.05$) with significance level $\alpha = 0.05$. It shows that there is a relationship between Willingness To Pay (WTP) and compliance with paying premiums for BPJS Kesehatan independent participants at the inpatient installation at RSUD Prof. Dr. H. Aloei Saboe in Gorontalo City. Statistical test results show that there is a significant relationship ($p < 0.05$) between the willingness to pay (WTP) to compliance paying a premium for independent BPJS every month. Respondents who have willing to pay most of them obediently pay BPJS premiums independently. Some studies indicate that respondents who have the ability and willingness to pay will be obedient to pay health insurance premiums.

Respondents who are not willing to pay the majority are not compliant with the independent BPJS premiums payment. Willingness to pay is a consideration in spending income/expenses to buy goods or other services due to limited acceptance. So that economically in choosing maximum satisfaction. We can use the understanding to understand respondents. Those who less

willing to pay will choose more important expenses to rule out paying BPJS premiums independently. High costs can prevent patients from getting the care they need. These findings have two distinct policy implications. First, raise awareness among service providers of high allowance burdens and financial barriers to care, so doctors need to discuss health care coverage and costs to their patients. As long as the patient's perception is not correct about the ability to pay, the doctor can help the patient overcome the treatment barrier. Second, a health plan can reduce the sharing of patient costs for medicines. By overcoming financial barriers to care, it is hoped that treatment adherence will increase among patients (Bernard, Johansson and Fang, 2014).

This community group needs more attention from the government so that their health is guaranteed. 20% of the respondents of this study entered the age of the elderly (more than 45 years). Several factors influence WTP, namely age, family status, occupation. It can be information about how these findings can be used to help find more fully the value of health insurance and its implications for policy decisions (Al-Hanawi et al, 2019; Mon et al, 2018).

The financing of the health system in Bangladesh has been slowing down as a result of the increasing inequality of health care payments. Financing is more concentrated among the poor. Income inequality increases due to high "direct from pocket payments". The increase in income inequality due to out-of-pocket payments was 89%. These findings prove the impact of health system financing on the unfair financial burden of health care and income. Direct payments dependence highly affects the standard of living of households. Therefore, it is necessary to reform the health system financing scheme (Molla and Chi, 2017).

The average person will be less willing to pay for prevention costs than treatment, but they are still willing to pay for prevention costs with a higher WTP than treatment. The average total WTP for prevention is about 85% higher than for treatment (Wolff, Larsson, and Svensson, 2020). they will be willing to pay for the intervention, provide reimbursement (eg reduced hospitalization) and improve efficiency in staff utilization is demonstrable. These factors will support the price premium if it is cost-effective (Cope et al, 2018).

Social trust is a vital factor in determining the willingness of the population to provide the financial resources needed to support public health care. Increased social trust is associated with a greater willingness to pay contributions to improve public health services. (Habibov, Cheung, and Auchynnikava, 2017). Patients' willingness to pay for prevention and health care services depends on the patient's ability to pay. Those with higher monthly incomes tend to pay for local services (Meng et al, 2020).

Conclusion

Willingness to pay is related to compliance with pay. Respondents who have willing to pay are more obedient to pay premiums than respondents who have no willing to pay. Thus, the government needs to reorganize the health system financing scheme in Indonesia.

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Anti-Tuberculosis Drugs against the Resistance Level of Mycobacterium tuberculosis isolates

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Abstract

Prolonged MDR-TB therapy can have side effects, namely a correlation between cure rates and changes in bacterial profiles related to resistance to anti-tuberculosis drugs (ATD) which can affect the incidence rate of MTB and MDR-TB in a region. The research objective was to analyze the effectiveness of the type of ATD against the resistance level of Mycobacterium tuberculosis (MTB) isolates with the incidence of tuberculosis (TB) and MDR-TB. The research method used was a retrospective cohort based on tracing medical record data at the Surakarta City Center General Hospital 2016 until 2017 with total sampling. The independent variable of this study was the type of ATD, while the dependent variable was the resistance level of MTB isolates. The characteristics of the most patient respondent suspect TB were male with the level of resistance of MTB isolates to ATD relatively varied. The results of the analysis of different tests showed a p value of 0.000 so that the p value was <0.05, so there was an effect of the type of ATD (Strepttomycin, Isoniazid, Rifampicin and Ethambutol) on the resistance of TB isolates from patients with suspected TB. This is useful to determine the success of TB therapy in terms of mortality and the effectiveness of therapy in TB patients.

Introduction

The prevalence rate of TB in Indonesia is 0.4% of all diseases in Indonesia. Based on the results of a survey conducted by the Directorate General of P2P Ministry of Health of the Republic of Indonesia found that in 2017 the province of Central Java was in third place with the number of TB incidents of 42,272 people. The prevalence rate of TB based on clinical diagnosis shows that the incidence of TB in Central Java in 2018 was 0.4%, while according to the Strategic Plan target in 2019 the prevalence of TB was 245 / 100,000 population (Ministry of Health of the Republic of Indonesia, 2018). The incidence rate of tuberculosis (TB) is increasing every year. Meanwhile, the government program on the treatment and control of tuberculosis is continuing to solve this disease, but the increase in the number of cases and deaths is always increasing drastically. Spreading among families often occurs in tuberculosis sufferers and complications also occur due to the incomplete healing process carried out by the sufferer.

TB treatment lasts quite a long time, namely at least 6 months of treatment, causing patients to drop out of treatment or undergo treatment irregularly. Both of these have fatal consequences; which causes treatment to be unsuccessful and the emergence of germs that are resistant to Anti-Tuberculosis Drugs (OAT) or multi-drug resistance (MDR) so that it has an impact on the multiplying of TB treatment costs and complicating TB eradication in Indonesia. The high number of MDR-TB cases

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in Indonesia and TB management that has been carried out through appropriate and safe treatment are expected to reduce the increase in the occurrence of MDR-TB or germ resistance to OAT through increased immunostimulants. In general, MDR-TB occurs because of poor adherence in tuberculosis treatment. MDR-TB is a TB infection caused by Mycobacterium tuberculosis (MTB) and is resistant to isoniazid (H) and rifampin with or without other drug resistance.

The increasing number of TB patients can add to new problems, namely the increase in the number of TB patients and an increase in the incidence of MDR-TB at the Central General Hospital (RSUP) of Surakarta city. RSUP Surakarta was originally known as the Surakarta Center for Community Lung Health in accordance with the Minister of Health Regulation Number 64 of 2015 technically the function is fostered by the Directorate of Referral Health Services as a referral hospital for suspected TB patients located on Prof. Dr. R. Soeharso street Number 28 Surakarta.

Prolonged MDR-TB therapy can have side effects, namely a correlation between cure rates and changes in bacterial profiles related to drug resistance. There is a change in the profile of MTB bacteria related to resistance to OAT, which can affect the incidence rate of MTB and MDR-TB in a region. Therefore, analysis of the effectiveness of OAT used against the resistance level of MTB isolates from TB patients needs to be done to determine the success of TB therapy related to mortality rates and effectiveness of therapy in TB patients. Based on the formulation of the problem and the results of the situation analysis, the aim of the study was to analyze the effectiveness of the type of OAT on the resistance level of MTB patients in RSUP Kota Surakarta.

Methods

The research method was a quantitative descriptive study with a retrospective cohort design based on tracing the medical records of tuberculosis patients at the Center General Hospital of Surakarta City. The independent variable of the study was the type of OAT including Streptomycin, Isoniazid, Rifampicin and Etambutol (SIRE), while the dependent variable was the resistance level of MTB isolates..

Data collection techniques include primary data obtained from tuberculosis patient medical record data at the Center General Hospital of Surakarta City from 2016 to 2017. From the primary data, the editing, coding, scoring and tabulating stages were carried out for further statistical analysis, namely univariate and bivariate analysis. Univariate analysis is an analysis that describes each variable using a frequency distribution table. This univariate analysis of data is presented in the form of a frequency table so that phenomena related to the variables studied will be illustrated. Meanwhile, the bivariate analysis was carried out by using a different test to see if there was a relationship between the independent variable and the dependent variable with the degree of significance $\alpha = 0.05$.

Results and Discussion

Based on primary data from the medical records of suspected TB patients at the Center General Hospital of Surakarta City in 2016 to 2017 as listed in table 1, the characteristics of the respondents including gender and age were obtained based on the identity of the respondents when registering patients who visited the at Center General Hospital of Surakarta City.

Table 1. Distribution of Respondent Characteristics

No.	Description	In 2016		In 2017	
		Number	%	Number	%
1	Gender				
	Male	249	66,22	120	60,91
	Female	127	33,78	77	39,09
2	Ages				
	< 18 Years Old	7	1,86	2	1,02
	18-25 Years Old	52	13,83	28	14,21
	26-35 Years Old	71	18,88	42	21,32
	36-45 Years Old	63	16,76	36	18,27
	46-55 Years Old	73	19,41	36	18,27
	56-65 Years Old	65	17,29	34	17,26
	> 65 Years Old	45	11,97	19	9,64
	Total	376	100	197	100,0

Based on table 1, the characteristics of respondents according to gender indicate that the majority of respondents suspect TB is male, namely in 2016 amounted to 66.22% and in 2017 amounted to 60.91%. TB infection is generally related to the level of infection occurring in the lung organs and is influenced by the behavior of respondents, namely smokers, and the majority of smokers are male than female. In addition, in general, men are the backbone or family responsibility, which is strongly influenced by socio-economic, cultural and environmental conditions, including factors of type and work load, total income, education level, lifestyle or habits and the environment in which they live. The results showed that the prevalence of TB in male was higher than in female as happened in China where the ratio of male and female reached 2.01 (1,303 / 647) with the percentage of male patients 67.49% and 32 female. , 51%. The level of drug resistance in male to TB was significantly higher than in female. This may be due to differences in population distribution and different study periods (Q. Li et al., 2018).

Apart from gender, age also affects the incidence of TB infection. As table 1 shows the characteristics of the respondent suspect TB occurred relatively in the productive age to adulthood, namely 26-55 years old. Age is an independent factor related to MDR-TB and significantly occurs in the age 45–65 years old. Productive age to adulthood is the age of optimum activity carried out by respondents in relation to socio-economic conditions. The distribution of TB patients shows that a percentage of more than 50% occurs in productive age, namely 20 and 50 years old, this is related to social relations and working conditions of respondents (Liu et al., 2018). The results of previous studies indicated that respondents aged over 60 years old had a significantly lower percentage of the incidence of MDR-TB and / or XDR-TB than those in the younger age group. This is thought to be related to the workload, study and life loads that are greater while the lifestyle of the elderly is relatively simpler. The level of resistance to OAT in respondents aged over 60 years in reinfection cases was significantly lower than for other age groups due to an imbalance of drug resistance between different age groups mainly due to history of treatment (Ullah et al., 2016).

Other factors that influence the occurrence of TB disease include socioeconomic conditions, age, gender, nutritional status and smoking habits. In general, the education level of the suspect TB patients was relatively low and correlated with their socioeconomic life. The low level of education of TB patients, will have difficulty or lack of understanding of guidelines for the treatment of drug-resistant tuberculosis and its effects. In terms of socio-economic conditions, namely due to the low level of welfare due to unemployment or retirement and insufficient nutritional needs that affect stressor factors and smoking behavior. The number of new TB cases in Indonesia was 420,994 cases in 2017. The percentage of smokers occurred in males as much as 68.5%, while females were only 3.7%. In addition, the number of new TB cases in males was 1.4 times greater than that in females. This happens because men are more easily exposed to the risk of TB due to smoking and less adherence to taking medication. Although smoking is not the main cause of tuberculosis, smoking can reduce the immunity of smokers because the toxins in cigarettes are harmful to health, namely tar, nicotine, CO gas, and NO that come from tobacco so that people are more susceptible to TB bacterial infection. Smoking habits make a person more susceptible to TB infection, and the death rate from TB will be higher in smokers compared to nonsmokers. Smoking habits can also damage the lung defense mechanism called muccociliary clearance. In addition, cigarette smoke can increase airway resistance and cause easy leakage of blood vessels in the lungs, it will also damage macrophages, which are cells that can eat harmful bacteria. Individuals who are exposed to secondhand smoke or secondhand smoke have a higher potential for exposure to TB than active smokers. TB in smokers is more contagious than non-smoking TB sufferers, smoking habit is also a factor in the progression of pulmonary tuberculosis and the occurrence of fibrosis (Sarwani, Nurlaela, & Zahrotul, 2012).

Since 2010, WHO has recommended the Molecular Rapid Test (TCM) as the initial examination for the diagnosis of MDR-TB. The TCM method is a new revolution in TB diagnosis

that contributes to the rapid diagnosis of TB and MDR-TB cases within 2 hours compared to conventional culture and sensitivity testing methods which take 3-4 months. The results of the MDR-TB diagnosis of the TCM method can be used as a basis for patient treatment but does not exclude the need for culture and sensitivity testing for OAT because TCM only detects first-line OAT-resistant TB, especially against rifampicin. Immunity to INH must be confirmed by a culture examination followed by an OAT sensitivity test (Sun et al., 2019). Diagnosis of TB-RO, MDR-TB and XDR-TB can be done using a rapid test of the PCR method (Xpert MTB / RIF), culture examination and a germ sensitivity test for OAT, namely the Drugs Sensitivity Test (DST). A rapid and sensitive diagnostic test method needs to be done to support adequate MTB examination results and MTB therapy strategies (Weldegebreal & Mebrahtu, 2017).

Table 2. Distribution of MTB Sensitivity and Resistance Test Results Against OAT

No.	DST results	In 2016		In 2017	
		Number	%	Number	%
	Resistant	170	45,21	47	23,86
	Sensitive	206	54,79	150	76,14
	Total	376	100	197	100,0

Source: Primary Data, 2017

Based on table 2, it shows the distribution of sensitivity test results for MTB isolates to OAT in RSUP Kota Surakarta, showing the percentage of resistance and sensitivity that varies, namely the percentage of sensitivity of 54.79% and resistance of 45.21% in 2016; whereas in 2017 the percentage of sensitivity was 76.14% and resistance was 23.86%. The DST stage is carried out after a positive smear microscopic examination result or a positive TCM examination result. DST uses Lowenstein Jensen (LJ) solid media containing OAT, namely Streptomycin, Isoniazid, Rifampicin and Etambutol (SIRE). The varying levels of resistance or sensitivity of MTB isolates to OAT are influenced by several factors including different characteristics of respondents related to the level of TB infection of respondents suspect initial TB or the MDR-TB group. DST laboratory examination results can be influenced by HR factors (Human Resources) related to soft skills and hard skills of TLM (Medical Laboratory Personnel) in conducting examinations, strengthening internal quality including laboratory facilities and infrastructure, standardization of tests in order to ensure the reliability and validity of examination results, limits expired diagnostic reagent, type of examination method, recording and external laboratory testing includes recording and reporting of examination results or medical record data. However, DST is a direct method of susceptibility testing for M. tuberculosis as one of the laboratory diagnostic parameters used in determining the level of germ resistance. Another factor that affects the in vitro DST results is the sensitivity and specificity of each examination method (Harti, Murharyati, Sulisetyawati, & Oktariani, 2018). The ideal examination method is to meet the specificity, sensitivity and representative criteria so that each method has weaknesses and strengths. The results of the sample culture carried out are part of the sensitivity test for M. tuberculosis to drugs and to determine the potential for MDR-TB (Lu et al., 2017).

MDR-TB is a type of TB bacillus resistance to at least two first-line OAT, namely isoniazid and rifampin; which are known to be the two most effective types of OAT. Germicidal resistance to OAT can occur if the administration of drugs is not appropriate, namely the patient does not complete the treatment given, the health worker provides inappropriate treatment, whether in combination, dosage, length of treatment and quality of the drug, as well as the problem of drug supply which is not always available. MDR-TB is a major public health problem due to the presence of a strain of M. tuberculosis that is resistant to first-line OAT, including rifampin and isoniazid simultaneously. A patient who is confirmed to have MDR-TB can pass this form of TB to other people. MDR-TB

sufferers usually occur in individuals who have a history of previous TB treatment compared to new cases of patients. A history of TB treatment increases the risk of MDR-TB incidence, this is related to previous treatment results, namely dropping out of treatment, failing treatment, relapse, or patients who have had MDR-TB treatment (Kobayashi, Hattori, Akter, Mizoue, & Ohta, 2017). The need for monitoring OAT therapy through routine culture examinations for TB patients during the treatment process (Mitnick et al., 2016)

Table 3. TB Category Distribution

No.	TB Category	In 2016		In 2017	
		Number	%	Number	%
	MTB	206	54,79	47	23,86
	MDR-TB	170	45,21	150	76,14
	Total	376	100	197	100,0

Source: Primary Data, 2017

Based on table 3, it shows that the percentage distribution of the incidence rate of MDR-TB and MTB in 2016 and 2017 at the Surakarta City Hospital is relatively varied. In 2016 the percentage of MDR-TB occurrence (45.21%) was lower than that of MTB (54.79%) while in 2017 the incidence rate of MDR-TB (76.14%) was higher than that of MTB (23.86%). The decrease or increase in the percentage cannot be used as a guide or reference that MDR-TB cases are lower than MTB due to various factors that influence the rate of MDR-TB occurrence in a region. Many factors contribute to drug resistance and the occurrence of MDR-TB, including in Indonesia. This is due to the patient's ignorance of the disease, poor patient adherence, ineffective administration of monotherapy or drug regimens, inadequate doses, poor instructions, low medication regularity, lack of motivation, irregular drug supply, poor bioavailability and quality. drugs contribute to secondary drug resistance. The percentage distribution of resistance levels and / or sensitivity of MTB isolates to the type of OAT SIRE in Center General Hospital of Surakarta City is as listed in the table 4.

Table 4. Resistance Level of MTB Isolates To SIRE

No	Types of OAT	In 2016						In 2017					
		Resis-tent	%	Sensitive	%	Mean Rank	P value	Resis-tent	%	Sensitive	%	Mean Rank	P value
1	S (Strepto-mycin)	154	40,96	222	59,04	541,50	0,000	39	19,80	158	80,20	346,00	0,000
2	I (Iso-niazid)	21	5,59	355	94,41	807,50		11	5,58	186	94,42	402,00	
3	R (Rifam-pycin)	12	3,19	364	96,81	825,50		5	2,54	192	97,46	414,00	
4	E (Etham-butol)	7	1,86	369	98,14	835,50		3	1,52	194	98,48	416,00	

Source: Primary Data, 2017

Based on table 4, it shows that MTB isolates from suspected TB patients in the Surakarta City Hospital showed the highest percentage of sensitivity to Ethambutol, amounting to 98.14% in 2016 and 98.48% in 2017. Based on this, Ethambutol is the most effective type of OAT for therapy. MTB and / or MDR-TB rather than Streptomycin, Isoniazid or Rifampicin. The results of the different test analysis showed a p value of 0.000 so that the p value <0.05, then there was an effect of the type of OAT SIRE on the resistance and sensitivity of TB isolates from patients with suspected TB. The resistance factor of MTB isolates to the type of OAT had an impact on the incidence rate of MDR-TB.

The effectiveness of a type of OAT on the level of resistance or sensitivity of M. tuberculosis isolates is very much influenced by the mechanism of action of the drug, namely

related to the chemical physical properties of medicinal compounds to penetrate the cell walls of TB bacteria; and the optimum dose required to be bactericidal. In addition, it is also influenced by environmental factors such as acidity, temperature, enzymatic activity and physiological factors of M. tuberculosis cells related to the structure and composition of the cell wall and biomolecular genetic expression. (Y. Li et al., 2016). The level of resistance of MTB to OAT can occur through two main mechanisms, namely primary resistance of MTB to OAT during transmission to a new host and secondary resistance due to mutations in genes that are resistant to one or more OATs. (Sowajassatakul, Prammananan, Chaiprasert, & Phunpruch, 2014). The mechanism of action of OAT including isoniazid (INH) is thought to work by inhibiting the synthesis of mycolic acid, the main component of MTB cell wall. Rifampicin (RIF) is bactericidal through inhibition of nucleic acid synthesis, namely transcription RNA synthesis by binding to the β subunit of RNA polymerase. Pyrazinamide (PZA) is a structural analogue of nicotinamide, bactericidal against semidorman tubercle bacilli in acidic conditions. Under acidic conditions, tubercle bacilli produce pyrazinamidase, an enzyme that converts PZA to pyrazinoic acid, which acts as an antibacterial. Ethambutol (EB) can interfere with carbohydrate metabolism, while streptomycin (SM) kills bacteria by interfering with protein synthesis, translation, by binding to 16s rRNA. INH is the most effective OAT both for treatment and prevention of TB disease because M. tuberculosis is very sensitive to INH. INH resistant lines often appear with a frequency of approximately 90%. Resistance to INH is caused by mutations in one of the katG, inhA or ahpC genes. Previously, TB could be cured with the proper administration of anti-tuberculosis, however, recently many M. tuberculosis strains were found to be resistant to two or more OATs known as MDR-TB strains. Initial treatment of pulmonary TB caused by M. tuberculosis usually uses isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EB) or streptomycin (SM) as the main options. Resistance encourages the use of other more toxic alternative drugs, namely ethionamide, aminosalicylic acid, cycloserine, capreomycin, ciprofloxacin or ofloxacin. The emergence of M. tuberculosis strains that are resistant to two or more anti-tuberculosis drugs (OAT) causes the failure rate of tuberculosis therapy to be high. The high level of resistance of MTB to rifampin suggests a potential increase in the incidence of MDR. Therefore, a TB control program is needed by the related government agencies or institutions (Adane, Ameni, Bekele, Abebe, & Aseffa, 2015).

The incidence of MDR-TB is an important public health problem and is a global disease (McBryde et al., 2017). The emergence of multidrug-resistant tuberculosis (MDR-TB) and multiple drug-resistant tuberculosis (XDR-TB) around the world has posed additional challenges to global tuberculosis (TB) control efforts, because of the limited treatment options available and treatment outcomes are often sub- optimal (Alene et al., 2017). Data from WHO in 2018 shows that the number of TB cases that are resistant to rifampin (RR-TB) is estimated to reach 201.8 million worldwide in 2017, and 82% of these cases are MTB that is resistant to several types of drugs, namely the least isoniazid and rifampin. In 2017, it was estimated that among MDR-TB cases there were 8.5% of TB cases that were widely resistant to drugs, namely MTB-XDR, resistance to isoniazid, rifampin, one fluoroquinolone, and one second-line drug. The duration of MDR-TB treatment is relatively longer than non-MDR-TB longer than drug-sensitive TB and expensive treatment costs. Recent data on the results of therapy show that the treatment success rate for TB treatment is up to 82%; 55% for MDR / RR-TB and 34% for XDR-TB. The proportion of MDR or XDR-TB incidence rates in China was higher in recurrent treatment cases than in initial TB cases and the level of MTB resistance to OAT was influenced by factors of age, sex and region or region and standardized TB therapy could reduce the incidence of MTB resistance to OAT and reinfection of TB (Wu et al., 2019).

Determination of the incidence of MDR-TB and MTB as a useful determinant for early and accurate detection of mortality rates and effectiveness of therapy in TB patients. The distribution of the level of occurrence of MTB and MDR-TB in suspected TB patients is

influenced by various factors that contribute to the occurrence of germicidal resistance to drugs, respondent characteristics, treatment programs, culture, socio-economic and environmental conditions. Variables that influence the incidence of MDR-TB include family support, knowledge, regularity of taking medication and the activeness of staff. In addition, tuberculosis patients who do not regularly drink OAT are at risk of experiencing MDR-TB. The knowledge of pulmonary TB patients about TB disease, the required treatment and the length of treatment that must be done will affect the patient's adherence to complete treatment. Patients with low knowledge level will have more than twice the risk of treatment failure compared to patients who have high knowledge. Respondents with poor medication adherence had a 2.486 times risk of developing MDR-TB disease compared to respondents who were adherent in taking OAT on TB treatment. Education, knowledge, behavior, social support, and self-efficacy are related to adherence to treatment of TB patients. Low levels of education, lack of family support, and medical services related to tuberculosis are associated with low adherence to medication.

Pulmonary TB treatment generally consists of an intensive phase for 2-3 months and a follow-up phase for 4 months. TB drugs should be taken regularly for 6-8 months according to schedule. Treatment regularity less than 90% will affect healing. OAT must be taken regularly according to schedule, especially in the two phases of treatment to avoid treatment failure and relapse. TB treatment in the intensive phase needs to be considered and carried out according to the procedure and schedule because of the inaccuracy of the implementation of the intensive phase of treatment, that is, if the TB patient does not regularly take medication, it will have an impact on conversion failure at the end of the intensive phase of treatment and the emergence of MDR-TB problems. The results showed that the success of MDR-TB treatment using a long-term regimen in MDR-TB patients in 2013-2015 was only 49.7%. The previous TB-RO treatment regimen took so long that in May 2016, WHO recommended a new TB-RO treatment, using short-term guidelines. This new regimen aims to streamline the patient's treatment period so that it is not too long so that it can reduce patients who drop out of treatment. With a long treatment time, TB-RO patients are at risk of dropping out of treatment and leading to treatment failure. Shorter treatment duration with the effectiveness of faster treatment results, is expected to increase treatment enrollment, reduce the number of patients dropping out of treatment and increase the success rate of treatment in TB-RO patients so that standard short-term treatment guidelines for drug resistance patients began to be implemented in Indonesia in 2017.

The treatment success rate of TB-RO patients is still low because the management of drug-resistant treatment is much more difficult and requires a long duration of treatment, namely a minimum of 20 months. Another problem related to TB-RO management that is currently available around the world is costly both for the program and for the patient. Therefore, TB control in health services primarily requires effective strategic steps. Practical measures include support for program activities, high-quality training for medical staff and raising public awareness about TB prevention and control including routine DST activities for TB patients from high burden areas and limited resources to reduce the global burden of TB. (Lan, Li, Chen, Zhang, & Zhang, 2019).

The strategies used in controlling tuberculosis include prevention of transmission, case finding, treatment and intensive treatment of TB-RO patients until they recover with passive case treatment as a standard operational procedure for TB control in Indonesia, which requires patients to go to Puskesmas. Sufferers are hindered by location, transportation, economic conditions. Management of therapeutic services in addressing TB-RO treatment non-adherence is the key to achieving program success. According to WHO, TB-RO control is influenced by the role of health workers, efforts to provide therapy services in health facilities and patient behavior. Treatment less than 12 months can result in a risk of treatment failure, and a greater risk of transmission, cause medical and psychosocial problems, and become a global community problem, as it contributes

to increased morbidity and mortality. MDR-TB therapy uses several types of drugs, causing several problems in terms of tolerance to these drugs. The response of each individual is unpredictable, but treatment should not be stopped just because of fear of the reaction.

The MDR-TB control program is a new challenge for the Indonesian government because of difficult diagnosis, high rates of therapy failure and mortality. Treatment for MDR-TB sufferers is relatively more difficult, with a success rate of only about 50% and expensive treatment costs, even up to 100 times more expensive than TB treatment without MDR, so that developing countries including Indonesia becomes a very heavy burden in efforts to overcome it. Treatment of TB-RO, MDR-TB, and XDR-TB is more difficult when compared to the treatment of sensitive TB germs. The success rate of TB treatment can be done quickly if TB cases have been identified early and the effectiveness of the treatment program. TB and MDR-TB treatment is relatively long, namely 18-24 months, but the TB treatment program must be integrated because if a failure occurs it will have an impact on various things, including the high cost of treatment. The price of second-line TB drugs is much more expensive, which is 100 times more than ordinary TB treatment and its handling is relatively more difficult. (Flora et al., 2013). Apart from the complicated treatment mix, the number of drugs is more and the side effects caused are also heavier. Several factors that must be considered that greatly affect the success of treatment, such as the length of time for treatment, compliance and regularity of patients for treatment, immune system, as well as the socio-economic factors of patients who are no less important. Treatment that is interrupted or not in accordance with DOTS standards can also result in the emergence of multiple cases of immunity to Anti-Tuberculosis Drug which results in a stronger type of TB germ, namely the occurrence of MDR-TB. MDR-TB treatment requires more expensive and longer time with the success of treatment is uncertain. The most dominant variable influencing the incidence of MDR-TB was medication adherence; Therefore, it is necessary to increase the extension program to patients and families about the importance of medication adherence and the consequences that arise from non-adherence to taking medication so that this can be used to control the increase in the incidence of MDR-TB.

Medical personnel, especially doctors and nurses, need to provide therapeutic services to patients, especially in an effort to improve drug-resistant tuberculosis patient adherence to treatment, in order to avoid the spread of drug-resistant tuberculosis more widely and prevent XDR-TB. In addition to health services, family and community support is needed, namely the need for a strong commitment to healing in patients, Active Case Treatment from officers, family psychosocial support and family support systems to become caregivers to prevent extensively drug resistance. Family support for having compliance to Anti Tuberculosis Drug shows the effect of family support on adherence to taking anti-tuberculosis drugs, the higher the family support the higher the level of compliance of patients with taking Anti Tuberculosis Drug. The role of the family in the care of TB sufferers includes: looking after and caring for the sufferer, maintaining and improving mental status, anticipating socio-economic changes, providing motivation or support and facilitating the patient's spiritual needs. High family support will reduce the morbidity and mortality rates of sufferers. The quality of life of TB patients who undergo treatment depends on their physical condition, emotional distress, individual and family coping, social support from family and people around them, and the environment that supports pulmonary TB patients in their life. Good adaptation methods in undergoing boredom and obstacles during long treatment for MDR-TB patients are based on the process of self-awareness in the form of creating motivation to change, strong support systems, continuous and continuous coaching efforts. A concerted effort from stakeholders, supporters and research is needed for the development of a shorter, more effective and safer regimen of Anti Tuberculosis Drug (Tiberi et al., 2018).

Complete TB control can be pursued by implementing a 3 pillar strategy, namely integrated patient-focused treatment and prevention; integrated policy and support

systems and intensive and innovative TB research in the search for TB drugs (Migliori et al., 2020). The key to preventing MDR-TB is early diagnosis of any suspected drug resistant TB and followed by treatment with standard of Anti Tuberculosis Drug. The application of standardized TB treatment using standardized of Anti Tuberculosis Drug is very important for controlling TB and the incidence rate of MDR-TB effectively, especially in monitoring adherence and completeness of treatment, and must be reported into the surveillance system.

Conclusion

The results of the analysis of the difference test showed a p value of 0.000, so that the p value <0.05, then there was an influence on the type of Anti Tuberculosis Drug (OAT) (Strepttomycin, Isoniazid, Rifamicin and Ethambutol) against resistance to TB isolates from patients with suspected TB.

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Z. mauritiana Leaves as Larvasidal Alternatives

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Abstract

The development of resistance to chemical insecticides among mosquitos has been considered as a setback in vector control. However, the use of chemical insecticides is often toxic to both human and non-target animals, thus it needs the development of natural insecticides. This study aims to analyze the larvicidal effect of Z. mauritiana leaves as a natural larvicidal that is friendly to the environment. This research will outline the larvicidal effect of Z. mauritiana leaves and discuss the significance of addressing this natural larvicide against Aedes aegypti larvae. Methods and Material in this study, we developed a mosquito larvacide by extracting Z. mauritiana leaves with the maceration method. We extracted Z. mauritiana leaves into 5 different concentrations (1%, 3%, 5%, 7%, 9%) and its effect compared to the current chemical larvicide (1% of temephos). Data analysis was performed by using the computer and statistical of variance test One Way Anova. This experiment was successfully 100% killed Aedes aegypti in 24 hours of the intervention of 9% extract of Z. mauritiana leaves which was a powerful effect compare to recent studies. The intervention of concentration variations was significantly associated with larvae mortality ($p \leq 0{,}001$).

Introduction

Mosquitoes can transmit a number of diseases than any other group of arthropods and affect more than 700 million people worldwide annually, including arboviruses responsible for yellow fever, dengue hemorrhagic fever, epidemic polyarthritis, several forms of encephalitis and bancroftianfilariases (Kazembe and Makusha 2012) and pathogens which continue to have devastating effect on human beings (Maheswaran, Sathish, and Ignacimuthu 2008). One of the concerned disease which cause a high number of mortality is Dengue Hemorrhagic Fever (Jain et al., 2017). Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by Aedes aegypti (World Health Organization 2009; Pham et al., 2011; World Health Organization 2016; Sucipto, Raharjo, and Nurjazuli 2015). In Province of West Borneo, for the last five years, there were fluctuative Dengue Fever cases starting from 2011, were 784 cases (CFR 1,3%), 1.614 cases in 2012 (CFR 1,4%), 2013 recorded 838 cases (CFR 1,7%), 5.049 cases were noted in 2014 (CFR 1,3%), 2015 were 951 cases (CFR 1,6%) and 1.210 cases in 2016 (CFR 1,4%) (Kementerian Kesehatan 2016; Dinas Kesehatan Kalimantan Barat 2015).

Baseline cause of DHF is the high population of Aedes aegypti. This mostly due to the presence of uncovered water reservoirs and less implementation of larvicides other than low Clean and Healthy Living Behavior (Sucipto, Raharjo, and Nurjazuli 2015). Most community in West Borneo use water reservoir like crocks inside or outside of their houses. Based on research, the highest OR value (8.8) as the causes of mosquitos breeding are water reservoir and Clean and Healthy Living Behavior, Especially hanging the clothes behavior with OR value (8.3) (Kementerian Kesehatan 2016). Personal protection from mosquito bites is currently the most important way to prevent transmission of these disease (Fradin 1998). To prevent

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proliferation of this mosquito borne diseases and to improve quality of environment and public health, mosquito control is essential.

Chemical control like the use of larvacides in line with WHO is as the best choice to control vectors specifically in endemic or the high number of outbreaks areas (World Health Organization 2009), meanwhile based on a research in Brazil, chemical larvicides such as themepos has experienced resistance (Marcome et al., 2012; Abou-elnaga 2014), side effect towards environment (non-target organisms involved) (Aguirre-obando et al., 2015; Tennyson et al., 2013) and people tend to dislike the smell (Tennyson et al., 2013). There is now a strong consensus among scientists and public health workers that alternative tools (insecticides) and strategies are urgently needed to ensure effective and sustainable control of dengue in the tropics, for example natural ingredients which can be accepted by the community and safe to use (Marcome et al., 2012; Pamungkas, Syafei, and Soeroto 2017). The new tools need to be specific, cost-effective, and safe for the environment and non-target fauna. Unfortunately, the research and development of new chemical classes for use in public health control has been rather limited in the past 20 years because it involves a long, expensive, and non-profitable process for private companies.

Different methods have been offered by recent studies in the control of larvicides and mosquitos. The use of natural compounds such as lemongrass, citrus leaves, betel leaf as larvacides has been carried out by several researchers and the results are quite effective to be used as larvacides, but based on research has not been applied in the community due to lack of socialization about the use and change of taste natural as mentioned above, so it needs an alternative to other natural ingredients such as Z. mauritiana leaves (Pratiwi 2012). Z. mauritiana leaves contain compounds such as flavonoid, pektin, glikosida, alkaloid, triterpenoat acid, saponin, tanin and lipid (Ghosh, Chowdhury, and Chandra 2012; Dureja and Dhiman 2012). Furthermore, it also contains triterpenoat acid, oleanolat acid, betulinat acid, oleanonat acid, zizyberenalat acid and betulinat acid. Saponin and tannin are larvicides which can destroy tracture digestive membrane and epiphytic and binds the larvae of Aedes aegypti, more over Z. mauritiana leaf has carotene source, vitamins A and C and can be used as vegetables (Ma et al., 2017; Lamien-Meda et al., 2008). This statement encouraged us to use Z. mauritiana leaves as natural larvicide by extracting in order to isolate its chemical compounds.

The objective of this study was to determine the larvicide effect of Z. mauritiana leaves extract towards Aedes aegypti larvae by using the variations of Z. mauritiana leaves extract and to determine the value of LC50 and LC90. In addition, this study is important to identify the effectivity of Z. mauritiana leaves compare to temephos. Researchers state whether there is a difference mortality of Aedes aegypti larvae after giving interventions with Z. mauritiana leaves extract.

Methods

Z. mauritiana leaves extract were obtained from local producers in Pontianak, and its extract were obtained from Tanjung Pura University Laboratory by using maceration method and ratio 1:1. Maceration results are filtered by using filter paper, then the existing maserate is concentrated at 500C in oven so Z. mauritiana leaves extract becomes more concentrated. Concentration of Z. mauritiana . Eggs of Aedes aegypti was collected from researchers house, especially in a humid and dark rooms such as under the stairs in Pontianak. Aedes aegypti was obtained as egg rafts on the filter paper and were reared in trays containing tap water and maintained at 28 ± 2`C. The average of eggs trapped in each ovitrap around 30-50 eggs. In the main experiment, the larvae were reared in 15 × 20 cm plastic trays. When the eggs were hatched out into first instar larvae, they were fed with a mixture of yeast powder and dog biscuits in the ratio of (1:3). On the third day after hatching the first instar larvae moulted into second instar larvae on the fifth day, third instar larvae observed, which moulted into fourth instar larvae on the seventh day (Mohan and Ramaswamy 2007). The 1st and 2nd instar of Aedes aegypti was experimented for the present study.

The larvicidal assay were conducted according to WHO (Fuadzy and Marina 2012).

The larvacidal effects of the Z. mauritiana leaves formulation were tested on Aedes aegypti under room conditions. Baseline tests were initially run in distilled water to determine the range of lethal doses of the formulation. Each of the six beaker glasses had the ordinary larval rearing medium supplemented with the bidara leaves extract formulation at the different concentrations (i.e. 1%, 3%, 5%, 7% and 9%). Counting the number of larvae mortality by using shooter count was conducted to determine the effects of different concentration of bidara leaves extract and 1% of temephos. Terminate mortality was assessed at 24 hours. Dead larvae were identified when they failed to move after touching with tip of thin brush. This experiment was repeated four times.

Data analysis was performed by using computer and statistical of variance test One Way Anova and means were separated using LSD at p<0,05. Probit analysis of larvae mortality was carried out to determine LC50 and LC90. Significant difference in LC50 and LC90 were determined by the overlapping and non-overlapping of the 95% confidence interval (CI).

Results and Discussion

The study began by making Z. mauritiana leaves extract using maceration with a ratio of 1:1, then examined the content of alkaloids, flavonoids and saponins by phytochemical tests which conducted in the laboratory of Tanjung Pura University with positive results for those parameters. After becoming an instar III / IV a preliminary test is performed to determine the LC50 and LC90 values. In this study, physical environment is considered by measuring temperature and humidity by using 4 in 1 multifunction. The temperature and pH are measured in each repetition, and the average results can be seen in the table 1.

Table 1. Measurement result of temperature and pH

Repetition	Temperature [^{0}C]	pH
I	29	6.5
II	28	6.5
III	28	6.4
IV	29	6.4
Average	28.5	6.45

Source: Primary data, 2018

The average of temperature in all repetition was 28,50C and pH was about 6,45. These result similar with the optimum condition of environment where Aedes aegypti larvae lives.

After turning into instar III/IV, a preliminary test is carried out in order to determine LC50 and LC90 value. The mean, minimum and maximum lethal concentration (LC50 and LC90) on Aedes aegypti larvae at 24 hours exposure in interventing Z. mauritiana leaves extract is shown in Table 2.

Based on the result of equation analysis, it can be concluded that concentration (Y) = 4.1667X + (-2.6667), where X is the amount of mortality larvae.

The highest mortality of larvae is recorded in 9% of Z. mauritiana leaves extract at 24 hours application which was significantly higher than average mortality of larvae in 1%-7% (Table 1). In addition, at 24 hours after Z. mauritiana leaves extract exposure to larvae, larvae mortalities at concentration of 7% to 9% were not significantly but they were significantly higher than mortalities at 0%, 1%, 3% and 5% (Table 2). To compare, in temephos 1%, all larvae found dead, was significantly higher than average mortalities in 0%, 1%, 3% and 5% of Z. mauritiana leaves extract.

Table 2. The analysis result of LC_{50} and LC_{90} of *Z. mauritiana* Leaves as Larvacide

Lethal Concentration	Mean	Minimum	Maximum
LC_{50}	4.697	1.306	6.472
LC_{90}	8.648	6.136	12.113

Source: Primary data, 2018

Table 3. Effect of *Z. mauritiana* Leaves Extract Concentration on Larval Mortality of *Aedes aegypti*

Repetition	Larvae Mortality							P value
	Control	1%	3%	5%	7%	9%	Temephos 1%	
I	0	2	8	14	19	20	20	≤0.001
II	0	3	8	13	20	20	20	
III	0	2	7	14	18	20	20	
IV	0	2	8	14	19	20	20	
Mean	0	2.75	7.75	13.75	19	20	20	
%	0	13.75	38.75	68.75	95	100	100	

Source: Primary data, 2018

It can be seen that the Z. mauritiana leaves concentration at 9% cause the highest larvae mortality than others, and it had same mortality average with 1% temephos intervention. In all cases, higher larvae mortality was recorded with increase in the concentration of Z. mauritiana leaves extract which exposure to larvae. Statistical analysis proved that there was a difference of larvae mortality between concentration variations of Z. mauritiana leaves extract. Z. mauritiana leaves extract was an effective larvacide against Aedes aegypti larvae; it was highly toxic to mosquito larvae. The high rated of larvae mortality observed at higher concentrations (7% and 9% of the Z. mauritiana extract concentrations) within 24 hour after exposure indicate the high toxicity of the product. Surprisingly, this product had the same potency as temephos did, which cause 100% of dead larvae.

To see the difference effect towards larvae mortality, Anova test was performed. It proved that there was a difference between bidara leaves concentration and the mortality larvae of Aedes aegypti with p value ≤0.001 and it was found significant difference between 2 variations, except between 7% and 9% Z. mauritiana leaves extract, and between 7% and 9% bidara leaves extract with temephos 1%, by meaning that 7% and 9% bidara leaves extract had similar potency with temephos 1% for larvicide. Based on the average of larvae mortality after giving intervention 9% similar with abate 1%, it caused 100% larvae died in 24 hours, or in another words it can be stated that the most effective consentration of Z. mauritiana leaves extract to kill Aedes aegypti larvae in 24 hours was 9%. Life cycle of Aedes aegypti larvae in brood water successfully survive to hatch into adult mosquitos in a range pH 4,4 to 9,3 (Fuadzy and Marina 2012). Meanwhile light has indirect effect to the larvae growth. Light will also affect the temperature, while the optimal temperature for those larvae is in range 250C–350C (World Health Organization 1981). The result obtained the average of temperature in all repetition was 28,50C and pH was 6,45. Thus, this result is similar with the optimum condition of environment where Aedes aegypti larvae live in order to reduce confounding variables.

As per the preliminary phytochemical investigation, the constituents like flavanoids, tannins, alkaloids, saponins, phenolic compounds, coumarins and carbohydrates are equally present in leaf, root, bark and seed of aqueous and ethanolic extracts. These findings were in agreement of similar nature of study conducted by Okaye and Carol (Palejkar et al., 2012; Ek et al,. 2018).Those compounds like saponnin might cause destruction of tracture digestivus membrane and epicuticula and binds the larvae of Aedes aegypti (Abalaka, Daniyan, and Mann 2010). Moreover, it is stated that alkaloids could catalyst and improve the speed of neurosecretory cells to secretion exdison hormone that might cause failed in moulting process of mosquito larvae and flavonoid in form of glycoside to inhibit their move to the surface in order to inhale oxygen (Perumal et al., 2012). It is in line with a recent study, that Z. mauritiana leaves contained higher alkaloids compare to other species of Ziziphus (Perumal et al., 2012).

A survey of literature on control of different phytochemicals obtained from various plants has been carried out by number of researchers in the field of vector control (Sukumar, Perich, and Boobar 1991). There

are many studies of toxicity carried out with other plants that reflect a similar behavior against Aedes aegypti. Plant could be an alternate source of bioactive chemicals and generally free from harmful effects. Use of these botanical derivatives in mosquito control instead of synthetic insecticides could reduce the cost and environmental pollution. Many of the defensive components of plants are biodegradable with non-residual effects on the biological environment. Hence an attempt has been made in the present investigation to identify the larvicidal potential of the locally available plant Z.mauritiana.

Public acceptance of the use of larvicides from plants, in general, was accepted by the community as research on the acceptance of larvicides using lemongrass. Larvicide from plant material is generally accepted by the public because of the appearance (color and odor) aspects, ease of use, application in mosquito breeding sites, and availability of larvicidal material (Pratiwi 2012). Biolarvicides can be another alternative in controlling Aedes aegypti to break the chain of transmission of Dengue Fever. Control using natural ingredients to replace insecticides can maintain the carrying capacity of the environment. Controlling using an insecticide is a last resort in controlling fever based vectors. The most important control efforts are through environmental management, physical control, and biological control(Boesri 2010).

From the foregoing, it is clear that the concentrations of Z. mauritiana leaves extract were effective for the larvae mortality or control of mosquitos larvae, but 9% of bidara leaves extract was the most effective followed by others. It should however be noted that though, all the concentration of bidara leaves were toxic to larvae; meanwhile the degree of toxicity depends on the concentration applied and also the period of exposure. Extracts of Z. mauritiana leaves have been reported to be effective as temephos at concentration 9%. It can conclude from this study that in totality, the data collected show that Z. mauritiana indeed has larvicidal potential when treated to larvae in low concentrations, and can be used as substitute for commercial insecticides, like temephos. Though the presence of phytochemicals in Z. mauritiana, it could be studied further in detail and its beneficial effect to control mosquitoes. It is suggested for community to use Z. mauritiana leaves as natural larvicides by giving 9% of Z. mauritiana leaves extract in clear water, which estimated 1 ml extract for 1000 ml clean water or 5 ml (1 spoon) for 5 litre of water, especially clean water which stored in containers, thus reducing Aedes aegypti larvae. For further research, it will give significant improvement by considering the effectivity length of Z. mauritiana leaves extract compared to temephos which can be stayed as larvicides for 3 months.

Conclusion

The use of natural chemical compounds in many plants offers a solution to this limitation through new and innovative approaches to reducing mosquito larvae. This study showed that larvae of Aedes aegypti can be killed by chemical compounds in Z. mauritiana leaves. The implementation of Z. mauritiana leaves is suit with situation today where most community in West Borneo used water reservoir such as crock or container. Thus, it is clearly that issue deserves to be appointed in this study.

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Amount of Menstrual Blood and Nutrient Intake with Hemoglobin Level

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Abstract

The most influential factor in the anemia is severe menstrual bleeding on each cycle. Heavy menstrual bleeding that can periodically reduce iron stores in the body so that the body has an iron deficiency and lead to anemia. This study in 2019 aimed to find out the relationship between menstrual blood counts and nutritional intake with hemoglobin (Hb) levels in girls. The study used a cross-sectional design with a sample of 169 young girls in middle school in Banyumas District, Central Java, Indonesia. The amount of menstrual blood was seen using a questionnaire menstrual pictogram. The nutritional intake studied was the intake of protein, fibre, iron, and vitamin C using an FFQ semi-quantitative questionnaire and Hb levels through the insertion of peripheral blood. Data analysis using is chi-square and Fisher exact tests. There was no significant relationship between the amount of menstrual blood with Hb levels (p = 0.54 CI 95% = 0.36-1.74), protein intake (p = 0.26), fibre intake (p = 0.78) and iron intake (p = 0.44). There was a significant relationship between vitamin C intake and Hb levels (p = 0.03 CI 95% = 1.04-4.10). There is a significant relationship between vitamin C intake and hemoglobin levels in young girls.

Introduction

Adolescence is a period of rapid growth and development physically, psychologically, and intellectually. Adolescents according to the Republic of Indonesia's Minister of Health Regulation No. 25 of 2014 are residents in the age range of 10-18 years. The number of Indonesian adolescents who are almost a quarter of Indonesia's population of around 63.36 million people (24.27%) is a big challenge because it can be seen as a manifestation of a better future for the nation if the quality of the teenagers is good too.

One nutritional problem in adolescents is iron deficiency anemia, one of which is characterized by low levels of Hemoglobin (Hb) in women, especially in adolescent girls. According to Indonesia data of Household Health Survey in 2012 the prevalence of anemia in adolescent girls aged 10-18 years reaches 77.1% (Ministry of Health of the Republic of Indonesia, 2012). This is included in severe problems of iron deficiency anemia because the prevalence reaches> 40%. But in 2011, Indonesia was ranked sixth out of 11 ASEAN countries, with approximately 22.5% of women in childbearing age affected by anemia (Stevens et al., 2013). Anemia can be have many causes, including nutritional deficiencies, acute and chronic infection, blood loss, cancer, and hemoglobinopathy Anemic condition in adolescence that retain until pregnancy could increase the risk of perinatal maternal mortality, low birth weight baby, early labor and other disorders (van den Broek & Letsky, 2000).

Adolescents in addition to physical changes also experienced a biological process that is menstruation. However, most adolescents experience menstrual-related disorders such as dysmenorrhea (89.5%), menstrual cycle irregularities (31.2%), and the length of menstrual duration (5.3%) (Cakir et al., 2007). Disruption in the menstrual cycle will directly affect the quality of life and daily activities, if left

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untreated will result in the body's continuous blood loss so that adolescents experience anemia (Mesarini & Astuti, 2013). According to Nelson & Ritchie (2015), the factors that most contribute to the incidence of anemia are heavy menstrual bleeding in each cycle and chronic bleeding in the disease. Severe bleeding during menstruation can periodically reduce iron stores in the body so that the body experiences iron deficiency and results in anemia (Fraser et al., 2015).

Banyumas Regency is one of the districts in Central Java that has a high ratio of adolescents compared to the overall population, reaching more than 25% (Central Bureau of Statistics, 2014). This makes adolescents as an age group that influences the quality of the population in 10-15 years ago. One group of adolescents with nearly 41.653 people is in adolescents who attend Vocational High Schools in Banyumas, with a high number of adolescents in the group and considering the high prevalence of anemia in Banyumas Regency which is 76% (Sari et al., 2016). We want to find out the relationship between menstrual blood counts and nutritional intake with hemoglobin (Hb) levels in girls.

Method

This research is a quantitative design with an observational method that uses a cross-sectional design. The study was conducted in July 2019 at Vocational High School in Banyumas. The study population was all students of Banyumas 1 Vocational High School, while the affordable population was students of class X and XII of Banyumas 1 Vocational High School. Sampling was chosen based on purposive sampling technique with a minimum sample of 160 people. Hemoglobin levels were measured by a professional laboratory using the Quick Check Hb tool by dripping 1-2 drops of blood from the respondent's finger on the strip then placing it on the instrument and reading for a few seconds. Hemoglobin category when <12 g/dl is less and ≥ 12 g/dl is normal.

The amount of menstrual blood is the volume of blood that comes out in one menstrual cycle obtained from the menstrual pictogram questionnaire. Respondents fill in by choosing a picture of a bandage in accordance with the bleeding experienced during the last menstrual period. each picture of the dressing will represent the amount of blood that comes out (Warrilow et al., 2004). The category of menstrual blood counts when ≤36.5 ml is mild, 36.5-72.5 ml is moderate, and > 72.5 ml is severe (Dasharathy et al., 2012). Nutrition intake taken is the intake of protein, fibre, vitamin C, and iron which is consumed by respondents on average per day. Nutritional intake was measured using the Semi-quantitative Food Frequency Questionnaire (SQ-FFQ) obtained by direct interviews with respondents keeping in mind the frequency and portion of food during the last 3 months. Later, this data converted in grams using Indonesian Household Size Tables and Indonesian Food Composition Tables and then compute with nutrisurvey software.

The data obtained will be processed in several stages. The first stage is for the frequency of data from each research variable. The second stage is looking at the relationship between the amount of menstrual blood and nutritional intake with hemoglobin levels using the chi-square test if the expected value is >5 but if <5 using the Fisher exact test. After that it calculates the odds ratio (OR) with a significance level of 0.05. Data were analyzed using SPSS Version 17. The research respondents were explained about the study protocol and if the respondent was willing to take part in the research it would fill in informed consent. This research was conducted by obtaining an ethical eligibility letter from the Ethics Commission of the Faculty of Medicine, Jenderal Soedirman University number : 3970/ KEPK/VIII/2019.

Result and Discussion

The subjects of the research were female students of class X and XI of Banyumas 1 Vocational High School. The number of research subjects who filled out informed consent was 169 people with an average age of respondents 17 years. Most of the respondents had a normal amount of menstrual blood (79.3%) and a normal Hb level (69.8%). Protein and vitamin C intake tend to be sufficient with a percentage of 81.8% for adequate protein intake and 54.4% for adequate vitamin C intake as well. But for fibre and iron intake, intake tends to be less 90.5% for fibre and 78.7% for iron.

The characteristics of the research subjects are in Table 1.

The prevalence of heeavy menstrual bleeding in women varies between 27.2% and 54.0%, making it a common disorder (Fraser et al., 2015). The prevalence of low Hb levels in adolescent girls in Banyumas Regency according to this study was 30.2%. The prevalence is not as high as the prevalence in the previous study in Banyumas Regency, which is 76% of young women anemic Sari et al. (2016) where it shows that the anaemia problem in Banyumas Regency has not become a public health problem because the limit to health problems is ≥40%. As many as 30.2% of young women are included in the category of heavy menstrual blood that is more than 72.5 ml during one menstrual (Dasharathy et al., 2012). Calculation of protein and vitamin C nutrient intake in young girls is mostly sufficient, but most teenagers have low fibre and iron intake, which is more than> 70% of young women.

Table 1. Characteristics of Respondents

Variable	M ± SD	n	%
Age (years old)	17±0.63		
Age of menarche (years old)	12.66±1.02		
Amount of menstrual blood (ml)	54.05±30.52		
More (>72.5 ml)		35	20.7
Normal (≤72.5 ml)		134	79.3
Hemoglobin level (g/dl)	12.75±1.91		
Low (<12 mg/dl)		51	30.2
Normal (≥ 12 mg/dl)		118	69.8
Protein intake (g/days)	111.1±78.72		
Low (<80 % RDA)		32	18.9
Adequate (≥80 % RDA)		137	81.1
Fibre intake (g/days)	13.44±12.34		
Low (<80 % RDA)		153	90.5
Adequate (≥80 % RDA)		16	9.5
Vitamin C intake (mg/days)	182.9±333.9		
Low (<80 % RDA)		77	45.6
Adequate (≥80 % RDA)		92	54.4
Iron intake (mg/days)	18.97±15.16		
Low (<80 % RDA)		133	78.7
Adequate (≥80 % RDA)		36	21.3

Source: Primary Data, 2019

Based on the chi-square test showed that there was no relationship between the amount of menstrual blood with Hb levels (p = 0.54 CI 95% = 0.36-1.74). The relationship between the amount of menstrual blood and hemoglobin levels is shown in Table 2. Based on the results obtained, it was found that there was no significant relationship between the amount of menstrual blood with haemoglobin levels. This is different from research with Jagannath et al. (2014) that heavy bleeding in menstruation is significantly related to the incidence of anaemia as seen from haemoglobin levels and according to Zakherah et al. (2011) women with normal menstrual blood levels have better haemoglobin levels compared to women with very large amounts of menstrual blood. Besides, the excessive blood loss during the menstrual period can cause physical health problems such as iron deficiency anemia (IDA) and fatigue (Knol et al., 2013).

Heavy menstrual bleeding can therefore cause a decrease in iron level and hemoglobin amount and lead to anemia in women if not treated (Hasson, 2012). The results of this study are in line with (Clancy et al., 2006) study explain that there is no significant relationship between the amount of menstrual blood with anaemia. In the Clancy et al. (2006) study looked at the amount of blood by looking at

Table 2. The relationship between the amount of menstrual blood with hemoglobin levels

Amount of menstrual blood	Hb Level				OR (95% CI)	p
	Low		Normal			
	n	%	n	%		
More	12	34.3	23	65.7	0.79 (0.36-1.74)	0.55
Normal	39	29.1	95	70.9		

Source: Primary Data, 2019

the thickness of the endometrium as blood loss during menstruation via transvaginal ultrasound and the condition of anaemia through measurement of red blood cells and hemoglobin. The study has the result that there is no relationship between endometrial thickness and Hb levels in healthy women.

Based on the chi-square test and Fisher exact, it shows that there is no relationship between the intake of protein, fibre, and iron with Hb levels. There was a significant relationship between vitamin C intake and Hb levels (p = 0.03 CI 95% = 1.04-4.10). The relationship between nutritional intake and Hb levels is shown in Table 3. Nutrition intake data collection using SQ-FFQ which is able to see the intake of protein, fibre, vitamin C, and iron consumed by adolescent girls because this method can assess specific nutrient intake and can provide information on the number of servings to the subject (Fraser et al., 2015) . There is no significant relationship between the intake of nutrients in protein, fibre, and iron on haemoglobin levels, but there is a significant relationship between vitamin C intake and haemoglobin levels.

Most of the protein intake in this research subject is sufficient but the quality or type of protein consumed cannot be known from the study. This can cause the quality of the protein absorbed by the body to differentiate between animal and vegetable proteins, in addition to energy sources derived from animals such as meat, fish, and poultry is classified as low in people with low social status (Osungbade & Oladunjoye, 2012). In this study, researchers did not examine the economic status of the subject but based on interviews with the school. Most students had low social-economic status.

Iron intake is an interesting finding because in this study subjects with low iron intake reached 78.7%. The average nutrient intake is only 11.89 mg/day while the need for daily nutrient intake in women aged 15-49 years is 26 mg (Departemen Kesehatan Republik Indonesia, 2012). Bioavailability of iron is better in animal food sources because it is more in the form of heme while in plant foods it is stored in non-heme form so that its bioavailability is lower (Fraser et al., 2015). Fibre consumption has a relationship with iron absorption because fibre consumption can inhibit the subject's iron from vegetable products (Fraser et al., 2015). However, the results of this study have a significant result between fibre intake and Hb levels in young women. This can be due to other factors not examined in the study such as phytic acid, polyphenols/tannins, and oxalate which can inhibit the absorption of vegetable products in the body (Hallberg & Nilsson, 1964).

Vitamin C intake in adolescent girls reaches an average value of 120 mg/day while the need for vitamin C in women of childbearing age is only 75 mg (Departemen Kesehatan Republik Indonesia, 2012). This high intake of vitamin C has an effect on the abortion of iron intake in the body, which increases the amount of iron absorbed by the body. High Hb levels are associated with high intake of ascorbic acid which is part of vitamin C in women aged 16-44 years (Péneau et al., 2008). Based on the results of research and discussion, the prevention and treatment of anaemia in young women can begin with good nutritional intake such as intake of vitamin C. Vitamin C intake can be sourced from several food ingredients, especially vegetables and fruits such as guava, oranges, tomatoes, and several other sources.

The weakness of this study is that there are other nutritional intakes that affect the Hb levels that have not been studied in this study such as folic acid, vitamin A, and vitamin B12. In addition, infectious diseases experienced by adolescents can also be related to haemoglobin levels, not yet examined in this study. Futhurmore, changes in serum

ferritin concentrations more accurate to know anemia status than iron stores because ferritin is an acute phase protein and is affected by inflammatory processes irrespective of the iron store status (Babaei et al., 2017). In further research, researchers hope that further research will be done using a total fluid volume method by weighing pads before and after use as well as additional studies on the intake of folic acid, vitamin A, vitamin B12 and anti-nutritional substances. Moreover, to add a serum ferritin indicator to the anemia status test.

Table 3. The Relationship between the Nutrient Intake with Hemoglobin Levels

Variable	Hb Level				OR (95% CI)	p
	Low		Normal			
	n	%	n	%		
Protein intake						
More	7	21.9	25	78.1	1.69 (0.68-4.20)	0.26[a]
Normal	39	29.1	93	67.9		
Fibre intake						
More	47	30.7	106	69,3	0.75 (0.23-2.45)	0.78[b]
Intake	4	25	12	75		
Vitamin C intake						
More	17	22	60	78	2.07 (1.04-4.10)	0.03[a]
Intake	34	36.7	58	63.3		
Iron intake						
More	42	31,6	91	68,4	0.72 (0.31-1.67)	0.44[a]
Intake	9	25	27	75		

[a] Chi-square test
[b] Fisher exact test
Source: Primary Data, 2019

Conclusion

There was no significant relationship between the amount of menstrual blood, protein intake, fibre intake, and iron intake with Hb levels. There was a significant relationship between vitamin C intake and Hb levels. We wish to acknowledge the field research team for their dedicated professionalism during the stages of data collection and analysis, and also offer our sincere gratitude to the participants, teachers, and principals from Banyumas 1 vocational high school. Researchers are also grateful to the Research Institution and Community Service Jenderal Soedirman University as the funders of this research.

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Relationship between Smoking and Hereditary with Hypertension

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Abstract

Smoking describes overt behavior where smokers inhale tobacco. High blood pressure describes the condition of systolic blood pressure ≥140 mmHg and diastolic ≥ 90 mmHg at 2 times checking blood pressure measurements within 5 minutes duration in calm conditions. This type of research is an observational analytic method with a cross-sectional approach that held in 2019. Sampling using is a purposive sampling method. Data were analyzed by Chi-Square Test. Results, using Chi-Square test analysis prove p-value = 0. 016 which is less than the significance value (0.05), proves that there is an important relationship between smoking habits with high blood events and there is a relationship between the generation aspect and high blood events and by using the Chi-Square test proves p-value = 0. 023 were less than the significance value (0.05). Conclusion, there is a link between smoking and the history of generation to the hypertension event in the area of the Makassar City Health Center of Barombong. It can be applied by respondents and families in helping to lower blood pressure in an efficient and efficient way by avoiding aspects that can be replaced.

Introduction

High blood pressure describes the condition when systolic blood pressure ≥140 mmHg and diastolic pressure ≥ 90 mmHg at 2 times checking blood pressure measurement within 5 minutes duration with a relaxed condition. In general, people with high blood pressure do not feel complaints and the typical indications are many people who do not know if you have high blood pressure (Ningsih, 2017). Armalina et al (2020), argues that aging is one factor that decreases protection in the heart and increases the risk of heart failure damage. Consider examining other organs that can affect the cause of heart abnormalities in the elderly and are expected to increase awareness of the importance of maintaining blood pressure. Based on data prove that the habit of the disease does not spread to face an increase when compared with Basic Health Research data in 2013. Hypertension, diabetes mellitus, cancer, stroke, severe kidney disease is an illustration of a non-widespread disease that faces an increase every year. From the information contained in hypertension sufferers inhabit the second queue of the disease that is often encountered. The number of hypertension sufferers from 2018 to 2019 faced an increase, with the number of hypertension sufferers in 2018 totaling 1. 065 patients and in 2019 it became 1. 174 patients. From this information it can be concluded that hypertension sufferers face an increase every year (Kemenkes, 2018).

Hypertension in pregnancy may be an independent risk factor for subsequent diagnoses of hypertension and stroke (Garovic et al., 2010). Kim et al (2003), argues that systolic and diastolic blood pressures were significantly higher in the cold-exposed group, and body core temperature was significantly lower in the cold-exposed group. Cold exposure was a risk factor for hypertension, and risk factors affecting hypertension in cold exposed workers were age, cold exposure severity, and milk intake. Therefore, cold exposed workers should minimize cold exposure time as much

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as possible, and ingest foods containing calcium such as milk. In particular, old workers working in cold areas should check their blood pressure and electrocardiogram periodically. Arterial Hypertension is part of the group of cardiovascular diseases that represent the highest proportion of death causes by diseases thus highlighting the need to evaluate the risk factors that contribute to this clinical situation and its high prevalence. It was observed that the development of several studies are important to contribute to the public health policies and actions, by providing indications to combat the increasing prevalence of Arterial Hypertension and risk factors, in order to be better control this disease (Pinto and Martins, 2017).

Increasing awareness, willingness and ability to live a healthy life for everyone are optimal degree of public health which can be achieved through the creation of the nation's people and the Indonesian state, the population lives in a healthy environment and behavior and has a fair and equitable quality of health. Family care should use a systematic approach to identifying health problems appropriately and increasing information provided by health workers to improve family and community understanding of an illness and health problems related to people's lives, through prevention, and health promotion (Asmi and Husaeni, 2019). Patients with essential hypertension had significantly higher homocysteine concentration compared to the control group. No correlation was observed between homocysteine levels and age, diastolic, systolic blood pressure in subjects with essential hypertension. In healthy volunteers, only a correlation between age and homocysteine concentration was found (Korzeniowska et al., 2015).

Methods

The research method was an analytic observational cross-sectional technique with primary data. This research was conducted in the working area of Makassar City Barombong Health Center 2019. Inclusion criteria: patients who come for treatment at the public health centers, Patients aged 30 years to 70 years come for treatment at the public health centers, Patients who come to the public health centers for at least 2 times blood pressure checks with different distances in a state of blood pressure more than 140/90 mmHg, can read and communicate properly and correctly, hypertensive patients who are willing to sign an informed consent and fill out a questionnaire. Exclusion criteria: hypertensive patients come to the health center with unconsciousness and Patients with secondary hypertension. Sample data is a portion of the population, namely patients with hypertension in the working area of the public health centers. Then the sample size is determined using the purposive sampling method with the Slovin formula.

Results and Discussion

Table 1 shows characteristics based on age, the results showed that the sample numbered 88 respondents, had an average age of 47.57 years old with a young age of 30 years old and the oldest 70 years old. Based on smoking habits, the results of the study showed that the majority of respondents were not smoking as many as 46 people (52.3%). Based on Gender, the results showed that most respondents were female as many as 47 people (53.4%). Based on heredity, the results of the study showed that most of the respondents had hypertension as many as 59 people (67.0%). Based on the incidence of hypertension, the majority of respondents experienced hypertension as many as 65 people (73.9%).

Table 2 results analysis using a bivariate statistical analysis experiment is known from 42 respondents who have the habit of smoking, some of them face hypertension by 36 people (85.7%). Similarly, of the 46 respondents who did not have the habit of smoking, a large number faced hypertension by 29 people (63.0%). Using the Chi-Square experiment proves p-value = 0. 016 where the significance value is less than 5% (0. 05), it proves that there is an important bond between the routine of smoking and the incidence of hypertension. From the above analysis, OR = 3. 51 is obtained which proves that the respondents' smoking risk is 3. 3. times for dealing with hypertension. Analysis using statistical analysis experiments using Chi Square experiments prove p-value = 0. 023 in which the significance value is less than 5% 0. 05, it proves that there is an important

Results and Discussion

Table 1. Demographics of Research Subjects

Demographics Variables	Percentage	Frequency
Smoking habit		
Do not smoke	46	52.3
Smoke	42	47.7
Total	**88**	**100**
Gender	**Amount**	**Percentage**
Male	47	53.4
Female	41	46.6
Amount	88	100
Heredity Factor	**Percentage**	**Frequency**
There is no	33.0	29
There is	67.0	59
Total	100	88
Heredity Factor	**Frequency**	**Percentage**
No hypertension	23	26.1
Hypertension	65	73.9
Total	88	100

Source: primary data, (2019)

Table 2. Analysis Relationship of Smoking Habit and Heredity with the Occurrence of Hypertension

Smoking Habit	**Occurrence of Hypertension**				Total	%	p-*value*	OR (CI9)
	No Hypertension		**Hypertension**					
	n	%	n	%				
Yes	17	37.0	29	63.0	46	100	0.016	3.51 (1.22-10.0)
No	6	14.3	36	85.7	42	100		
Total	**23**	**26.1**	**65**	**73.9**	**88**	**100**		
Heredity Factors								
Yes	12	41.4	17	58.6	29	100	0.023	3.08 (1.14-8.27)
No	11	18.6	48	81.4	59	100		
Total	**23**	**26.1**	**65**	**73.9**	**88**	**100**		

Source: primary data, (2019)

bond between aspects of generation with hypertension. From the analysis above we get the OR = 3. 08 which proves that aspects of the generation of respondents are at risk 3. 08 times for dealing with hypertensions.

Different from the results of the study prove the number p = 0, 571 (p 0.05). There is no connection between smoking routine with the hypertension event in the Health Center Activities of Molompar Bercak Area in Bercak District in 2018 (Uguy,eal, 2019). (Sofiana and Rahmawati, 2019) argues that shows a statistically and biologically significant correlation between hypertension and diabetes mellitus with the incidence of stroke. Efforts to improve health promotion programs to increase public awareness about the incidence of stroke are suggested to improve the quality of life of stroke patients. Stroke is one of the leading causes of death and neurological disability in Indonesia. The risk of stroke increases with the number of risk factors. Stroke is the leading cause of death for inpatients at General Hospital of Panembahan Senopati in Bantul.

The results of the study are in line with the research that there is a link between the

smoking routine and hypertension which is influenced by the duration of smoking and the type of cigarette, but there is no correlation between the number of cigarettes and the incidence of hypertension (p = 0, 412). Because smoking routines increase the risk of hypertension, health counseling regarding the risk of an increase in blood pressure point for people with hypertension who have smoking disorders must be tried. This is needed so that there is a reduction in the points of hypertension (Setyanda,etal, 2015).

The results of the study prove that there is a bond between the routine of smoking and consuming alcohol with the occurrence of hypertension with a strong relationship with a positive direction. Hypertension describes a non-widespread disease that has become a serious problem at this time. The incidence of hypertension will continue to increase, 29% of people throughout the earth are predicted to face hypertension in 2025. Smoking and alcohol consumption are aspects of the risk of hypertension that can be replaced (Memah, Kandou and Nelwan, 2019). The results of study (Anggara and Prayitno, 2013) if respondents who suffer from hypertension k are (30, 7%), the opposite is true for respondents whose blood pressure is reasonable (69, 3%). Pubic type in this research is not related to statistical methods with emphasis. Conversely, age, learning, profession, BMI, smoking, alcohol consumption, exercise routine, sodium consumption, and potassium consumption are related to statistical methods with blood pressure points. To reduce the problem of hypertension, there needs to be a method to contain it, such as: giving counseling to residents about hypertension and carrying out blood pressure checks on a regular basis. (Buntaa,etal, 2018) argues that the age variable with the incidence of hypertension in fishermen has a relationship (p = 0.005), the family history variable with hypertension (p = 0,000) and there is no relationship between smoking habits and the incidence of hypertension in fishermen with a p-value (p = 0.539). The results of this study that the age and family history variables are associated with the incidence of hypertension while for the smoking habit variable is not related to the incidence of hypertension.

(Novian, 2013) argues that there was a significant correlation between the levels of education, the level of knowledge, the role of the family, the role of health workers with dietary obedience of hypertension patients and there was no correlation among age, gender, and occupation with dietary obedience of hypertension patients. Based on the results of his research that the salt intake habits of the elderly are mostly included in the frequent category, the consumption habits of fatty foods for the elderly hypertensive are mostly included in the frequent category, the smoking habits of the elderly are mostly non-smokers, the sports habits of the elderly hypertensive are mostly included in the unfavorable category. The four factors studied were related to the incidence of hypertension in the elderly at the mobile health center in Village Klumpit UPT of public health center Gribig (Arif, Rusnoto and Hartinah, 2013).

The results of the study prove that there is a bond between high blood pressure with aspects of generation with, there is a bond with eating patterns with, there is a bond with the smoking aspect with, and there is a bond with the alcohol factor, there is no bond between sports activities and there is no bond with body weight. Related to the deterrence action, it is hoped that health services will distribute health counseling to avoid high blood pressure (Situmorang, 2015). Supported by research results prove that there is an important bond between the history of generation, obesity and physical activity with hypertension, conversely smoking and sodium consumption are not important ties. The most powerful aspects of risk are the history of generations, obesity and physical activities (Fitriana,etal, 2012).

In accordance with the results of the study there is a connection between middle-aged, genital type, generation, profession, and sports with hypertension in Public Health Center of Makrayu, Palembang. The health apparatus in the Public Health Center of Makrayu can increase health advertence or special health counseling for people with hypertension who arrive for treatment (Azhari, 2017). Proving there is no bond between smoking routines, sports activities as well as there is a bond between family history and hypertension events. Question answered, but from the residents

do not all know for early discovery about hypertension. Other efforts that can be tried are deterrence of hypertension in a comprehensive manner, through primordial deterrence, health advertence, special protection, increased citizen impulse for early assessment (screening, check-up checking), healing right (quickly obtaining a complete cure and early causal complaints), rehabilitation (efforts to correct due to further hypertension that cannot be overcome) (Suprihatin, 2016).

Increasing prevalence of hypertension (HTN) in children and adolescents has become a significant public health issue driving a considerable amount of research. Aspects discussed in this document include advances in the definition of HTN in 16 year or older, clinical significance of isolated systolic HTN in youth, the importance of out of office and central blood pressure measurement, new risk factors for HTN, methods to assess vascular phenotypes, clustering of cardiovascular risk factors and treatment strategies among others (Lurbe et al., 2016). The aspects of heredity, obesity and sodium consumption are aspects of the risk of hypertension in early young children. Hypertension is one of the highest mortality of cardiovascular disease associated with hypertension were obesity and tense (Korneliani and Meida, 2012).

Based on the results of the study (Abdullahi and Amzat, 2011) showed that some staff members showed a relatively high level of knowledge about complications related to hypertension but knowledge of risk factors and attitudes towards the disease was still low. However, the level of education significantly influences awareness of complications (at 0.05) and knowledge of risk factors (at 0.05) that hypertension and its complications are a major health problem not only in Nigeria but also throughout the world. Thus, this study examined awareness about risk factors and complications associated with hypertension at the University of Ibadan, Nigeria. The questionnaire instrument was used to collect data from 556 randomly selected subjects that were selected in all faculties, departments and sectional units of the University. Workplace screening and educational programs are a fundamental way to increase knowledge about hypertension in the workplace.

Mule et al., (2015) argues that in essential hypertension, short-term BP variability is independently associated with early renal abnormalities. Based on the results of the study prove that 49, 4% of respondents have a generation of hypertension disease, 51, 3% of adult respondents ≥ 43 years and 48, 6% of respondents are overweight. The bond between the aspects of generation with the event of hypertension obtained a probability of 0, 000 (p-value0, 05) (Dedullah,etal, 2015). Elevated serum ferritin level was independently associated with the incidental risk for hypertension in Korean men. This finding suggests the value of elevated ferritin level as an early predictor of hypertension (Ryoo et al., 2015).

Conclusion

Sourced from research results to be concluded; there is a close relationship between smoking routine with hypertension. From the analysis proves that smoking routine is at risk 3. 51 times can face hypertension events and there is an important bond between aspects of generation with hypertension events, the results prove that generation aspects are at risk 3. 08 times can face hypertension events. Escalation of hypertension travel can take place influenced by lifestyle and consumption of food. Aspects that can affect hypertension are broken down into 2 groups of aspects that cannot be controlled such as age, gender, genetic, ethnicity, as well as aspects that can be controlled such as diet, smoking, smoking, excessive salt consumption, lack of activity, lifestyle, patterns, patterns sleep, and stressful thoughts full of emotions

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Altered Baseline of Plasma Glucagon Level in pre-Obese to very Obese Persons

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Abstract

"Bihormonal hypothesis" is disturbances of both insulin and glucagon in diabetes mellitus. It resulted in a high blood glucose level. Interestingly, as one of Diabetes Mellitus's risk factors and metabolic disorders, obesity may also play role in altering homeostasis and regulation of glucose metabolism in blood and its utilization in tissues. Unfortunately, there is limited information about the alteration of glucagon levels in various degrees of obesity. This research objective is to learn the plasma glucagon levels alteration in pre-obese, obese, and very obese persons in Jatinangor in 2015. We had observed 31 obese female subjects in one village. This study was conducted using descriptive quantitative with cross-sectional design. Blood vein samples from the left arm were collected, stored, and transferred to Dr.Hasan Sadikin General Hospital. Glucagon plasma was measured by the ELISA method. We discovered an interesting pattern that showed a correlation between glucose level and the glucagon level in a very obese group. We observed average glucose level is declined and linearly associate with the glucagon level from pre obese to obese and to very obese group. The average level of glucagon in the pre-obese group is 158.62 pg/mL, the obese group is 149.99 pg/mL, and the very obese group is 111.98 pg/mL.

Introduction

The prevalence of obesity has been increasing for the last 50 years. In Indonesia, based on Riskesdas 2013, obesity prevalence increased significantly. Prevalence of obesity in adult females (>18 years) inclined from 15,5% in 2010 to 32,9% in 2013. The obesity prevalence in males also increased from 7.8% in 2010 to 19.7% in 2013. Different from WHO classification, Riskesdas classifies obesity when the BMI reaches 27 kg/m2, while WHO 30 kg/m2 (Riset Kehatan Dasar, 2013). This is due to Asians have a risk of hypertension, diabetes, dyslipidemia with lower BMI than WHO recommends (Wells and Victoria, 2005). Obesity is one of the factors of metabolic syndrome, which is closely related to various diseases, such as cardiovascular disease and diabetes mellitus type 2. There is a close relationship between obesity and DM type 2.

Fifteen thousand six hundred eighty people, ranging from age 35 – 74, were observed for at least eight years. Interestingly, 28.3% of males with obesity and 31.3% female with obesity then have diabetes mellitus type 2 (Wang et al., 2014). It is due to the adipose tissue in people with obesity can secrete pro-inflammation factors, which have a great role in the development of insulin resistance (Nehete et al., 2014). In people with diabetes, there are

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disturbances in both of secretion and function of insulin which causes the elevation of blood glucose and FFA (Golay et al., 1986).

Physiologically, two hormones work antagonistically to regulate the homeostasis of blood glucose. They are insulin and glucagon. Insulin is the hormone secreted by the beta cell of the pancreas. Its function mainly is to maximize glucose transportation from blood to all over the body cells to be utilized then as a source of energy. In the condition the blood glucose is too high, insulin acts in glycogenesis in the liver and skeletal muscle (Hall, 2006). Glucagon is the hormone secreted by the alpha cell of the pancreas. Its function is to increase blood glucose through its actions in the liver. Glucagon increases glycogenolysis and gluconeogenesis in the liver (Quesada et al., 2008). Interestingly, in 1975, Unger and Orci published "bihormonal hypotheses" which stated that there was a combination between insulin and glucagon disturbances in diabetes mellitus (Quesada et al., 2008).

Early hyperglucagonemia correlated with hyperinsulinemia and lipid metabolic disturbances (Manell, 2019). Another research revealed hyperglucagonemia in people with diabetes mellitus type 2 (Shah et al., 2000). Insulin disturbances are also found in people with obesity (Cavaghan et al., 2000). Other research in the UK revealed a correlation between BMI and blood glucose (Innocent et al., 2013). Nevertheless, until today, there were so limited prove about glucagon alteration in obese people. This study aims to display the alteration pattern of glucagon in people with obesity.

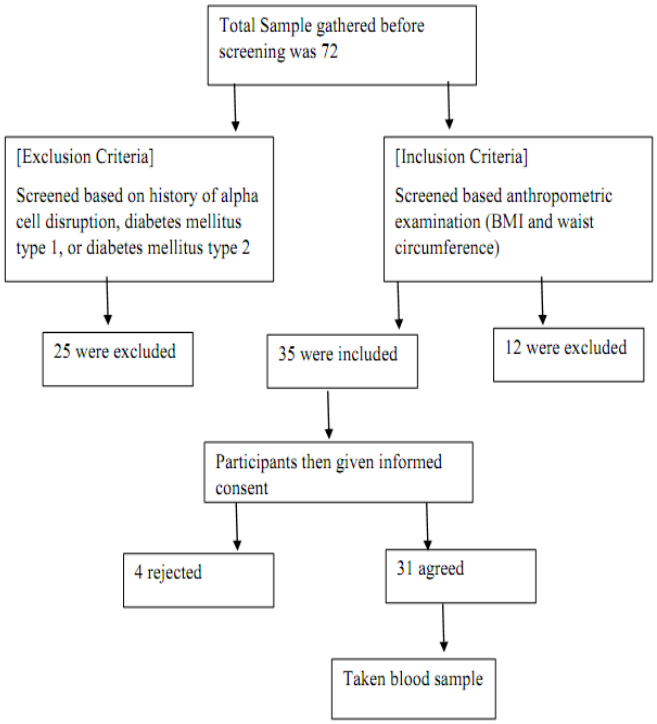
Method

The population of this study is male or female who is older than 18 years. In health care (puskesmas) Desa Sayang and Cipacing, Jatinangor, Indonesia. Inclusion criteria are BMI greater than 27 kg/m2 and waist circumference more than 102 cm for man, 88 cm for the woman. Exclusion criteria are, have been diagnosed by a doctor to suffer or proven by laboratory result to have alpha cell disruption, diabetes mellitus type 1, or diabetes mellitus type 2. This study used a descriptive quantitative design with a cross-sectional approach. Total sampling in this research followed the rule of thirty criteria. All procedures were under subjects' adequate understanding and written consent. The study used primary data from the blood samples community in Jatinangor which was then transferred to the Department of Clinic Pathology of Dr. Hasan Sadikin General Hospital.

The experts handled the blood sampling process. Then it will be measured by the ELISA method (Elab Science, USA) to determine the level of glucagon in plasma. We take the data by by cross-sectional approach. Researchers made ethical clearance and letter of permission to do the research beforehand. The ethical clearance's number is 100./UN6.C1.3.2/KPEK/PN/2016. The study variables are age, glucagon level, body weight, body height, BMI, and waist circumference. Out of 7 villages in Jatinangor, two villages Desa Sayang and Desa Cipacing were chosen randomly. The subject participants were coordinated to gather by cadres. The total samples included were 72. The next phase was screening the participants. There were two screenings, each using history taking and anthropometric examination. We asked the participants whether they had been diagnosed or proven to have alpha cell disruption, diabetes mellitus type 1, or diabetes mellitus type 2. We took 25 out of 72 based on screening results. Participants who still fulfilled the criteria were then measured based on the operational definition of obesity. The measurements of body weight, body height, and waist circumference were done by calibrated tools. It took 12 participants out of 47. Then the researcher explained the study objective, benefits the participants will have and asked for their understanding and agreement. If the participants agreed, they would get an informed consent letter. 4 of the participants rejected the consent. The remaining participants then were punctured by their veins, done by certified experts. The procedure ran in sequences. First, the participant's dominant hand was tied with a tourniquet, then the area that will be aspirated was swabbed by alcohol beforehand. The puncture used a 3cc syringe. We took the blood for about 3cc. Then the sample was placed in an EDTA tube and homogenized. These tubes were then placed in an icebox along with an

ice pack. The samples were then transferred to the Department of Clinic Pathology of Dr. Hasan Sadikin General Hospital. The samples then were handled by experts and run by an ELISA kit to determine the glucagon level of the sample.

Diagram 1. Sample Selection Procedure



Result and Discussion

The total sample included in this study was 31 then classified based on their BMI.

Table 1. Characteristic of Participants based on BMI

Characteristic	Total (n = 31)	Percentage (%)
Sex		
Female	31	100%
BMI		
27.01 – 29.99	12	39.4%
30.00 – 33.99	12	36.4%
>33.99	7	24.2%
Body Weight (kg)		
55 – 64	5	15.2%
65 – 74	15	48.5%
75 – 84	8	27.2%
>84	3	9.1%
Body Height (cm)		
135 – 144	3	9.1%
145 – 154	16	51.5%
155 – 164	11	36.4%
165 – 174	1	3.0%
Waist Circumference (cm)		
80 – 90	8	24.2%
90 – 100	11	33.3%
>100	12	42.5%

Source: Primary data, 2015

Table 2. Mean and Standard Error of Mean of Glucagon Level based on BMI

BMI group	Mean	SEM
27.01 – 29.99	158.6248333	10.03304678
30.00 – 33.99	149.9902417	11.37438632
>33.99	111.9853143	12.97802512

Source: Primary data, 2015

The research location is in Jatinangor. The participants are 100% women. This phenomenon can be explained by the data in Riskesdas 2013 mentioning there were obese females twice as many as males in Indonesia (Riset Kesehatan Dasar, 2013). Also, some theories can explain why females are more likely to be obese than males. First, women have lower physical activity than men. It causes lower energy expenditure of women (Hall, 2006). Second, estrogen is higher in females, causing weight gain in females because estrogen inhibits thyroid function and modulating the hypothalamus (Grantham and Henneberg, 2014).

Physiologically, blood glucose will be controlled in the normal range by two hormones, insulin, and glucagon. Insulin is the hormone secreted by the beta cell of the pancreas. The primary function is to maximize glucose transportation from blood to all over the body cells to be utilized then as a source of energy. When the blood glucose is too high, insulin acts in glycogenesis in the liver and skeletal muscle (Hall, 2006). On the contrary, glucagon is the hormone secreted by the alpha cell of the pancreas. The function is to increase blood glucose, through its actions in the liver. Glucagon increases glycogenolysis and gluconeogenesis in the liver (Hall, 2006; Quesada et al., 2008). In other words, insulin acts by decreasing blood glucose, while glucagon increases blood glucose levels (Hall, 2006).

Human and animal studies showed the declining trend of glucagon level and glucagon insulin ratio, both in obese mice and humans (Stern et al., 2020). Glucagon effects decrease body weight, both physiological and pathological conditions (Charron and Vuguin, 2015). Glucagon increases energy expenditure through acute and chronic thermogenesis processes (Charron and Vuguin, 2015; Kleinert et al., 2019). Exogenous Glucagon treatment could increase energy expenditure (Scott and Bloom, 2018). So the conclusion is due to lower glucagon levels, the weight-loss functions subsides and causing heavier weight and higher BMI. In people with obesity, there is chronic inflammation that relates closely to various pathogenesis of diseases. One of them is diabetes mellitus type 2. Adipose tissue in obese people secretes humoral factors, such as C-reactive protein, inflammation factors, such as monocyte-chemoattractant protein-1 (MCP-1), tumor necrosis factor-alpha (TNF alpha), and interleukin- 6 (IL-6) (Chang et al., 2015).

Insulin resistance is a condition where body tissue becomes less sensitive or even resistant to insulin (Ye, 2013). In this condition, glucose cannot be utilized optimally by body cells. Body cells cannot work well due to a lack of glucose as their energy source (Hall, 2006; Ye, 2013). If this condition lasts for some time, the body will suffer the "cell hunger phenomenon". It triggers insulin elevation to maximize glucose utilization happens through two activities. The activities are beta-cells increase and enzyme alteration. Those activities have a role in glucose metabolism in the beta-cell of the pancreas. The glucokinase role as the rate-limiting step in glucose metabolism of the beta-cell is replaced by hexokinase. Hexokinase causes elevation of insulin secretion (Moon and Won, 2015). If the insulin elevation remains constant, then the level of insulin in the blood will remain high. This condition is well known as hyperinsulinemia.

Hyperinsulinemia is defined as a stagnant condition of high insulin level in plasma in fasting. Insulin resistance is the cause of hyperinsulinemia because insulin is needed to maintain standard glucose tolerance (Cavaghan et al., 2000). Melissa K. Cavaghan, David A. Ehrmann, and Kenneth S. Polonsky stated that further work displayed increased

insulin secretion and reduced insulin clearance resulting in hyperinsulinemia. Nonetheless, hyperinsulinemia is also one of the main factors causing insulin resistance. This theory is believed to be the effect of negative feedback of the body to control the circulating insulin level. The elevated insulin level will subside the tissue's sensitivity towards insulin and causes insulin resistance (Ye, 2013).

The insulin itself has a function to regulate glucagon secretion (Hall, 2006). Along with somatostatin and amylin, insulin is the factor that inhibits glucagon secretion (Moon and Won, 2015). Researches had proved, rodents that suffer hyperglucagonemia will improve if injected with exogenous insulin (D'Alesio, 2011). With this fact, it can be stated that hyperinsulinemia will potentially inhibit glucagon secretion and causing hyperglucagonemia. Besides, resistin hormone, which is related to the development of insulin resistance, proved to be elevated in people with obesity (Al-Salam et al., 2011). Resistin causes insulin resistance, which then will aggravate hyperinsulinemia and end with glucagon inhibition.

Also, it is well known that the primary inhibitor of glucagon is the high level of blood glucose itself. In the condition where insulin resistance happens, the blood glucose will not be utilized optimally, leaving the glucose in the blood and will inhibit the glucagon secretion (Hall, 2006). Other research in the UK revealed obesity correlates with blood glucose level (Innocent et al., 2013). It will also cause inhibition of glucagon secretion, similar to our research showed. The higher the BMI, the higher the blood glucose, the lower glucagon secretion. In obese individual, glucagon and insulin ratio tend to be static in fasting and after-meal (Stern et al., 2020)

Interestingly, although diabetes mellitus type 2 is well-known because of insulin disturbance, the research done by Pankaj Shah and the team showed that there was also glucagon disturbance in people with diabetes mellitus 2. They observed hyperglucagonemia in people who suffer from diabetes mellitus type 2 (Shah et al., 2000). This research may reinforce the theory of "bihormonal hypotheses" stated by Unger and Orci back in 1975. They mentioned a combination of insulin and glucagon disturbances in the pathogenesis of diabetes mellitus type 2 (Quesada et al., 2008). Our research displays glucagon levels inversely to those in diabetes mellitus. Glucagon level tends to decrease when the BMI gets higher, opposed to the high level in diabetes mellitus type 2. Studies have been conducted to treat diabetes mellitus type 2 through glucagon receptor (Al-Massadi et al., 2019; McShane et al., 2016). Furthermore, inhibition of glucagon receptor has promising results to treat metabolic syndrome (Habegger et al., 2010). Therefore, future studies to compare glucagon and insulin treatment for obesity are needed.

Conclusion

Decrease glucagon level in the blood plasma has a potentially close relation with the increase in BMI. This glucose modulation is connected with the alteration of insulin level. The insulin might regulate glucagon secretion along with somatostatin and amylin. However, insulin modulation might also affect the homeostasis and regulation of glucagon levels in obese persons since insulin is the factor that inhibits glucagon secretion.

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Dynamic System Model of the Role of Leadership Coaching on Employee Performance

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Abstract

Jakarta Cempaka Putih Islamic Hospital (RSI) experienced a decline in performance. Judging from the 2013 Bed Occupancy Rate (BOR) of 70.59%, it then dropped to 44.12% in 2016. Efforts to improve employee performance by coaching have been carried out, but not comprehensively in each Hospital unit. The study aims to look at the role of leadership coaching with a dynamic system model on employee performance at the Jakarta Cempaka Putih Hospital. Besides that, it is also to find out the role of inspirators, facilitators, motivators, as well as the pattern of system behavior characteristics between the role of leadership coaching on employee performance. Analytical research using quantitative methods with explanatory research design. The research sample was 86 taken by accidental sampling technique from the population of inpatient staff and medical support in May 2018. Data processing techniques were carried out in stages including univariate analysis, bivariate Chi-Square, multivariate logistic regression, and dynamic system models of causal loop diagrams formulated to the flow diagram. The instrument used in the form of a questionnaire. In general, the test results showed the influence of the role of leadership coaching on employee performance. Specifically, it shows the influence of the role of leadership coaching as an inspiration, facilitator, and motivator on employee performance. Then the pattern of system behavior characteristics for the next 10 years is in the form of exponential growth and in the next 20 years in the form of S-Shaped growth. Likewise, the behavior pattern of the coaching leadership system role for the next 10 years in the form of exponential growth. The leadership coaching role was found to have an effect on improving employee performance.

Introduction

Competition in the current era of globalization encourages organizations to improve employee performance. Employee performance is an employee's achievement according to specific criteria that apply to a particular job. When the quality and quantity of employee's work achievement following the responsibilities given to him. Concerning employee performance, several phenomena have emerged in the organization, one of which is the not yet optimal performance of employees. The indications are reflected in the low employee achievement of work targets (Arisa et al., 2018)

The research analysis results by Hallinger (2016), explained one of the factors that affect employee performance, namely leadership. According to Hao and Yazdanifard (2015), leadership definition is a kind of power where a person can influence or change others' values, beliefs, behavior, and attitudes. Leadership is the main factor in bringing about positive change for the organization; if there is no leadership in the organization, it will not be able to change in the desired direction, vice versa can experience negative changes. (Hao and Yazdanifard, 2015; Arisa, Joko and Uchyani, 2018)

According to Achi & Sleilati (2016), there are five types of leadership, including Inspiring Leader, Autocratic Leader, Democratic Leader, Service Leader, and Situational Leadership.

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Vidal et. al. (2017), explained that leadership styles always evolve according to the context faced by the leader, with new elements that complement, enhance, and accompany a more traditional model. In situational leadership, this type of leadership is created by prioritizing the situational approach faced by a leader towards each team member he leads and focuses on responsibility. The four types of situational leadership are Directing, Coaching, Supporting, and Delegating. (Achi & Sleilati, 2016; Vidal et al., 2017)

Coaching is expected to lead to an increase in individual employee performance and ultimately to make a significant contribution to the company's overall performance (Silva, 2016). Lodhi et. al. research (2018), explained that coaching indirectly affects job performance through job involvement, quality of member-leader exchange, job satisfaction, and intention to change places. (Daniëls et al., 2019; Lodhi and Orangzab, 2018)

To be able to assist in understanding the role of leadership coaching on employee performance, we can use a dynamic system model, namely causal loop diagrams. It is associated with a tendency to incorporate more variables into the model and thus make it more realistic. In the causal loop diagram, there is only positive and negative feedback. It is then formulated as a flow diagram. (Shaikh et al., 2017; Bureš, 2017)

RSI Jakarta Cempaka Putih experienced a decline in performance. Judging from the Bed Occupancy Rate (BOR), in 2013, it was 70.59%. Then decreased to 44.12% in 2016. Although in 2017 it increased to 51.54%, this is not following the parameters of the Indonesian Ministry of Health (2005) which is 60-85%. (Arisa et al., 2018). It is hoped that the research can determine the effect of the role of leadership coaching on employee performance at RSI Jakarta Cempaka Putih using a dynamic system model.

Method

This research type is quantitative analytic research with an explanatory research design. It is research that explains the relationship between research variables and testing hypotheses that have been formulated previously. We researched in May 2018 at RSI Jakarta Cempaka Putih. The population in this study was employees in the inpatient and medical support units with a total of 362 people. The population is in small numbers or less than 10,000. Then we use the number of simple formulations determined based on the formula according to Notoatmodjo so that a total sample of respondents is 86 people. The sampling technique used was accidental sampling, where the researcher took samples that he happened to meet at that time. (Arisa et al., 2018)

The data analysis method used in this study is the univariate analysis used to describe the characteristics of the respondents. Then bivariate analysis was used to determine the relationship of each variable using the Chi-Square Test. The results of bivariate analysis of independent variables that have a relationship with employee performance were followed by multivariate analysis using logistic regression analysis. Then use causal loop diagrams and flow diagrams to see the role of leadership coaching on employee performance.

Result And Discussion

The first step of data analysis is univariate analysis. The results of this analysis aim to explain or describe the characteristics of each variable. This data is primary data collected through filling out questionnaires conducted by 86 (eighty-six) research respondents. The frequency distribution of respondents' characteristics is mostly in each category, namely age 26-35 years, female gender, DIII education, and working period of more than three years. Then from the frequency distribution, it is also found that only the role of a good inspiration is, while that of a facilitator and motivator is not good. Then the leadership coaching role is inversely proportional to employee performance. When it is lacking, the employee performance is good. The next analysis uses bivariate, where the p-value used in the Chi-Square table is the continuity correction value because the table used is a 2x2 table. There is no expected value < 5. Then all the tables are combined into one as in Table 1.

Table 1. Effect of Each Role to Employee Performance

	Employee Performance				Total		P *Value*	OR
	Good		Less					
	n	%	n	%	N	%		
Inspirator Role								
Good	34	67	17	57	51	100	0.049	2.667
Less	15	43	20	33	35	100		
Total	49	57	37	43	86	100		
Facilitator Role								
Good	27	71	11	57	38	100	0.033	2.901
Less	22	46	26	33	48	100		
Total	49	57	37	43	86	100		
Motivator Role								
Good	25	78	7	22	32	100	0.005	5.260
Less	24	44	30	56	54	100		
Total	49	57	37	43	86	100		
Leadership Coaching Role								
Good	28	78	8	22	32	100	0.002	4.883
Less	21	42	29	58	54	100		
Total	49	57	37	43	86	100		

Source: Primary Data 2018

The largest percentage was found in the leadership coaching role as a good inspiration for good employee performance. The statistical test results obtained a p-value of 0.049 (α < 0.05), so it can be concluded that there is an influence between the role of leadership coaching as an inspiration to the performance of employees at RSI Jakarta Cempaka Putih. Then from the analysis results, the OR value = 2,667 means that the leadership coaching role as a good inspiration has 2,667 times the opportunity for good employee performance compared to the leadership coaching role as a less inspiration.

The leadership coaching role as a good facilitator for good employee performance is the largest percentage. The statistical test results obtained a p-value of 0.033 (α < 0.05), so it can be concluded that there is an influence between the leadership coaching role as a facilitator on employee performance at RSI Jakarta Cempaka Putih. Then from the analysis results, the OR value = 2,901 means that the leadership coaching role as a good facilitator has 2,901 times the opportunity for good employee performance compared to the leadership coaching role as a facilitator is lacking.

The influence of leadership coaching as a good motivator for good employee performance is the highest percentage. The results of statistical tests obtained a p-value of 0.005 (α < 0.05). It can be concluded that there is an influence between the leadership coaching role as a motivator on employee performance at the Islamic Hospital Jakarta Cempaka Putih. Then from the analysis results, the OR value = 4,464 means that the leadership coaching role as a good motivator has 4,464 times the opportunity for good employee performance compared to the role of leadership coaching as less motivator.

The study results show that good leadership coaching influence role with good employee performance is the highest percentage. The results of statistical tests obtained a p-value of 0.002 (α < 0.05). It can be concluded that there is an influence between the role of leadership coaching on employee performance at RSI Jakarta Cempaka Putih. Then from the analysis results, the OR value = 4.833 means that a good leadership coaching role has 4,833 times the opportunity for good employee performance compared to a less leadership coaching role.

The next step of analysis using multivariate. Each independent variable performed the bivariate analysis with the dependent. If the p-value <0.25 results, the variable will immediately enter the multivariate stage. On the other hand, if the bivariate result produces a p-value > 0.25 but is substantially important. Then the variable can be included in the multivariate model, as shown in Table 2.

Table 2. Multivariate Model

Variable	B	Wald	P value	OR
Inspirator Role	0.105	0.035	0.852	1.111
Facilitator Role	0.293	0.270	0.604	1.306
Motivator Role	1.494	6.287	0.012	4.260

Source: Primary Data 2018

From the analysis results, two variables have a p-value > 0.05, namely the role variable as an inspiration and a facilitator. The highest variable is the inspiration role. So it must be removed from the model. Then the next model is shown in Table 3

Table 3. Multivariate Final Model

Variable	B	Wald	P value	OR
Facilitator Role	0.293	0.270	0.604	1.340
Motivator Role	1.494	6.287	0.012	4.457

Source: Primary Data 2018

From the results of the multivariate test, it was found that the variable that has the dominant influence is the role of leadership coaching. It is a motivator with a significant value of 0.012 (PV <0.05) and OR 4.457. It means that the role of leadership coaching as a motivator has a chance of 4,457 times influencing employee performance than the variable leadership coaching role as a facilitator. The last analysis uses a dynamic system model. It is based on the problem identification poured into causal loop diagrams and formulated in flow diagrams.

The causal loop between the leadership coaching roles is built from inspiration, facilitator, motivator. Meanwhile, employee performance is built through work quality, work quantity, knowledge, innovation, creativity, initiative, and personal quality. We can increase employee performance through the leadership coaching role. It comes from the ability to become an inspiration, facilitator, and motivator. From the figure, a positive loop is also obtained. It means that the leadership coaching role can improve employee performance, as shown in Figure 1.

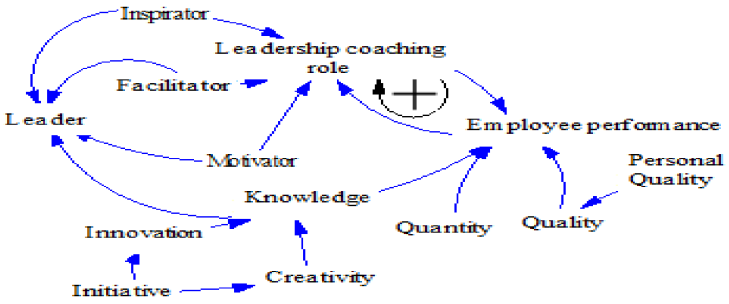

FIGURE 1. Causal Loop of Leadership Coaching Role to Employee Performance

The employee performance flow diagram is formed from the elements of performance improvement, the role of leadership coaching. The leadership coaching role is formed from increasing roles as an inspiration, facilitator, and motivator. Employee performance is stock and performance improvement is flow. Then, the leadership coaching role is stock, and increasing the leadership coaching role is a flow. Then the inspiration, facilitator, and motivator as auxiliary. The diagram can be seen in Figure 2.

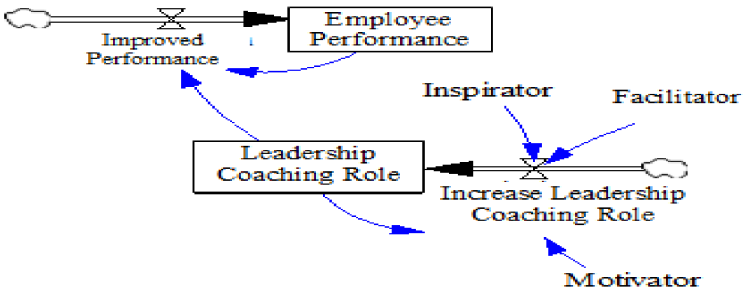

FIGURE 2. Flow Diagram of Leadership Coaching Role to Employee Performance

By using the Vensim application, we get a graph of the behavior pattern of the employee performance system in the next ten years in the form of exponential growth, which means that employee performance will continue to increase. For a 20-year simulation, it shows that the graph of the behavior pattern of the employee performance system in the form of S-Shaped growth. It pictures a balance and does not increase. Then the role of leadership coaching for the next 10, in the form of exponential growth showing an increase through its role as an inspiration, facilitator, and motivator.

According to Gavin (2018), leaders play a vital role in managing change, innovating, have ideal influence, inspirational motivation, and intellectual intelligence. One of the methods leaders can use to develop employee performance is coaching. According to Anthony (2017), Leadership coaching has increased in popularity over the last decade. It is because the leadership coaching development program brings positive value to individuals and organizations. (Anthony, 2017; Gavin, 2018)

The results indicate the influence of the role of good leadership coaching with good employee performance. It is the highest percentage, and has 4.833 times the opportunity for good employee performance compared to the leadership coaching role is less. It is aligned with the results of Hao & Yazdanifard (2015) research, where the application of leadership coaching brings significant positive changes in employee performance, increases leadership effectiveness, and slightly increases business results. Arisa et al., (2018) and Achi et al. (2016) research explains that coaching is needed. It directs employees to develop skills, creativity, and motivation. Therefore they can improve well in solving a problem, with the result of increased performance. The coaching can use the COACH method, namely C: Connect, Build Relationships by asking how you are doing. O: Outcome, Conversation Goals by finding out what is an important topic. A: Awareness, Awaken Awareness by asking questions and will listen actively. Hear the unspoken, explore discoveries, thoughts, commitments, and actions through a conversation. C: Course, Action Steps by trying to capture understanding and thoughts and then translate them as actions to be carried out. H: Highlights, Reviewing Learning by asking employees to review what they have learned, the understanding gained, and useful things. Meanwhile, Achi & Sleilati (2016) explain that the focus of coaching on self-management and self-awareness is the basis for improving individual functions such as practice leaders and health systems, and frontline doctors. Following the research of Commer et al. (2017) where managerial coaching directly affects employee performance and indirectly

affects organizational performance in the form of behavior towards individuals and organizations (Arisa et al., 2018; Achi and Sleilati, 2016; Achi & Sleilati, 2016; Commer et al., 2017; Hao & Yazdanifard, 2015)

According to Arthur et al. (2016) and Gavin (2018), the ability to lead, inspire and motivate people is a vital human characteristic. So we expect a leader to have ideal influence, inspirational motivation, intellectual prowess, and the ability to connect tasks directly with the vision, the greater one. From the results of this study, we found a significant relationship between the role of leadership coaching as an inspiration and the performance of employees who had 4,833 opportunities to improve employee performance and must continue to be maintained, so that good performance does not decrease by 79.3%. Arisa et al., (2018) explains the role of leadership coaching as an inspiration and motivator, namely the way the leader defines a vision to achieve the future, challenges followers to high standards, speaks optimistically and enthusiastically, and provides encouragement and meaning for things that need to be done. Therefore, by applying leadership coaching as an inspiration, we can conclude that it can improve employee performance. (Arisa et al., 2018; Arthur, Wagstaff and Hardy, 2016; Gavin, 2018)

According to Bureš (2017), in the dynamic system model, causal loops are used to capture the dynamic nature of the system modeled. Causal loops provide a method for mapping the complexity of a concerned system consisting of variables, causal relationships and polarity of the two links, and feedback cycles. The structure of the causal loop is clear. It can be easily understood by the clear reader as said by Jamil and Shaharanee (2017). The causal loop diagram in this study explains that employee performance coming from work quality, work quantity, job knowledge, creativity, cooperation, initiative, dependence, and personal ability, can increase through the leadership coaching role obtained from the ability to be an inspiration, facilitator, and motivator. There is also a positive loop, which means that the role of leadership coaching can improve employee performance. It is aligned with the research of Achi & Sleilati (2016) explaining that coaching can improve the performance of both individuals and organizations. Employee performance itself is an employee's work performance which is considered a vital component in organizational success and productivity (Achi & Sleilati, 2016; Bureš, 2017; Jamil and Shaharanee, 2017; Shaikh, Shaikh et al, 2017; Tunio and Shah, 2017).

To make the model, so the flow structure is described in detail, the causal loop diagram needs to be changed to a flow diagram. In his research, Arisa et al., 2018 explained that flow diagrams can describe the relationship between variables and have been expressed in the form of symbols, such as stock, flow, and auxiliary. Where stock states the condition of the system at any time, is an accumulation that occurs in the system. Flow is a policy structure that explains why and how a decision is made based on the information available in the system, this flow is the only variable in the model that can affect stock. The auxiliary is some things that can complement the variables in the dynamic system model. In this study, the flow diagram of employee performance is formed from the elements of performance improvement and the role of leadership coaching. The leadership coaching role is formed from increasing roles as an inspiration, facilitator, and motivator. Where employee performance is stock and performance improvement is flow. This flow is aligned with the research of Osta et al., (2017), which found a positive relationship between situational leadership that contained coaching in it and increased employee performance. Then the role of leadership coaching is stock, and increasing the leadership coaching role is flow. While the inspiration, facilitator, and motivator an auxiliary. As explained in Khusniyah's research (2014) that the leader as an inspiration as well as a motivator has characteristics that include knowledge, skills, humility, and the ability to develop people's motivation and commitment to bond with each other so that they can influence to make real changes that achieve goals together. Meanwhile, Rasmussen and Hansen (2018) explain that leaders as facilitators must be able to create an environment for dialogue and discussion. The next step is computer simulation using the vensim application. (Khusniyah, 2014; Osta

et al., 2017; Arisa et al., 2018; Rasmussen and Hansen, 2018)

The characteristic pattern of system behavior is analyzed in the next ten years with a dynamic system model using the vensim application. The graph is in exponential growth form, which means leadership coaching the role can improve employee performance. For the next 20 years, the pattern of behavioral characteristics of the employee performance system will form an S-Shaped growth, meaning towards balance. It is in line with the results of research by Núñez-Cacho et al. (2015) founding a positive relationship between increasing individual performance as a result of coaching. Likewise, research by Losch et al. (2016) showed that individual and group coaching is effective in reducing procrastination and facilitating goal attainment. Individual coaching created a high level of satisfaction and was superior in helping participants achieve their goals. Meanwhile, group coaching was successful in encouraging the acquisition of relevant knowledge. (Núñez-Cacho, Grande and Lorenzo, 2015; Losch et al., 2016)

Conclussion

There is an influence between the leadership coaching role as an inspiration, facilitator, and motivator on the performance of employees at RSI Jakarta Cempaka Putih. Where the motivator has a very dominant role from the results of this study. Then from the dynamic system model, it is found that the leadership coaching role can improve employee performance. Predictions for the next ten years are based on the results of the exponential growth graph. The leadership coaching role is expected to improve employee performance. Meanwhile, for the next 20 years, the pattern of behavioral characteristics of the employee performance system will form an S-Shaped growth which means towards balance.

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Loving Lactation of Massage Effectiveness to Accelerating Lactation Onset

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Abstract

Failure to provide exclusive breastfeeding can be a factor in the occurrence of stunting. The reasons for not giving exclusive breastfeeding, among others, are because the breast milk has not yet come out. Massage is one of the most popular methods among the public. Loving lactation massage has not been widely used. This study aims to analyze the effect of Loving Lactation Massage on postpartum mothers on lactation onset. This type of research is Quasi Experimental with a non-randomized control group design. The population of postpartum mothers in the Perumnas II area of Pontianak City who gave birth to BPM Titin Widyaningsih with the number of samples is 51 people. The sampling technique used was purposive sampling. Data analysis by univariate, bivariate. The hypothesis test used was Anova, with a significance of 95% (α = 5%). Results: The average occurrence of lactation onset in the untreated group was 57.17 hours. Conventional group massage 44.17 hours. In the Loving Lactation Massage group, 35.47 hours There was a significant difference between conventional and untreated lactation massage on lactation onset. ((p=0,004). There is a significant difference between the lactation massage with the loving lactation massage method and the untreated lactation onset (p=0,000). Statistically, there was no significant difference between the loving lactation massage method and the conventional method of lactation onset (p=0,079).

Introduction

The focus of health development in Indonesia in the 2015-2019 period is reducing maternal and infant mortality, reducing the prevalence of stunting, controlling infectious diseases and controlling non-communicable diseases (Mebus, 1998). The nutritional problem facing the Indonesian nation today is stunting. Attention to stunting is an important matter because it will affect the quality of Indonesia's human resources in the future. Efforts to prevent and reduce stunting rates need to involve various sectors including empowering the family itself.

Stunting is a chronic nutritional problem in toddlers characterized by mismatching of the child's height compared to children of his age (shorter). Children who suffer from stunting will be more susceptible to disease, and are at risk for developing degerative diseases as adults. Besides having an impact on health, stunting also has an impact on the level of intelligence of children (Kementerian PPN/ Bappenas, 2018). The integrated stunting prevention intervention program launched by the government is an effort to prevent this. The intervention program is meant to involve cross-agencies and ministries. The government has designated 100 districts in 34 provinces as priority locations for stunting reduction in 2018. In the following year the number will increase by 60 districts. This cross-sector collaboration is expected to reduce the stunting rate in Indonesia, which in the end will reduce the stunting rate by 40% according to the target of the Sustainable Development Goals (SDGs) in 2025..

The incidence of stunting in the world in 2017 was 22.2% or around 150.8 million children under five. This figure has decreased

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when compared to the stunting rate in 2000, which was 32.6%. The proportion of children under five with stunting in the world in 2017, more than half of Asia (55%), more than a third (39%) live in Africa. The proportion of children under five with stunting in Asia is 83.6 million, and most of them come from South Asia (58.7%). The least proportion is in Central Asia (0.9%). Based on data from the World Health Organization (WHO), Indonesia is the third country with the highest prevalence of stunting in the Southeast Asia / South-East Asia Regional (SEAR) region. In 2005-2007, the average prevalence of stunting under five in Indonesia was 36.4%.

The impact of stunting can be divided into two, namely the short-term and long-term impacts. Increased incidence of morbidity and mortality, suboptimal cognitive, motor and verbal development in children and increased health costs are short-term impacts. Posture that is not optimal as an adult, increased risk of obesity and other diseases, decreased reproductive health, less than optimal learning capacity at school, not optimal productivity and work capacity are the long-term impacts (Mebus, 1998) (Kementerian PPN/ Bappenas, 2018). The risk of growth disorders, including stunting, can be affected by the nutrition obtained from birth. Failure to provide exclusive breastfeeding (ASI) and not carrying out early initiation of breastfeeding, as well as early weaning, can be a factor in the occurrence of stunting. The quality and quantity of complementary feeding of breastfeeding and the safety of the food provided are also things that need to be considered.

National coverage of exclusive breastfeeding for infants in 2017 was 61.33%. The highest percentage was found in West Nusa Tenggara (87.35%), while the lowest percentage was in Papua (15.32%). The coverage of infants receiving exclusive breastfeeding in West Kalimantan Province in 2017 was 62.73%. Exclusive breastfeeding coverage in Pontianak City in 2018 was 73.13%. The survey results in the area of the Public Health Center in Perumnas II show that 42.3% of babies do not receive exclusive breastfeeding. Based on the survey, breastfeeding does not come out is one of the reasons for not giving exclusive breastfeeding.

According to the Ministry of Health of the Republic of Indonesia (2013), postpartum mothers on days 1-3 have not issued breastfeeding (Delayed Lactation Onset) so that exclusive breastfeeding cannot be given to their babies. To meet the needs of the baby, the mother provides formula milk. Delayed Lactation Onset is the delay in the release of breastmilk in postpartum mothers> 72 hours. Proper and proper feeding for babies is by breastfeeding the baby exclusively from birth to the age of 6 months and continuing to breastfeed the child until the age of 24 months. Breast contains lots of white blood cells, protein and immunity, so that Breastfeeding is the best food for babies, helps the child's growth, optimal development and protects against disease.

Zhu *et al*. (2013) in his research stated that Delayed OL is a negative effect of multiple perinatal biopsychosocial stress. Severe stress in the first trimester of pregnancy, delivery by caesarean section, elevated body mass index ≥7.62, frequency of breastfeeding less than 3 times on the first day after birth, are risk factors for Delayed OL (Nommsen-rivers, Chantry, and Cohen, 2010) in his research stated that the median OL was 68.9 hours postpartum and 44% of mothers experienced Delayed OL while (Dewey *et al*., 2003) stated Delayed onset of lactation (> 72 hours) occurred in 22% of women. (Husayni, 2018) said that the prevalence of Delayed OL *73%*.

Lactation onset is the initial period of increasing milk until milk comes out for the first time or the mother's perception of when her milk comes in, which is characterized by a hard, heavy, swollen breast until milk or colostrum comes out. Lactation onset is also called stage II lactogenesis, starting from 24 hours postpartum, characterized by breasts feeling full, breasts feeling large or swollen and milk leaking. (Rocha. *et al*., 2017)"ISSN":"1556-8342","abstract":"Background: Low milk supply is frequently reported as a reason for breastfeeding early weaning. Objective(s dan (Asazawa, 2017). *Loving post natal treatment* is a non-pharmacological method. Loving post natal treatment is a treatment given

to mothers after childbirth to help restore their pre-pregnancy body shape. Loving post natal treatment is a treatment that combines conventional treatments and natural ingredients from nature. Loving massage is a holistic therapy that combines physical, thought, and feeling, care, sincerity and love for the masseuse to the mother. Massage techniques are carried out by means of effleurage, petrissage, accupreessure and love kneading on certain parts of the body to increase circulation and relaxation. Massage during pregnancy, childbirth and childbirth is an appropriate way to reduce stress and improve the well-being of both mother and baby.

Some of the benefits of massage for postpartum mothers are reducing pain, supporting uterine health, reducing tension, stress and anxiety, reducing nausea, stimulating peristaltic activity, encouraging deeper breathing, increasing internal respiration, reducing muscle tension, restoring balance in posture, normalizing blood pressure , elevates the mood or mood, increases milk production and encourages loving maternal care, prepares the mother physically, emotionally and mentally for the postpartum period (Melyana & Kusmini, 2018)

Massage in Arabic and French means touching. Massage is one type of alternative medicine in the physical therapy group. Massage in Indonesian is called massage or massage. Massage develops and is passed down from generation to generation not only in Indonesia but almost all over the world. Massage is one of the most popular methods among the public. Lactation massage methods that have been widely practiced include oxytocin, oxytocin, and loving lactation massage. (Yunitasari, 2015) in his research stated that Acupressure points for lactation are a solution to overcome the improper production of breast milk and help maximize prolactin and oxytocin receptors, as well as minimize the side effects of delayed breastfeeding. (Cho *et al*., 2012) mentioned that Oketani massage significantly reduces breast pain, increases breast milk levels and the baby's sucking speed. (Putri, 2015) states that there is a significant effect of oxytocin massage on breast milk expenditure in post partum mothers.

Back massage is effective at increasing lactation. Back massage can speed up the release of breast milk because the basis of this back massage is to stimulate the oxytocin reflex (Patel & Gedam, 2013). When the spine is massaged there arises a neurogrnik reflex that accelerates the work of the parasympathetic nerves to convey commands to the back of the brain (Rahayu, 2015). From the study results stated that the combination of breast care and oxytocin massage significantly increased breast milk production (Hesti *et al*., 2017). Post partum mothers who were given lactation massage, the onset of lactation was faster than those given oxytocin massage (Hesti *et al*., 2017).

Based on the research results mentioned above, most of the measured outcomes were milk production. To the best of our knowledge, the effect of lactation massage on lactation onset has not been widely carried out. Research on lactation massage on lactation onset was conducted by Hesti *et al.* (2017) comparing between lactation massage and oxytocin massage. Based on this premise, "The effect of the Loving Lactation Massage method of lactation massage on postpartum mothers on lactation onset is interesting to study.

Method

This research is a Quasi Experiment study, with a non-randomized control group design. In this study, the experimental group was divided into 3 (three) groups. The first group was treated in the form of lactation massage using the Loving Lactations Massage method, the second group used conventional methods and group 3 without treatment. The Loving Lactational Massage method is a massage method that is carried out holistically, starting with breathing relaxation, then praying to God, releasing emotions and integrating body, mind, and spirit, followed by creating a feeling of caring, loving and loving massage to the mother sincerely followed by massage with effleurage, petrissage, accupreessure and love kneading on certain body parts to improve circulation and relaxation. The conventional method is a massage method that is not carried out holistically and is done by massaging the breasts in 3 steps, followed by warm compresses and cold compresses and back massage.

The population of this study was postpartum mothers in the area of the

Preumnas II Public Health Center, Pontianak City. The research subjects were postpartum mothers in the area of Puskesmas Perumnas II, Pontianak City who gave birth at BPM Titin Widyaningsih during the study period. The sample size obtained was 17 people for each group. Inclusion criteria are implementing Early Initiation of Breastfeeding, Willingness to be a respondent, and being able to read and write. Exclusion criteria were postpartum mothers experiencing bleeding, fever, nausea, diarrhea, acute vascular inflammation such as phlebitis, high blood pressure, acute pneumonia, infectious diseases, diabetes with complications such as kidney problems and cancer.

The instruments used in this study were the protab for the Loving Lactation Massage method and the conventional massage method. Observation sheet was used to measure the onset of lactation. Univariate analysis was carried out to describe the characteristics of the respondents and presented in tabular form. Bivariate analysis was performed to determine the effect of Loving Lactation Massage and conventional massage on lactation onset. Hypothesis testing used is the Anova Test and Post Hoc Bonferroni with a significance level of 95%. (α=0.05).

Results and Discussion

Univariate analysis is carried out as a first step in a study and is used to determine further analysis. The results of the univariate analysis included the characteristics of the respondents, the data on lactation onset and the distribution of the data, the characteristics of the respondents based on the type of treatment. The results of the analysis are presented in tables.1, .2 and 3. The characteristics of the respondents in table 1 show that: based on age, some of the ages are 20-35 years, namely 47 people from 51 people (92.16%). Based on parity mostly on parity two, namely as many as 23 people from 51 people (45.10%) and parity 1 as many as 20 people from 51 people (39.22%). The characteristics of respondents based on education are mostly high school education, namely as many as 45 people (88.24%). Based on occupation, most of the respondents were housewives as many as 45 people (88.24%).

Table 1 Characteristics of Research Respondents

No.	Characteristics	n= 51	%
1	Ages		
	<20 years old	1	1,96
	20-35 years old	47	92,16
	>35 years old	3	5,88
2	Parity		
	1	20	39,22
	2	23	45,10
	3	7	13,73
	4	1	1,96
3	Education		
	Junior high school	2	3,92
	Senior high school	45	88,24
	Higher education	4	7,84
5	Occupation		
	Housewife	45	88,24
	Entrepreneur	4	7,84
	Civil servent	2	3,92

Source: Primary Data, 2019

Table 2. Characteristics of Respondents by Type of Treatment

Characteristics	Type of Treatment						p
	Loving Lactation Massage		Conventional Massage		Without Treatment		
	n	%	n	%	n	%	
Ages							
<20 years old	1	5,88	0	0	0	0	0,40
20-35 years old	16	94,12	15	88,24	16	94,12	
>35 years old	0	0	2	11,76	1	5,88	
Parity							
1	6	35,29	6	35,29	8	47,06	0,83
2	8	47,06	8	47,06	7	41,18	
3	3	17,65	2	11,76	2	1176	
4	0	0	1	5,88	0	0	
Education							
Junior high school	1	5,88	1	5,88	0	0	0,49
Senior high school	14	82,35	14	82,35	17	100	
Higher education	2	11,76	2	11,76	0	0	
Occupation							
Housewife	14	82,35	15	88,24	16	94,2	0,80
Entrepreneur	2	11,76	1	5,88	1	5,88	
Civil servent	1	5,88	1	5,88	0	0	

Source: Primary Data, 2019

To see the variable homogeneity between groups given treatment (massage) with conventional methods and loving lactation massage and those without treatment can be seen in table 2.The results of the analysis contained in table 2 show that of the 4 characteristics of respondents in the three treatment groups, statistically there is no difference in characteristics (homogeneous).

Given that the data in this study have a numerical scale (interval), to determine the next test it is necessary to describe the distribution of data based on the time of lactation onset. The results of the analysis in Table 3 show that the average occurrence of lactation onset in the untreated group was 57.17 hours with a standard deviation of 9.13. The conventional group massages 44.17 hours with a standard deviation of 12.34. In the Loving Lactation Massage group, the average occurrence of lactation onset was 35.47 hours with a standard deviation of 11.51. The three groups are normally distributed.

After it is known that the three groups are normally distributed, then the variant test is carried out. The results of the variant test showed that the three groups had the same variants, so the hypothesis test used was the Anova test. This is based on the data collected on a numerical scale and the number of groups is more than 2. To see which groups are different, a Bonferroni Post Hoc analysis is carried out. The results of the analysis are presented in tables 4 and 5.

The data contained in table 4 shows that statistically there is at least one significant difference between the three treatment groups. To see the different groups, the Post Hoc Bonferroni analysis was continued. The results of the analysis are contained in Table 5. The results of the analysis in Table

Table 3. Data Distribution of Lactation Onset

Type of Treatment	N	Lactation Onset Time		Data Distribution	*p*
		Mean (± SD)	Median (Min-Max)		
Loving Lactation Massage	17	35,47 (±11,51)	29 (24-62)	Normal	0,130
Conventional Massage	17	44,17 (±12,34)	41 (29-66)	Normal	0,107
Without Treatment	17	57,17 (± 9,13)	54 (40-81)	Normal	0,072

Source: Primary Data, 2019

Table 4. Effect of Lactation Massage with Conventional Methods of Massage and Loving Lactation Massage on lactation onset

Type of Treatment	N	Mean (± SD)	Median (± SD)	**F**	*p*
Loving Lactation Massage	17	35,47 (±11,51)			
Conventional Massage	17	44,17 (±12,34)	45,60 (± 14,1)	16,52	0,000*
Without Treatment	17	57,17 (± 9,13)			

Source: Primary Data, 2019
*= *Anova test*

Table 5. Differences in Lactation Onset by Type of Treatment

No.	Type of Treatment	Conventional Massage	Without Treatment
		Difference (*p*)	Difference (*p*)
1	*Loving Lactation Massage*	8,7 (0,079)	21,7 (0,000)
2	Conventional Massage		13 (0,004)

Source: Primary Data, 2019

5 show that there is a significant difference between loving lactation massage massage and without treatment on lactation onset (p = 0.000). There was a significant difference between conventional and untreated methods on lactation onset (p = 0.004). There was no significant difference between loving lactation massage and conventional massage on lactation onset (p = 0.079). Based on the average value, the loving lactation massage has the shortest average, so the loving lactation massage is the best method.

The results of the analysis show that statistically there is a significant difference between those who are given treatment (lactation massage) and those who are not given treatment for the occurrence of lactation onset. (p=*0,000*). The time of onset of lactation in the treated group was 13 hours faster than that of the untreated group. Research on the impact of lactation massage on lactation onset to the best of our knowledge has not been widely conducted. Similar research (Patel & Gedam, 2013)non pharmacologic measures are an attractive option over pharmacologic measures for improving lactation. Methods: A quasi experimental study was conducted for a period of 16 months, to assess the effectiveness

of back massage on lactation among immediate postnatal mothers. A total of 220 mothers were enrolled in two groups (Group A, Experimental group-100 cases, Group B, Control group-120 cases, stated that back massage in post partum mothers is effective in increasing lactation. Back massage is recommended to all mothers, especially those who face problems related to the initiation of breastfeeding.

Lactation onset is also called stage II lactogenesis, starting from 24 hours postpartum. Delayed breastfeeding in post partum mothers> 72 hours (delayed onset lactation) is one of the factors that the breastfeeding process is unsuccessful. The long-term impact of delayed onset lactation in infants is the risk of excess body weight occurring (Dewey *et al*., 2003). Research result (Dewey *et al*., 2003) stated that the risk of being overweight was 7.1 greater in mothers who experienced delayed onset lactation and 2.6 times greater in infants whose breastfeeding on day 0 was not optimal. Peng Zhu, *et al.* (2013) in his research stated that Delayed OL is a negative effect of multiple perinatal biopsychosocial stress. Nommsen-Rivers, L.A. *et. al.* (2010) in his study stated that the median OL was 68.9 hours postpartum and 44% of mothers experienced delayed OL. The risk factors for delayed OL are age> 30 years, obesity, LBW> 3600 grams, nipple disorders 0-3 days post partum, failure / not being able to breastfeed properly> 2 times in 24 hours post partum.

Lactation massage is a non-pharmacological method that has been used with many benefits. Research result (Patel & Gedam, 2013)non pharmacologic measures are an attractive option over pharmacologic measures for improving lactation. Methods: A quasi experimental study was conducted for a period of 16 months, to assess the effectiveness of back massage on lactation among immediate postnatal mothers. A total of 220 mothers were enrolled in two groups (Group A, Experimental group-100 cases, Group B, Control group-120 cases, showed that back massage in post partum mothers was effective in increasing lactation. Back massage is recommended to all mothers especially those who face problems related to initiation of breastfeeding. During childbirth, the discharge of the placenta causes a sudden drop in the levels of the hormones progesterone, estrogen and the Prediction Day of Birth, but the hormone prolactin remains high. This results in the production of massive breastfeeding known as phase Lactogenesis II.when the breasts are stimulated, the prolactin level in the blood raises, peaks over a 45 minute period, and then returns to the pre-stimulation level three hours later. The release of the hormone prolactin stimulates cells in the alveoli to produce Breastfeeding, and this hormone also comes out in Breastfeeding itself. Research indicates that the prolactin level in milk is higher when the breastfeeding is higher, which is around 2 a.m. to 6 a.m., but the prolactin level is low when the breasts feel full.

Biochemical markers indicate that the process of lactogenesis II begins about 30-40 hours after delivery, but usually new mothers feel full breasts about 50-73 hours (2-3 days) after delivery. This means that breastfeeding production is actually not immediately after delivery. After the mother gives birth, there will be changes both physically and psychologically. The psychological changes after childbirth consist of three phases. The dependency phase lasts from the second day after delivery. Mothers are focused on themselves so they tend to be passive towards their environment. The mother's discomfort is more caused by the labor she has just gone through. Mules, pain in the birth canal, lack of sleep, or lethargy, are the things that mothers often complain about. In this phase, the need for rest, nutritional care and good communication must be fulfilled. If these needs are not met, the mother can experience psychological problems in the form of: disappointment with the baby, discomfort as a result of physical changes experienced, guilt for not being able to breastfeed the baby and criticism of the husband or family about caring for the baby.

The condition of the mother who is easily anxious and stressed can interfere with lactation so that it can affect milk production. This is because stress can inhibit the release of Breastfeeding (Chen *et al*., 1998) and (Dewey, 2001). The emotional state greatly influences the milk flow reflex. This reflex controls the commands sent by the hypothalamus to the pituitary gland. When the mother is under

stress, anxiety, worry, tension, etc., milk will not go down from the alveoli to the nipple.

Generally this occurs during the first days of breastfeeding when the reflex to drain milk is not fully functional. The milk flow reflex works best when the mother is relaxed and calm, not tense or anxious. Breast care will accelerate milk production and stimulate the breasts, will affect the hypopise to release more of the hormones progesterone, estrogen and oxytocin. The oxytocin hormone will cause contractions in other cells around the alveoli, so that milk flows down towards the nipples. The mean time of onset of labor in the treatment group was 44.17 hours, with the shortest time being 29 hours and the longest time being 66 hours. Whereas in the untreated group the average time of lactation onset was 54 hours and the longest was 81 hours. There were 1 (5.8%) people who experienced Delayed Onset of Lactation. The prevalence of DOL ranges from 22-44%. So in this study the prevalence of DOL is smaller. This is because the respondents in this study were doing Early Initiation of Breastfeeding (IDM).

The results of the analysis showed that there was a significant difference in the time of lactation onset between those who were given lactation massage using the *loving lactation massage* method and those who were not given the treatment. (p=0,000). The group that was given the loving lactation massage method, the lactation onset time was faster than the untreated group, with a mean difference of 21.7 hours. The effect of massage on this *loving lactation massage* method is similar to conventional methods, but the results are different. It is possible that there are differences in massage technique procedures. In the loving lactation massage method, relaxation techniques, emotional release, and positive affirmations are taught. Besides that, they are also given aromatherapy and music therapy. In the conventional method is not given.

The health benefits of music therapy include overcoming muscle tension and reducing depression. (H. H. Lin *et al*., 2019 and (C.-J. Lin *et al*., 2019), in his research on the effects of music therapy during vaginal delivery as a post partum pain reliever and mental health, states that using music therapy during labor reduces anxiety, pain at post partum. (Kheirkhah *et al*., 2014) in his research, stated that aromatherapy and footbath can reduce anxiety in a mother giving birth to primiparous in the active phase. (Sara Esmaelzadeh-Saeieh1, Mitra Rahimzadeh2, Nafiseh Khosravi-Dehaghi3, Shokufeh Torkashvand4) in their research stated that inhalation of Boswellia Carterii essential oil can significantly reduce pain in childbirth. (Asazawa *et al*., 2017) stated that aromatherapy significantly improves relaxation in the early postpartum period.

The results showed that statistically, there was no significant difference between the *Loving Lactation Massage* method and the conventional method (p = 0.079). The average time of lactation onset with the Loving Lactation Massage method was 35.47 hours and the conventional method was 44.17 hours. Lactation onset with the *Loving Lactation Massage* method is 8.7 hours faster than the conventional method. Although it does not show a statistically significant difference, it can be considered clinically significant, considering that the process of breastfeeding takes 3 hours. The characteristics of the respondents in this study were equivalent, so that the characteristics of the respondents were not at issue. Lactation onset is also influenced by early initiation of breastfeeding (IMD). In this study, all respondents did early initiation of breastfeeding, given the policy at BPM Titin Widyaningsih facilitating Early Initiation of Breastfeeding.

Conclusion

Based on the results of the study, it can be concluded that there is an effect of lactation massage on lactation onset. There are differences in the onset of lactation using the Loving Lactation Massage method with conventional methods ($p \leq 0{,}001$). The treatment uses the Loving Lactation Massage Method which is more effective in stimulating Lactation Onset compared to conventional methods.

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Additional Feeding Based on Local Food to Improve The Nutritional Status of Tooddlers

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Abstract

East Nusa Tenggara (NTT) occupies the first position in the incidence of malnutrition in Indonesia, with Kupang City as the third highest position in cases of malnutrition in NTT Province. The purpose of this study was to see the effect of supplemental feeding based on local food (Moringa nuggets) on improving status. Nutrition for toddlers. This research was conducted in 2020, using a quasi experimental research method with a pre-test-posttest control group design. A total of 90 respondents were selected using purposive sampling technique. The data were collected using a questionnaire, anthropometric measurements to measure nutritional status, and recording weight gain at the beginning and end of moringa nuggets. Each research subject in the case group was given Moringa nuggets for 30 days as many as 3 pieces of nuggets per day, where each piece contained 11.4% protein. Data analysis was performed bivariately using the Pearson correlation test with $\alpha = 0.05$ and pre-post comparison analysis with paired samples T-test. The results showed that there was a significant difference in changes in nutritional status of children under five before and after giving Moringa nuggets to underweight children under the anthropometric index of weight / age indicated by $p = 0.041$ ($p < 0.05$). Meanwhile, the anthropometric index weight / height did not show a significant difference with a value of $p = 0.052$.

Introduction

Child growth and development is a process that runs continuously from the womb to adulthood (Iskandar, 2017). Adequate nutritional intake during infancy and toddlerhood is vital to ensure optimal growth and development (Demilew, Tafere and Abitew, 2017). Childhood is the most precious period in the development of human life. At this stage, optimal brain and physical development occur (Mardani and dkk, 2015). About 35% of deaths in the world are related to nutrition. 4.4% of them are proven to be caused by the incidence of severe wasting (Workie et al., 2020).

Nutrition is one of the notable factors affecting the development of children under five. The condition of children who experience rapid weight loss or failure to gain weight due to hunger and/or disease is called wasting (Chaturvedi et al., 2018). The nutritional status of children under five can affect several aspects (Rahim, 2014). Undernutrition in children under five harms physical and mental growth, which in turn will hinder learning achievement. Another result is a decrease in endurance, causing the loss of a healthy life span for children under five, and more consequences, namely the emergence of disabilities, high morbidity, and accelerated death (Rahim, 2014).

Nutritional disorders are caused by factors (determinants), namely primary factors and secondary factors. The primary factor is when a person's food source is wrong in quantity or quality due to lack of food supply, poor food distribution, poverty, ignorance, improper eating habits, etc. Meeting the level of protein and zinc needs helps children achieve better growth and health (Blaney et al., 2019). The practice of proper feeding for infants and toddlers, according to the recommendations,

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has been shown to protect against malnutrition in various situations (Anin et al., 2020). Secondary factors include all factors that inhibit nutrients to the body's cells after food is consumed (Lutviana and Budiono, 2010). Apart from poverty, household sanitation and low food diversity also affect malnutrition among infants and toddlers (Muhoozi et al., 2016). The relationship between education, knowledge, and income is an interrelated factor. Where education affects cognition and speed in absorbing and understanding information, including about health and nutrition. On the other hand, education can determine the type of work a person gets and generate income. However, this relationship is not always relevant because it is affected by other factors (Sophia, Suherni and Kuswardinah, 2017).

East Nusa Tenggara (NTT) is the province with the highest level of malnutrition in Indonesia. Based on statistics, the regions with the most malnutrition sufferers without clinical abnormalities are South Central Timor Regency which reaches 310 children under five, Southwest Sumba (204), and Kupang City (209) (Dinas Kesehatan Provinsi NTT, 2017). The 2017 profile of the Kupang City Health Office shows that the prevalence of under-fives with underweight results in 2017 was 372 under-fives or 2.63% of the total children under five who were weighed in Kupang City as many as 14,167 children under five (Dinas Kesehatan Provinsi NTT, 2017).

The Ministry of Health has established comprehensive policies, covering prevention, promotion/education, and overcoming malnutrition under five. Prevention efforts are carried out through growth monitoring at posyandu. Exclusive breastfeeding and breastfeeding for two years can reduce malnutrition risk (Lassi et al., 2020). Physiologically, breast milk can only provide nutrition until a certain age where the baby's diet requires adding solid foods. Nutritional intake needs to be increased to ensure optimal growth and development. It is important to note that early nutrition can have irreversible consequences because, after two years of age, stunting and other growth deficiencies can be very difficult to overcome (Lassi et al., 2020). The formula given to people with malnutrition refers to the WHO standard. It consisting of milk, oil, sugar, flour, and water. Additional food (Pemberian Makanan Tambahan/PMT) is given in addition to the WHO formula, which is a modified formula in the form of a fair energy and protein-dense formula, consisting of ingredients that are available in the community at affordable prices (Mardani et al., 2015).

To enrich nutritional content, we can substitute the ingredients with local food sources of protein and vitamin A (Iskandar, 2017). One of the local food ingredients with high nutritional value as additional food easily accessible to people in NTT is moringa. According to DKBM Indonesia, the leaves contains 82 calories of energy; 6.7 grams of protein; 1.7 grams of fat; 14.3 carbohydrates; 440 mg calcium; 70 mg of phosphorus; 7 mg iron; 11300 IU of vitamin A; 0.21 vitamin B; and 220 mg of vitamin C (Dinas Kesehatan Provinsi NTT, 2017). The content of potassium is three times more than in bananas. The vitamin A contained is four times more than carrots. The iron is equivalent to 25 bunches of spinach. Vitamin C is equivalent to 7 oranges. Calcium, for the growth of bones and teeth, is equal to four glasses of milk and two times the protein from yogurt (Mardani et al., 2015).

Moringa oleifera lamk. (Moringa), a Moringaceae family. It is a medicinal plant that contains lots of vitamins and is effective for malnutrition. It contains seven times more vitamin C than oranges, ten times more vitamin A than carrots, 17 times more calcium than milk, nine times more protein than yogurt, 15 times more potassium than bananas, and 25 times more iron than spinach (Rahim, 2014).

Especially in NTT, the method of processing Moringa leaves is not so diverse. The most common preparations are stir-fried or soup. Less varied ingredients will make toddlers feel bored. So it is necessary to have a different variation of the processing of this Moringa vegetable. One of the foods that are easy to like and consume by toddlers is nuggets. By processing moringa into it, toddlers will be more interested in eating moringa, which nutritious for their growth and development.

Method

The research method used in this

research is quasi-experimental. The design used was the pretest-posttest control group design. In this design, there are two groups selected randomly. Then a pretest to determine the initial state is applied. Is there a difference between the experimental group and the control group? The independent variable in this study is the provision of additional food based on local food, in this case, is moringa nuggets. The dependent variable is the nutritional status of children under five. The sample is children who experience malnutrition based on records from the Puskesmas in Kupang City, totaling 90 children. Secondary and primary data collection was taken. Secondary data was the weighing data for children under five at health centers throughout the city of Kupang to screen children with low nutritional status based on anthropometric measurements. Primary data was the interviews using a questionnaire instrument to obtain data on the characteristics of respondents. As well as to measure the initial body weight of research subjects before and after being given Moringa nuggets (after 30 days).

The sampling method used was the purposive sampling technique. Researchers selected 90 toddlers with malnutrition. They were divided into two groups. The case group was 45 children under five and would be given moringa nuggets, while no treatment for the 45 children in the control group. Initial data collection is an interview with the help of a closed questionnaire. The questions contained in the questionnaire included: the identity of the research subject, family, and anthropometric measurements of the research subject at the beginning and end of giving Moringa nuggets to see changes or increases in body weight, especially for anthropometric measurements and nutritional status measurements carried out at the beginning and end of the study. To evaluate the results of supplementary feeding. Researchers expected that the respondents experience an increase in nutritional status from undernutrition to good nutrition. For anthropometric measurements, researchers measured themselves with the help of scales and measuring meters. Researchers carried out primary data collection from the house to the house of research subjects. Each research subject in the case group was given Moringa nuggets for 30 days, wherein one day the research subjects consumed three pieces, each containing 11.4% protein. It contains chicken by 70%, and moringa by 30% because the nuggets with this composition have a natural color, namely yellow with a bit green color, a more savory taste, the aroma of Moringa chicken is quite strong, the texture is dense, soft, as well as compact. Interviews, measurement of body weight, and provision of additional food (nuggets) were carried out after the research subjects filled out the informed consent represented by the mother as the respondent. The data processing and analysis use a statistical program. Data analysis was performed bivariate using the Pearson correlation test with $\alpha = 0.05$ and pre-post comparative analysis with paired samples T-test.

Result and Discussion

Table 1. Sample's Characteristics

Characteristics	Treatment (Case)		Control	
	n	%	n	%
Age				
12-24 months	25	27,8	22	24,4
25-36 months	12	13,4	10	11,1
37-48 months	4	4,4	7	7,8
49-59 months	4	4,4	6	6,7
Gender				
Boy	26	28,9	24	26,7
Girl	19	21,1	21	23,3

Source : Primary Data, 2020

Table 1 shows that most of the samples in this study in the treatment group (cases), namely 27.8%, and the control group, namely 24.4%, were age 12-24 months. Based on gender, 28.9% of children in the treatment group (cases) and 26.7% in the control group were males.

Tabel 2. Mother's Characteristic

Characteristic	Case %	Control %
Age		
15-35 years	29 (32,2)	25 (27,8)
36-56 years	16 (17,8)	20 (22,2)
Education		
Low	27 (30,0)	21 (23,3)
High	18 (20,0)	24 (26,7)
Occupational Status		
Does not work	31 (34,4)	18 (20,0)
Work	14 (15,6)	27 (30,0)
Family's percapita Income		
≤ Rp 234.150,-	37 (41,1)	35 (38,9)
>Rp 234.150,-	8 (8,9)	10 (11,1)
Number or children		
1 – 2	14 (15,6)	20 (22,2)
>2	31 (34,4)	25 (27,8)

Source: Primary Data, 2020

Table 2 shows 15-35 years of age mothers are more in the case and control groups than the 36-56 years of age mothers. As for the education level, the number of respondents' mothers with low education is higher in the case group. While for the control group, respondents' mothers with high education are more. For employment status, more respondents' mothers did not work in the case group. In the control group, more respondents' mothers worked. Most of the respondents' mothers had a per capita income of less than IDR 234,150 (80%). For the number of children, mothers with more than 2 (two) children were found more in the case group compared to those with less than 2 (two) children, while the control group showed that more respondents' mother had children less than 2 (two) than those who had children more than 2 (two).

Table 3. Nutritional Status Distribution Based on BW/BH Index

Nutritional Status from BW/BH Index	Treatment (Case)				Control			
	Before	%	After	%	Before	%	After	%
Very Thin	0	0	0	0	0	0	0	0
Thin	45	100	42	93,3	45	100	44	97,8
Normal	0	0	3	6,7	0	0	1	2,2
Fat	0	0	0	0	0	0	0	0
Total	45	100	45	100	45	100	45	100

Source: Primary Data, 2020

Based on table 3. The percentage of toddlers in the treatment and control groups with the thin category before being given Moringa nuggets was 100%. Before getting treatment, samples were 90 toddlers at Z-score between -3.0 SD to <-2.0 SD, with the highest Z-score being -2.42 SD and the lowest -2.87 SD. The percentage of toddlers in the underweight category in the treatment group given Moringa nuggets decreased from 100% to 93.3%. And increase in the normal category from 0% to 6.7%. The treatment group consisted of 45 toddlers with the highest Z-score of -2.42 SD, and the lowest was -2.87 SD. After treatment, the highest Z-score was -1.96 SD, and the lowest was -2.80 SD.

Whereas in the control group without any treatment at all. Toddlers with the

underweight category experienced a decrease from 100% to 97.8%. While toddlers under the normal category experienced an increase from 0% to 2.2%. The research sample in the treatment group amounted to 45 toddlers. Who previously were at the highest Z-score was -2.42 SD, and the lowest was -2.87 SD. They did not experience any significant changes because they received no treatment at all. However, one toddler who was initially in the thin category changed to the normal with a Z-score of -1.90 SD.

Table 4. Nutritional Status Distribution Based on BW/A Index

Nutritional Status from BW/A Index	Treatment (Case)				Control			
	Before	%	After	%	Before	%	After	%
Malnutrition	0	0	0	0	0	0	0	0
Under Nutrition	45	100	39	86,7	45	100	43	95,6
Well Nutrition	0	0	6	13,3	0	0	2	4,4
Over Nutrition	0	0	0	0	0	0	0	0
Total	45	100	45	100	45	100	45	100

Source: Primary Data, 2020

Based on table 4. The percentage of toddlers in the treatment and control groups with undernutrition category before being given Moringa nuggets was 100%. Before getting treatment, all samples were 90 children under five at Z-score between -3.0 SD to <-2.0 SD, with the highest Z-score being -2.35 SD and the lowest -2.92 SD. The percentage of toddlers with malnutrition in the treatment group given moringa nuggets decreased from 100% to 86.7%. The increase in the good nutrition category was from 0% to 13.3%. The sample in the treatment group consisted of 45 toddlers. Previously with the highest Z-score was -2.35 SD and the lowest was -2.92 SD. After treatment, the highest Z-score was -1.56 SD, and the lowest was -2.67 SD.

In the control group without any treatment, toddlers with undernutrition experienced a decrease from 100% to 95.6%. And toddlers with well-nutrition categories experienced an increase from 0% to 4.4%. The sample in the treatment group amounted to 45 toddlers had the highest Z-score was -2.35 SD, and the lowest was -2.92 SD. They did not experience any significant changes because they did not receive any treatment at all. However, one toddler who was initially in the thin category changed to the normal with a Z-score of -1.90 SD.

Table 5. Body Weight Description

Body Weight	Treatment (Case)		Control	
	Before	After	Before	After
Average	9,29	10,56	9,28	9,56
Minimum	5,9	6,4	6,1	6,3
Maximum	14,3	14,7	14,4	14,5

Source: Primary Data, 2020

Based on the results in Table 5, in the treatment or case group, the toddlers' bodyweight before being given Moringa nuggets had an average of 9.29 kg. After being given Moringa nuggets, the average body weight increased to 10.56. In the control group, there was no significant increase.

Table 6. Mean Z-score value Changes

Anthropometric Index	Before	After	Changes	p-value
Z-score BW/BH	-2,51 SD ± 0,74	-2,0 SD ± 1,0	0,51 ± 0,26	0,052
Z-score BW/A	-2,96 SD ± 0,81	-2,35 SD ± 0,84	0,61 ± 0,03	0,041*

Source: Primary Data, 2020

Based on Table 6, there is a change in the mean Z-score value on the BW/BH anthropometric index, before and after the giving of Moringa nuggets. It is 0.51 SD with a standard deviation of 0.26, and a change in the mean anthropometric index BW/A is 0.61 SD with a standard deviation of 0.03. Paired T-test results showed no significant difference in changes in the mean Z-score value of the anthropometric index BW/BH as indicated by the value of $p = 0.052$ ($p < 0.05$). Whereas in the anthropometric index BW/A, there was a significant difference in the mean Z-score before and after giving Moringa nuggets indicated by a value of $p = 0.041$ ($p < 0.05$).

Malnutrition during childhood is the result of inadequate dietary intake, diarrhea and other infections, lack of sanitation, and low parental education (Amare, Ahmed and Mehari, 2019). Food insecurity, inadequate maternal and child care, and poor health and environmental services, causing Poor diet and disease. Child malnutrition accounts for nearly half (45%) of child deaths, especially in low socioeconomic communities in developing countries. In 2018, global estimation mentioned that 149 million toddlers are stunting and 49 million wastings (Amare, Ahmed and Mehari, 2019).

Age is a vital indicator in determining one's productivity. Young people, of course, have higher productivity than the older, because the physical condition and health of young people are more optimal (Yapo, 2020). Productive age also plays an important role. At the age range, it is easier to capture information related to health education about the importance of exclusive breastfeeding for six months, breastfeeding for two years, and improving hygiene in the neighborhood to increase children's health status (Yapo, 2020). Research conducted by Hoq et al. (2014) in Bangladesh shows that inappropriate feeding practices can be the major cause of acute malnutrition in toddlers (Hoq et al., 2019). Mothers or caregivers only use available resources regardless of the diversity basic in preparing food intake for children. Due to lack of money, they cannot buy meat and other foodstuffs in the market (Hoq et al., 2019).

The influence of a mother's education is substantial in preventing malnutrition in children under five. Research conducted by Amare et al. (2016) in Ethiopia shows a significant relationship between maternal education and the incidence of stunting and wasting in toddlers (Amare, Ahmed and Mehari, 2019). Mothers with higher education can utilize all the resources they have compared to mothers who have low education. Maternal education affects maternal knowledge about nutrition. So nutrition, health, and knowledge is related (Rahim, 2014). The level of education will affect the type of work and have implications for the type and amount of income. The better the education level, the higher the opportunity to get a better job with regular income and a higher income (Rahim, 2014).

Tut Wie et al. research showed mother's education determine the child nutrition status (Tut and Tsegaye, 2020). Research conducted by Chowdhury et al. (2013) in Bangladesh shows that the wealth index or family income is closely related to underweight children (Chowdhury et al., 2018). Children from poor families tend to be underweight compared to those from the rich. Most of the population living in poverty cannot afford to buy nutritious food or access better health facilities to get health care (Chowdhury et al., 2018). In this study, the researchers conducted with 80% of the sample were families with per capita income less than Rp. 234,150.00 so that in their daily life, the mother prepared dishes intending to have the children and other family members can eat (full) regardless of the nutritional content of cooked food.

Research conducted by Hoq et al. (2014) shows that the number of children and family size is risk factors for malnutrition in several studies conducted in Ethiopia, Pakistan, India, and Malaysia. A large number of children can make children get less attention and have to share food with many (Hoq et al., 2019). In this study, the paired T-test results showed no significant difference in changes in the Z-score mean value of the anthropometric index BW/BH indicated by the value of $p = 0.052$ ($p < 0.05$). Whereas in the anthropometric index BW/A, there was a significant difference in Z-score mean changes before and after giving Moringa nuggets indicated by a value of $p = 0.041$ (p

<0.05). It can happen due to the calculation of nutritional status carried out by researchers used the BW/BH index. The height indicator at BW/BH has a lower sensitivity to nutrition deficiencies in the short term (Mardani et al., 2015). This research took time for one month, so the possibility of experiencing an increase in height is still low. For weight gain shows well results.

This research is in line with Mardani et al., 2015, which showed differences in nutritional status based on the index BW/BH, BW/A, and BH/A, after giving PMT-P (additional food and integrated health service) for 90 days. The contribution of energy and protein intake from PMT-P consumed by toddlers has increased every week. Supported by an increase in energy and protein intake from food other than PMT-P, the daily intake level is adequate (Mardani et al., 2015). Lack of proper diet will affect children's health and increase morbidity (Tariq et al., 2018). Therefore, it is necessary to fulfill the toddlers' nutritional needs. So the body grows and develops optimally.

One of the local food ingredients with a high nutritional value used as additional food easily accessible to people in NTT is Moringa. According to DKBM Indonesia, the content of the leaves are 82 calories of energy; 6.7 grams of protein; 1.7 grams of fat; 14.3 carbohydrates; 440 mg calcium; 70 mg of phosphorus; 7 mg iron; 11300 IU of vitamin A; 0.21 vitamin B; and 220 mg of vitamin C (Dinas Kesehatan Provinsi NTT, 2017). The content of potassium is three times more than in bananas. Vitamin A is four times than carrots. The iron in Moringa leaves equal to 25 bunches of spinach. Vitamin C is equivalent to 7 pieces of oranges. Calcium for the growth of bones and teeth in Moringa leaves is equivalent to 4 glasses of milk. Moringa contains protein two times more than yogurt (Mardani et al., 2015).

Moringa oleifera Lamk. (Moringa), the Moringaceae family is a medicinal plant that contains lots of vitamins and is effective for malnutrition. Moringa leaves have seven times more vitamin C than oranges, ten times more vitamin A than carrots, 17 times more calcium than milk, nine times more protein than yogurt, 15 times more potassium than bananas, and 25 times more iron than spinach (Rahim, 2014). Consumption of adequate complementary foods and daily foods contributes to the children's growth, health, and development improvement. WHO recommends proper time introduction of foods that sufficiently nutritious, appropriate, and safe for all children. Further indicate that consuming various foods ensures children's nutritional needs are met (Gewa and Leslie, 2015). Besides, animal-based foods, fruits, and vegetables rich in vitamin A should be included in the daily diet or as often as possible. The recommendations for meeting the nutritional needs of children do not differ from country to country. But it is more emphasized in developing countries with low income that bear the burden of child malnutrition and limited resources (Gewa and Leslie, 2015).

Conclusion

The results indicate a significant difference in the toddlers' nutritional status changes before and after giving additional food based on local ingredients. In this case, moringa nuggets for under-nutrition children according to the anthropometric index BW/A indicated by a value of $p = 0.041$ ($p < 0.05$). Meanwhile, the anthropometric index BW/BH did not show any significant difference in nutritional status before or after being given additional food (moringa nuggets) with a value of $p = 0.052$.

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Preference-Based Pricing of the Indonesian JKN-KIS Health Insurance for Urban Middle-Income Self-Funders

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Abstract

We determine optimal premiums of the Indonesian JKN-KIS health insurance plans for urban middle-income self-funders based on their preferences. The demand function was derived using the discrete choice experiment assuming a mixed multinomial logit model. The choice data were collected using questionnaires containing choice tasks that are randomly generated such that they are balanced, orthogonal, and have minimal overlap. The population is middle-income people living in the urban area that pay for health insurance with their own money. An online survey with a simple random sampling method taken time from February until March 2020. As many as 228 questionnaires were completed and collected. Individual utilities were estimated from choice data using the Bayesian method and subsequently used for deriving price-response functions. We found that more than 90% of respondents prefer first-class and second-class plans. Accordingly, we set up a pricing optimization formulation for those two plans to maximize total contribution while maintaining the price difference between them and setting the price of the third-class plan as it was. We came up with monthly premiums of Rp290,000 and Rp240,000 for the first-class and second-class plan, respectively, with an estimated monthly total contribution of Rp1.191 trillion, a 150% increase compared to that of the current pricing. It reveals the opportunity for increasing revenue by implementing finer price differentiation without sacrificing the mission of serving the underprivileged with the third-class plan.

Introduction

JKN-KIS is the national health insurance of Indonesia that was launched in 2014 and managed by the Social Security Administering Body of the Government of Indonesia (also called BPJS Kesehatan). By the end of July 2020, 221.8 million people have participated in this program, which constitutes 81.8% of the population. This figure was still below the universal health coverage target of 95% to achieve in 2019. About 35.6 million members were self-funder, while the rest were either government-funded or fully or partially funded by their employers. The JKN-KIS health insurance system offers three classes of service based on the type of ward and the possibility to upgrade. The classes consist of the first-class plan offering 2-4-bed wards and is upgradeable to the VIP class; the second class plan with 3-5-bed wards and upgradeable to the first-class and the VIP-class; and the non-upgradable third class with 4-6-bed wards.

Despite its growing membership coverage, the JKN-KIS has a fundamental problem regarding the continuing deficit. The primary cause of this deficit—which by the end of 2019 was about Rp32 trillion—is a relatively low premium compared to the cost paid to the healthcare providers. As of July 2020, the monthly premiums are Rp42.000, Rp100.000, and Rp150.000 for the first, second, and third classes, respectively. This research objective is to examine these premiums from consumers' perspectives by considering their preferences

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and willingness to pay (WTP). The focus is on measuring preferences and WTP of the urban middle-income self-funders for the JKN-KIS health insurance plans then determines the 'right' premium for each class.

The ultimate objective of this research is to determine monthly premiums for the urban middle-income self-funders to maximize the profitability obtained from the first-class and the second-class members. The third-class plan is designed for underprivileged people, and hence the premium should be set so most people could afford it. Since there is no private insurance company that offers similar premiums plans, it practically has no competitors. Meanwhile, the first-class and the second-class plans are offered at higher prices which may compete with health insurance plans available in the market. Since the population studied is not exhaustive, the result is not intended to be implemented marketwide. Yet, it tries to reveal the opportunity for increasing revenue by implementing finer price differentiation than one currently implemented, without sacrificing the mission of serving the underprivileged with the third-class plan.

Most of the previous research on measuring WTP for health insurance plans use the contingent valuation method or CVM (Mitchell, 2013) This method has been used for doing such research in various countries, like Namibia (Gustafsson-Wright, Asfaw, & van der Gaag, 2009), Indonesia (Aryani & Muqorrobin, 2013), Vietnam (Nguyen & Hoang, 2017), Malaysia (Azhar, Rahman, & Arif, 2018), Sierra Leone (Jofre-Bonet & Kamara, 2018)using a purposely-designed survey of a representative sample of this sector. Methods We elicit the WTP using the Double-Bounded Dichotomous Choice with Follow Up method. We also examine the factors that are positively and negatively associated with the likelihood of the respondents to answer affirmatively to joining a HI scheme and to paying three different possible premiums, to join the HI scheme. We additionally analyze the individual and household characteristics associated with the maximum amount the household is willing to pay to join the HI scheme. Results The results indicate that the average WTP for the HI is 20,237.16 SLL (3.6 USD, and Ethiopia (Gidey, Gebretekle, Hogan, & Fenta, 2019)access to at least the basic health services is still a problem in Ethiopia. With the intention of raising funds and ensuring universal health coverage, a mandatory health insurance scheme has been introduced. The Community Based Health Insurance has been implemented in all regions of the country, while implementation of social health insurance was delayed mainly due to resistance from public servants. This study was, therefore, aimed to assess willingness to pay for social health insurance and its determinant factors among public servants in Mekelle city, Northern Ethiopia. Methods: A concurrent mixed approach of cross-sectional study design using double bound dichotomous choice contingent valuation method and qualitative focus group discussions was employed. A total 384 public servants were recruited from randomly selected institutions and six focus group discussions (n = 36. The popularity of this method is due to its simple elicitation method, especially the dichotomous-choice-with-follow-up (DCF), which only needs three yes-no questions, out of which respondents need to answer two (Aizaki, Nakatani, & Sato, 2014).

The research in Namibia (Gustafsson-Wright et al., 2009), Serra Leone (Jofre-Bonet & Kamara, 2018)using a purposely-designed survey of a representative sample of this sector. Methods We elicit the WTP using the Double-Bounded Dichotomous Choice with Follow Up method. We also examine the factors that are positively and negatively associated with the likelihood of the respondents to answer affirmatively to joining a HI scheme and to paying three different possible premiums, to join the HI scheme. We additionally analyze the individual and household characteristics associated with the maximum amount the household is willing to pay to join the HI scheme. Results The results indicate that the average WTP for the HI is 20,237.16 SLL (3.6 USD, and Ethiopia (Gidey *et al*., 2019)access to at least the basic health services is still a problem in Ethiopia. With the intention of raising funds and ensuring universal health coverage, a mandatory health insurance scheme has been introduced. The Community Based Health Insurance has been implemented in all regions

of the country, while implementation of social health insurance was delayed mainly due to resistance from public servants. This study was, therefore, aimed to assess willingness to pay for social health insurance and its determinant factors among public servants in Mekelle city, Northern Ethiopia. Methods: A concurrent mixed approach of cross-sectional study design using double bound dichotomous choice contingent valuation method and qualitative focus group discussions was employed. A total 384 public servants were recruited from randomly selected institutions and six focus group discussions (n = 36 adopted the DCF elicitation method. The research in Namibia and Sierra Leone assumes a bivariate probit model for the responses to the first and second DCF questions, while one in Ethiopia assumes a logit model for the pooled responses. Research in Malaysia (Azhar *et al*., 2018), implemented CVM using dichotomous bidding and represented the corresponding response as a function of predictor variables using logistic regression. Meanwhile, the research in Indonesia (Aryani & Muqorrobin, 2013) and Vietnam (Nguyen & Hoang, 2017) use self-stated and payment card elicitation methods, respectively, and represents the WTP as a function of predictor variables using multiple linear regression.

Despite its popularity, CVM has several drawbacks where two of which are highlighted in this research. Namely over-stated WTP value (List & Gallet, 2001) and its inability to cope with competitive choice situations (Woolhandler & Himmelstein, 2017). The over-stated WTP, which is due to hypothetical setting bias, is in the average magnitude of 2.65 but in the worst condition can go up to 5 (List & Gallet, 2001). There are at least five methods to measure WTP (Woolhandler & Himmelstein, 2017). Namely, based on actual purchase data, self-stated WTP, experimental auctions, CVM, and choice-based conjoint (CBC). Among those, CBC is considered the best for measuring WTP in competitive choice situations. In CBC, competing products are presented as alternatives in the choice task, out of which respondents are asked to choose one that fits their preferences.

CBC is fundamentally different from the traditional conjoint method. It is based on the theory of random utility maximization (RUM). Which so far considered the best theory for modeling and predicting choice. In the theory of discrete choice, CBC is also called discrete choice experiment or DCE (Louviere, Flynn, & Carson, 2010). In its recent development, it can be used to analyze choice at the individual level. It is usually done by assuming a mixed multinomial logit model with multivariate normal distribution which, with current computer processor speed, can be efficiently estimated using the hierarchical Bayes method (Finkelstein *et al*., 2018). Unlike the traditional conjoint that maximizes maximize some likelihood function, hierarchical Bayes uses the Markov chain Monte Carlo simulation seeking convergence of parameters of interest by conditioning on each other. The capability to model and estimate choices at the individual level makes DCE better in estimating WTP than CVM using an aggregate approach.

In this research, WTP is manifested in the demand function, which is derived by predicting and aggregating individual choices. These choices are estimated from personal utilities using the randomized first choice simulation assuming a mixed multinomial logit choice model (Benjamin *et al*., 2017). The Bayesian estimation method is suitable to estimate individual utilities from stated-preference choice data (Finkelstein *et al*., 2018). Compared to the popular contingent valuation method (CVM), DCE is a better approach for analyzing the first and second-class plans because those are in a competitive situation with others available in the market. Moreover, this approach enables us to incorporate the cannibalization effect between classes which is very common in multiple fare-class.

Method

This research uses stated-preference choice data, collected using a DCE questionnaire. The questionnaire consists of a set of choice tasks. Each has several (usually 3-5) product concepts. The researcher adds a 'none' option to accommodate situations where respondents prefer a product not available in the choice task. Each product concept is represented as a combination of attribute levels

that make up the product. We determined product attributes using the critical incidence approach (Benjamin et al., 2017), while each attribute's level incorporates those currently available in the market and considered need to be explored. The choice tasks in a questionnaire are randomly generated and designed such that they are balanced, orthogonal, and have minimum overlap (Woolhandler & Himmelstein, 2017). That complexity requires the use of computer software to design and administer the DCE questionnaire. In this research, we use Lighthouse Studio from Sawtooth Software.

Since the design and generation of the choice tasks in the DCE questionnaire have to be computer-assisted, so does the survey. The population is people identified as being in the middle-income class and living in the urban area that pays for the health insurance out of their pocket. Since the survey is conducted online through chat groups and social media, the sampling frame is those connected to these channels. Using the simple random sampling method, the required sample size, denoted as n, is determined such that (Woolhandler & Himmelstein, 2017).

$$\frac{nta}{c} \geq 1000 \qquad \text{a)}$$

Where t is the number of choice tasks in the questionnaire, a is the number of alternatives in a choice task, and c is the maximum number of levels in any attribute. In our questionnaire design with t=8, a=4, and c=5, the minimum sample size is 157.

From choice data, individual utilities are estimated using the hierarchical Bayes (HB) method. This method assumes that the individual utility matrix, denoted by β, follows a multivariate normal distribution with mean vector μ and covariance matrix Σ. Estimating the value of β, μ, and Σ can be done iteratively by conditioning on each other. In this research, we employ the Metropolis-Hastings algorithm to estimate the values of β|μ,Σ, μ|β,Σ, and Σ|β,μ using one data at a time until they converge (Finkelstein et al., 2018). The convergence is implied by the Bernstein-von Mises theorem which simply states that the posterior distribution of a random parameter converges to its maximum likelihood estimator as the sample size increases. These convergent values are used as estimates of β, μ, and Σ.

In pricing research, the demand for a product is represented as a function of its price and denoted as d(p), where p is the price. Based on the WTP approach, the demand for a product at price p is the aggregation of demand from individuals that are willing to pay at least p for the product. Mathematically, this can be expressed as

$$d(p) = D \int_p^{\infty} w(x)\, dx \qquad \text{b)}$$

Where D is the market size and w(x) is the WTP function (Cohodes et al., 2015).

Instead of estimating w(x) and subsequently calculating d(p), we estimate (b) — which represents the share of preference—from individual utility data using the randomized first choice (RFC) method (Benjamin et al., 2017). If product i is offered at price level p, we can estimate d(p) by aggregating choices across all individuals and then multiply the result by D. In this research, to obtain a continuous demand function, we simulate for 5-6 different values of p and interpolate the resulted [p,d(p)] data points using cubic splines (Wolberg & Alfy, 2002).

In this research, the price of the third-class plan is set to the minimum between one follows the government's policy and one where at least 95% of the urban middle-income self-funders are willing to pay. Once we have the demand function, determining the price of the third-class plan is straightforward. Meanwhile, prices of the first-class and second-class plans are set to maximize profitability. If we denote p_1, p_2, $d_1(p_1)$, and $d_2(p_2)$ as prices and demand functions of the first-class and the second-class plans, respectively, the objective function of the pricing problem for those plans can be expressed as

$$\max_{p_1,p_2} d_1(p_1)(p_1 - c_1) + d_2(p_2)(p_2 - c_2) \qquad \text{c)}$$

Where and are the corresponding increwhere c_1 and c_2 are the corresponding

incremental costs. Incremental costs are additional costs incurred when a company makes one additional customer commitment (Cohodes et al., 2015). In this regard, customer commitment is the generalization of sales.

This simple objective function becomes much more complicated when we incorporate the cannibalization effect between the first-class and the second-class plans and between two and the third-class. Cannibalization takes place when customers with higher WTP buy lower-priced products (Cohodes et al., 2015). It is necessary to set the right premiums for the first-class and second-class plans to minimize the cannibalization effect and maximized revenue.

Let p_3^* be the minimum of the current price of the third-class plan and one that ensures at least 95% affordability. The demand function for the first-class plan, d_1 (p_1), is derived using RFC simulation by setting a competitive scenario where the price of the second-class plan is p_2 and that of the third-class plan is p_3^*. This can be expressed as

$$d_1(p_1) = f(p_1|p_2, p_3^*) \quad \text{d)}$$

where f(·) represents a function that converts individual utilities into demand function, which, as described above, combines RFC simulation and cubic spline interpolation. Using the same approach to derive d_1 (p_1), we have

$$d_2(p_2) = f(p_2|p_1, p_3^*) \quad \text{e)}$$

Equation (d) and (e) serve as a constraint to the objective function previously defined, together with the price-difference and nonnegativity constraints. We discretize the decision variables, p_1 and p_2, to make the solution feasible to be obtained using enumeration.

Result and Discussion

From preliminary interviews and observation, we came up with attributes and levels of health insurance plans for our DCE questionnaire as in Table 1. There are some conditional relationships between attributes. Namely, service class and type of ward, and service class and upgradability. The levels determination based on the current JKN-KIS health insurance plan and those we want to explore. Since we are to explore the possibility to increase revenue by price differentiation, we set the price levels up to twice as it is now and try to find out respondents' preferences to those levels.

TABLE 1. Attributes and Levels of Health Insurance Plans

Attributes	Levels
Service class	First; Second; Third
Type of ward	1 bed; 2-3 bed; 3-4 bed; 4-6 bed
Upgradability	Upgradeable; Not upgradeable
Monthly premium	Rp42,000; Rp110,000; Rp160,000; Rp250,000; Rp300,000

Source: Primary Data (2020)

Our critical incidence interview suggests not including insurance providers as an attribute in the DCE questionnaire. Moreover, incorporating this attribute in the questionnaire would be problematic. There are too many levels that respondents may consider. Some attributes representing service quality came up during the interview, such as waiting time and reliability. We do not include these attributes in the questionnaire design because we assume they have been represented by the JKN-KIS name acting as a composite attribute. Besides, previous research on the service quality of the JKN-KIS health insurance found that, in general, policyholders consider the service quality has been improved (Indarwati & Phuoc, 2018). It implies that the level of service quality of the JKN-KIS health insurance is comparable to that of other plans available in the market. The hypothetical setting in our choice tasks is a situation where respondents are offered the JKN-KIS health insurance plan. Then they should choose one that suits them best, or the 'none' option, otherwise. It makes the questionnaire still realistic since the possibility of respondents prefers choosing other insurance plans is accommodated.

Since this research is about pricing, determining the suitable levels for price attributes is very important. Firstly, they should cover the current pricing scheme, which is Rp42,000 – Rp150,000. Secondly, they should cover prices beyond the current range but still reasonable for the product of interest. In this research, it does not make sense to explore prices below the current price range. It would only make the deficit problem worse. Moreover, the fact that more than 90% of the respondents prefer higher service classes indicates that the population being studied is willing to pay more than the current premiums. We set the upper price limit of Rp300,000, which is twice the current maximum price level.

Each questionnaire consists of seven random choice tasks and one fixed choice task, each of which has four product concepts and a 'none' option. Fixed choice tasks are non-randomized choice tasks presented to all respondents and will be used for internal validation. Several prohibitions were imposed in the design to prevent the unrealistic product concepts occurrence, such as the first-class plan with a low monthly premium. Data were collected through an online survey during February-March 2020 from respondents identifying themselves as urban middle-income self-funders. After a one-month survey, 228 completed questionnaires were collected.

Estimation of individual utilities using the hierarchical Bayes method resulted in an average percent certainty of 0.686 means that the model is 68.6% fit with the data. Meanwhile, the average root likelihood is 0.603 means that the model predicts respondents' choices 0.603/0.20 = 3.015 times better than one without a model (i.e. random guess). The denominator of 0.20 comes from the probability of random guesses in a choice task consists of five alternatives (four product concepts and a 'none' option) as in our questionnaire (Woolhandler & Himmelstein, 2017). Next, internal validation was done by comparing respondents' actual choices toward the fixed choice task from the questionnaires with those predicted by the model using RFC simulation. Comparison across all alternatives in the fixed choice task resulted in a mean absolute error of 3.49%. Compared to the standard, this is a good result despite the relatively small sample size (Vilikus, 2012). Table 2 shows the average utility values of all respondents and an example of utility values from one of the respondents.

The utility value in Table 2 is represented in zero-centered ordinal data where greater values indicate more desirable levels. We

TABLE 2. The Average Utility of Each Attribute Level

Attributes	Levels	Average Utilities of All Respondents	Utilities of Respondent #79
Service class	First	1.126	-0.173
	Second	1.385	1.268
	Third	-2.511	-1.094
Type of ward	1 bed	1.749	1.551
	2-3 bed	1.782	1.219
	3-4 bed	-0.128	0.563
	4-6 bed	-3.403	-3.333
Upgradability	Upgradable	0.591	1.318
	Not upgradable	-0.591	-1.318
Monthly premium	Rp42,000	1.028	0.957
	Rp110,000	0.649	0.358
	Rp160,000	-0.108	0.814
	Rp250,000	-1.014	-1.343
	Rp300,000	-1.554	-1.786

Source: Data Processing

estimated the importance of each attribute by individual utilities from the Bayesian estimation. The result is in Table 3.

TABLE 3. Attribute importance

Attributes	Relative importance
Service class	42.81%
Type of ward	33.17%
Upgradability	8.28%
Monthly premium	15.74%

Source: Data Processing

The mean absolute error of 3.49% from internal validation indicates a good model considering the purpose of our research. We do not test external validity since we do not have data about the JKN-KIS policyholders from the population studied. From the average utility values in Table 2, respondents prefer the second-class and the first-class over the third class. It is also shown in Table 3 that respondents are not sensitive to price. It is consistent with the result of the simulation under the current condition. The majority of respondents choose the first-class (62.17%) and the second-class (34.03%). With a mean absolute error of 3.49%, it can be inferred from this simulation result that the differences in preference between service classes are significant. The corresponding order of preference is robust.

In determining optimal prices, we set the third class price as known today, which is Rp42,000 per month. The government determines the third-class price so that the majority of people could afford it. The population that we studied is limited to the middle-class in the urban area which can not be considered as a representation of the total population for which the JKN-KIS insurance plans were designed. Hence, we will not evaluate the price of the third class but focus on the first and the second class instead. While the third class price is set to ensure affordability, we should settle the higher class price to maximize profitability. With a low monthly premium, BPJS Kesehatan would likely suffer a deficit from running the third-class plan only. Although they are a not-for-profit organization, if they could make sufficient profit from the first-class and the second-class plans, they can allocate the profit to cover the deficit resulted from serving the third-class members. Nevertheless, they cannot set too high premiums because there is a risk that members of the higher-class plan defect to the third-class plan (cannibalization effect). In our pricing optimization, we do not restrict the price difference between the third-class and both higher-class plans. Instead, by our demand model, we let the mechanism of individual preferences determines optimal prices for each plan.

We start the search for optimal prices by simulating the current condition where the first-class (2-3 bed ward; upgradable), the second-class (3-4 bed ward; upgradable), and the third-class (4-6 bed ward; not upgradable) plans are offered at the prices of Rp150,000, Rp110,000, and Rp42,000, respectively. The simulation predicts that 62.17% of the respondents will choose the first-class plan, 34.03% the second-class, 2.68% the third-class, while the remaining 1.12% will not choose any of those. By simulating various possible price combinations of the first-class and the second-class plans, we found that the combined share of these two classes is always greater than 90%.

Since more than 90% of respondents prefer the first-class and second-class plans, we determine optimal prices for the first-class and second-class plans by setting the third-class plan at the current price of Rp42,000. We start by deriving the demand function for each plan using the method described in the previous section. The market size () for the demand functions is assumed to be 5,350,052. From the assumption that there is a 153.7 million urban population in Indonesia, out of which 21.7% has middle-level income, and based on the data from the Social Security Administering Body, 16% of the current members are self-funder. The incremental cost was estimated using data from the 2018 BPJS Kesehatan Financial Report. There was total spending of Rp94.3 trillion with 201.6 million active members.

By the method we use to derive the demand functions, the formulation of our pricing optimization problem incorporates the effect of cannibalization (Pratikto, 2019). This makes the pricing optimization model more realistic, but at the same time, much

more complicated. In a standard optimization problem, objective function coefficients are constant. In this research, we have an optimization problem where the coefficients of the objective function (i.e. and) change with the value of the decision variables (i.e. and). In addition to that, the use of cubic demand functions implies a quartic polynomial objective function which is extremely difficult to solve analytically (Ahmadi, Olshevsky, Parrilo, & Tsitsiklis, 2013). By discretizing the solution space to the multiple of Rp10,000, the number of solutions that need to be evaluated is 231, which can be completed in about 2 hours of computation. The optimal price for each plan was obtained by enumerating for all possible combination values of and in the multiple of Rp10,000 between Rp50,000 and Rp300,000 while maintaining the price difference constraint of . In each enumeration cycle, a combination of and values are picked, and demand functions are derived and subsequently used to estimate the quantity demanded of each plan. Accordingly, the total contribution was then calculated. This procedure was repeated for all possible combinations of and , and one with the greatest total contribution is selected. We came up with optimal prices of Rp290,000 and Rp240,000 for the first-class and the second-class, respectively, with an estimated monthly total contribution of Rp1.911 trillions.

The optimal prices of Rp290,000 and Rp240,000 have the corresponding share of 66.49% and 28.51% preferences. It suggests that respondents are willing to pay much higher than the current premiums of Rp150,000 and Rp100,000. The monthly total contribution from this pricing is estimated to be Rp1.191 trillion, an almost 150% increase compared to that of the current pricing. The demand functions at these optimal prices are specified in Table 4 and Table 5.

This result highlights the importance of managing price differentiation not only as a tool to provide customers with varied product choices but also as a tactic to increase profitability. BPJS Kesehatan also assumes social missions, increased profitability from optimal price differentiation on the first-class and the second-class plans would help to cross-subsidize the third-class. The result of this research indicates that finer price differentiation (with additional fare-classes to the existing three) is potential for increasing revenue from higher fare-classes (currently, these are the first-class and the second-class). Designing a comprehensive pricing policy marketwide requires information about preferences and WTP from all market segments, for which the method that we adopt in this research can be used. The corresponding pricing optimization problem would be more complicated, but our approach is still feasible to be used. Implementing this finer price differentiation should be accompanied by service differentiation which may be delivered through leaner processes, shorter processing time, easy access, etc.

Conclusion

We estimate the preferences and WTP of the urban middle-income self-funders for the JKN-KIS health insurance plans and derive the

TABLE 4. Demand function of the first-class plan assuming p_2= Rp240,000 and p_3= Rp42,000

Price, p_1	Demand functions, $d_1(p_1)$
$42.000 \leq p_1 < 110.000$	$d_1(p_1) = 4{,}740{,}030 - 0.91\,p_1 + 3.53 \times 10^{-5}\,p_1^2 - 2.80 \times 10^{-10}\,p_1^3$
$110.000 \leq p_1 < 160.000$	$d_1(p_1) = 3{,}697{,}983 + 27.51\,p_1 - 2.23 \times 10^{-4}\,p_1^2 + 5.03 \times 10^{-10}\,p_1^3$
$160.000 \leq p_1 < 250.000$	$d_1(p_1) = 6{,}614{,}268 - 27.17\,p_1 + 1.19 \times 10^{-4}\,p_1^2 - 2.09 \times 10^{-10}\,p_1^3$
$250.000 \leq p_1 < 300.000$	$d_1(p_1) = -631{,}998 + 59.78\,p_1 - 2.29 \times 10^{-4}\,p_1^2 + 2.55 \times 10^{-10}\,p_1^3$

TABLE 5. Demand function of the second-class plan assuming p_1 = Rp290,000 and p_3= Rp42,000

Price, p_2	Demand functions, $d_2(p_2)$
$42.000 \leq p_2 < 110.000$	$d_2(p_2) = 3{,}337{,}559 - 4.37\,p_2 + 8.08 \times 10^{-5}\,p_2^2 - 6.41 \times 10^{-10}\,p_2^3$
$110.000 \leq p_2 < 160.000$	$d_2(p_2) = 682{,}930 + 68.02\,p_2 - 5.77 \times 10^{-4}\,p_2^2 + 1.35 \times 10^{-9}\,p_2^3$
$160.000 \leq p_2 < 250.000$	$d_2(p_2) = 7{,}566{,}710 - 61.05\,p_2 + 2{,}29 \times 10^{-4}\,p_2^2 - 3.27 \times 10^{-10}\,p_2^3$
$250.000 \leq p_2 < 300.000$	$d_2(p_2) = 782{,}433 + 20.37\,p_2 - 9{,}64 \times 10^{-5}\,p_2^2 + 1{,}07 \times 10^{-10}\,p_2^3$

corresponding demand functions. Accordingly, we set up a pricing optimization problem for the first and second-class plans to maximize total contribution when maintaining between-class price difference and the current price of the third-class plan. The preference-based demand functions were obtained from DCE data using the combination of the Bayesian estimation method, randomized first choice simulation, and cubic spline interpolation. By applying enumeration to the resulted quartic polynomial optimization problem, we came up with optimal prices of Rp290,000 for the first-class plan and Rp240,000 for the second-class plan with an estimated monthly total contribution of Rp1.911 trillion. This is a 150% increase compared to that of the current pricing. This result reveals the opportunity for increasing revenue by implementing finer price differentiation than one currently implemented, without sacrificing the mission of serving the underprivileged with the third-class plan.

The use of stated-preference data may result in bias caused by the hypothetical setting. Although the bias is usually less than that of the CVM, it cannot be determined unless we conducted some experimental study to measure it accordingly. The use of the "none" option instead of direct competitors in the choice task may also cause bias. All these biases are the consequences of choices that we made. To obtain a more efficient survey instrument and consequently more valid data. The remaining bias is unavoidable and would be greater if the choices were made otherwise.

We can direct future research toward overcoming these biases. Bias caused by the use of the "none" option can be eliminated by including health insurance providers as an attribute in the questionnaire. We can use a mechanism like one in the adaptive choice-based conjoint to handle a situation where there are many attribute levels. Hypothetical bias may be reduced by combining stated-preference DCE data with revealed-preference data. Nowadays, in the e-commerce era, revealed preference data can be easily obtained from click, inquiry, and sales data.

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The Role of Caregivers in Elder Care during Coronavirus Disease-2019 Outbreaks

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Abstract

The elderly and their caregivers are at higher risk from Coronavirus Disease-2019, particularly for elderly with chronic health conditions. To prevent the transmission of the virus, those elderly issued strict physical distance, restricting most interactions between the elderly and their caregivers. On the other side, caregivers can serve as crucial and trusted partners in the elderly's care to curb the spread of the COVID-19 virus. Hence, this study aims to analyze the knowledge, attitudes, practices (KAP), and the role of caregivers in providing services to the elderly during the outbreaks. A descriptive quantitative study was conducted from May to June 2020. The survey was utilizing Google Forms in four cities in Indonesia. A total of 317 out of 400 participants had completed the survey. The knowledge of the COVID-19 score was 79.50%, attitude 92.11%, and practice 90.54%. The caregivers' role in protecting the elderly from COVID's infection was about 98.42%. They could continue their routine activities during physical distancing 84.54%, treated elderly by not going to the hospital (60.04%), not visited any crowded place, wore masks and washed their hand after activity (87.38%). They agreed that government would finally successfully control COVID-19 (90.22%). This study concluded that the knowledge, attitude, practice and role of caregivers on COVID-19 effectively prevents the caregivers neglecting the elderly during the COVID-19 outbreak. Future information on elderly care need to consider not just the risks of the virus, but also the healthy lifestyle.

Introduction

The elderly and their caregivers have been severely affected by the coronavirus disease 2019 (Covid-19) pandemic. With growing cases and sporadic spread of the virus this can only worsen for both the elderly and their caregivers (Gardner et al., 2020). World Health Organization (WHO) announced a new type of pneumonia cases, known as coronavirus or covid-19, in Wuhan City, China (Zhu et al., 2020), but the proper treatment was unidentified (Cascella et al., 2020). The escalation in the number of Covid-19 cases spread quite rapidly globally. To respond to it, WHO declared covid-19 as a pandemic (Cucinotta & Vanelli, 2020).

The novel Covid-19 case had spread very fast. On March 2, 2020, the Indonesian Government had announced two confirmed cases of Covid-19 (Setiati & Azwar, 2020). As of April 30, 2020, it has increased to 10,119 in 30 provinces. The five highest areas in the covid-19

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cases are Jakarta, Depok, Bandung, Yogyakarta and East Java (Kementerian Kesehatan Republik Indonesia, 2020). In response to Covid-19, critical readiness and response are needed, such as equipping health workers and health service facilities management with important information, procedures, and tools to be safe and effective at work (WHO, 2020a).

These Covid-19's patients usually show symptoms of an upper respiratory tract viral infection (Mawaddah et al., 2020), including progressive shortness of breath (Alzamora et al., 2020), fever (Tian et al., 2020), cough (dry) (Huang, 2020), sore throat (Lovato et al., 2020), smell loss without significant rhinorrhea or nasal congestion (Cooper et al., 2020), malaise (Alzamora et al., 2020), headache (Bolay et al., 2020), muscle pain or malaise (Wujtewicz et al., 2020), myalgia (Berger, 2020), nausea (Andrews et al., 2020), vomiting (Andrews et al., 2020), tachypnea (> 30 breaths/min) (Tay & Harwood, 2020), and hypoxia (SpO2 < 90% on room air) (Monto et al., 2000).

Sensitivity of taste and/or smell, diarrhea, fever, fatigue, and vomiting are usually founded on Covid'19 patients as well (Larsen et al., 2020; Graham et al., 2020). To date, COVID-19 does not have an effective cure yet. But early symptom recognition and timely seeking of treatment and prevention practices can accelerate disease recovery and combat the spread of the virus. The elderly with comorbidities may be more likely to be exposed. If the case becomes severe, it can cause heart injury, respiratory failure, acute respiratory distress syndrome, and lead to death (Feng et al., 2020; Holshue, 2020).

WHO has been categorized COVID-19 disease as a pandemic. This virus is known to be a highly contagious and life-threatening disease (WHO, 2020d). Besides, the transmission of COVID-19 has become an emerging and rapidly changing global health challenge in all life aspects (WHO, 2020b). Caregivers and/or health workers are not only dealing directly with the fight against this highly contagious disease but also by a higher likelihood of contracting this disease compared to the rest of the general population (McKibbin & Fernando, 2020).

Furthermore, WHO also mentioned that in many contexts, health services are delivered at the community level and in the home by community health workers, traditional medicine practitioners, social care workers, or a variety of formal and informal community-based providers, including caregivers, that refers to their parents, spouses and other family members or friends providing informal care as opposed to the care provided by formal health-care providers in the home (WHO, 2020b).

Home care may be considered for an adult with confirmed or suspected COVID-19 when inpatient care is unavailable or even unsafe (e.g. when capacity is insufficient to meet and also be cared for at home, if necessary (WHO, 2020c). In this case, caregivers [formal and non-formal] play a role (Sarafino & Smith, 2012) in responding to the COVID-19 outbreak and become the backbone of services for the elderly to limit or cope with the spread of the disease. Elderly caregivers are the same as other health workers. They have a very high risk for infection with the COVID-19 in their efforts to protect the larger community in terms of service to the elderly, therefore knowing caregivers knowledge, attitudes, and practices related to the COVID-19 virus and the role played during the pandemic very necessary in the implementation of services to the elderly (Kung et al., 2012).

By seeing the increasingly high environmental demands on service quality, we need to improve the service quality. In this case knowledge, attitudes, and the caregivers' role in fulfilling excellent service to the elderly (Sarafino & Smith, 2012). In the COVID-19 pandemic, knowledge, attitudes and practices and the role of caregivers related to COVID-19 should have to master what it is and how the spread of COVID-19 and what attitudes and attributes sought to improve the service quality to the elderly so that both parties can feel the benefits as much as possible (Kilzer & Skinner, 1953). Based on the background stated above, it is necessary to conduct studies on knowledge, attitudes, and practices related to COVID-19 in elderly caregivers. And their relation to the role in caring for the elderly during the COVID-19 pandemic. It is generally more vulnerable to infectious complications due to age and comorbid conditions.

Method

A descriptive quantitative study used Google Forms and distributed through "WhatsApp" groups from May to June 2020. The purpose is to collect and automate analyze the knowledge, attitude, practice, and elders caregivers' roles (The KAP Survey Model, 2020). The respondents targeted were 400 caregivers in 4 cities in Indonesia: Jakarta, Depok, Bandung, Yogyakarta. These regions were considered a representative of big cities with a high population of elderly. The initial stage of this study targeted 100 respondents from each city.

An investigation of Knowledge, Attitudes, and Practices (KAP) can utilize qualitative and quantitative techniques. However, due to the current condition of the COVID-19 outbreak, this study used quantitative one using a quick survey through an online survey (Shih & Xitao, 2008). The early stages were difficult because previously, the online survey was not accustomed to being done by the public in our country, and due to the urgency of the case, this quick survey was carried out through an online survey using Google form and distributed through WA group (The KAP Survey Model, 2020).

The respondents were restricted from the community and aged over 18 years of age. The researcher explained the study objectives and purposes. The respondents who agreed to participate should complete the questionnaire by clicking on the link. Participants had to answer questions with 'yes' or 'no' if they are willing to participate as respondents voluntarily. Then the respondents were asked to fill out a questionnaire that had to be filled in by themselves.

The questionnaire consisted of three parts: demography condition of the respondents, knowledge, attitude, practice, and the elders' caregivers' role. Demographic variables consists of age, sex, marital status, education, and occupation. The questionnaire of knowledge was measured by whether the respondents could identify the causes of the disease and transmission, general symptoms, risks, and the prevention of Covid-19. Attitudes were measured according to the awareness of social distancing at work, worship, and stay at home. Practices was measured by conducting prevention activities such as washing hands, not in a crowded place, not touching the face, cough and sneeze etiquette, wearing masks, and using disinfectant to prevent covid-19.

While the caregivers' role was regarding the caring done to the elderly during the outbreaks, understanding the medical history disease of the elderly, so they can avoid going to the clinic/hospital if the condition is not too severe. And the last was regarding the belief the government will finally successfully control the pandemic. These questions were answered by true/false with an additional option "I don't know" and agree and not agree answered. Data analyzes used the SPSS program with univariate analysis (Neuman, W.L.,2013).

However, our study has limitations because there is no standard tool for assessing KAP regarding COVID-19 in caregivers. But in the end, we attempted to use and modify the questionnaire used in the previous survey for KAP assessment on the prevention of respiratory tract infections in China. (Zhong et al., 2020) (Goni et al., 2020). Another limitation of the study was on the sample, which was selected not through sampling. In turn, the collection method, where the respondents had to have access to the internet and smartphone or computers to complete the survey. The study has been cleared by the Ethics Committee of Lembaga Penelitian dan Pengabdian Masyarakat Universitas Respati Indonesia, Number 041/SK.KEPK/UNR/IV/2020. All participants signed informed consent as their agreement in participation. The authors declare that there is no conflict of interest.

Result and Discussion

The survey research took place in four cities; Jakarta, Depok, Bandung, and Yogyakarta, as the representative of the cities with a high elderly population where the caregiver's profession is needed and has become an elderly care part. The survey was conducted in the community, with total respondents 317 out of 400 participants completed the survey questionnaire. The data collection was through an indirect online questionnaire distributed from May to June 2020. The result of demographic characteristics showed in table

1. That 50.2% respondents aged 30-49 years, 90.2% were women, education mostly senior high (50.8%), and 78.9% were married, their occupation mostly as family caregivers (45.1%). (Table 1).

Table 1. Demographic Characteristics of Participants

Characteristic	Description	Number of participants (%)
Gender	Male	31 (9,8)
	Female	286 (90,2)
Age-group	18 – 29 years	24 (7,6)
	30 – 49 years	159 (50,2)
	≥ 50 years	134 (42,3)
Marital status	Not married	21 (6,6)
	Married	250 (78,9)
	Divorce	46 (14,5)
Education	Primary	21 (6,6)
	Junior high	51 (16,1)
	Senior high	161 (50,8)
	Academy/University	84 (26,5)
Occupation	Caregivers (formal/informal)	32 (10,1)
	Family caregivers	143 (45,1)
	Volunteer	49 (15,5)
	Student/Part time job	2 (0,6)
	Other	91 (28,7)

Source: primary data, 2020

In this survey the number of female respondents was higher than men. This condition is often found in various activities in every city in Indonesia. Otherwise, the study by (Hanaoka & Norton, 2008) found informal caregiver usage by adult women and the characteristics that influence the formal caregiver usage in Japan. They found that marital status and cost of life were very significant factors in deciding whether to provide informal or formal caregivers for their parents or not. Traditionally, the role of daughter-in-law as caregivers has been less relevant than that of unmarried daughter. Those whose children are financially disadvantaged decide not to depend on formal caregivers (Hoffman & Wallace, 2018). For those who have unmarried children, and also less educated, it seems that it is the choice to play the role of informal caregivers (Liu et al., 2013).

In table 2, respondents' knowledge, attitude, and practice showed that 79.5% of participants were knowledgeable regarding the main symptoms of COVID-19 of the elderly with chronic diseases. Although it is acceptable and considered quite good, since basic aspects regarding the COVID-19 and protection measures were explored. In which expect knowledge to be better. These findings in line with previous studies in Egypt and China, which reported that most respondents believe that the COVID-19 is more dangerous for the elderly and for those suffering from chronic diseases (Abdelhafiz et al., 2020)(Huang, 2020).

Research by (Kusuma & Wijaya, 2013) found that health cadres with high knowledge were 18 times more likely to be active in controlling tuberculosis cases than those with low knowledge. Meanwhile, health cadres with good attitudes are eight times more likely to be proactive in controlling tuberculosis cases than fewer attitudes. Furthermore, according to (Geldsetzer, 2020), knowledge of clinical symptoms, the need to avoid crowded places, and immediately avoid contact with infected people is a preventive way. Another important thing and should be done more often is to wash hands as often as possible to prevent the COVID-19 virus. Accurate, precise, and relevant knowledge will consistently alleviate

Table 2. Descriptive Statistics of Knowledge, Attitude, and Practice of the Caregivers to avoid the Covid-1

		Frequency	Percent
Knowledge	Good	252	79.5
	Not good	65	20.5
	Total	317	100.0
Attitude	Positive	292	92.1
	Negative	25	7.9
	Total	317	100.0
Practice	As per health protocol	287	90.5
	Not as per health protocol	30	9.5
	Total	317	100.0

Source: primary data, 2020

the virus threat and improve preventive practices as an act for the safety of oneself and others (Padala et al., 2020; Reckrey, 2020).

Meanwhile, the majority of attitudes were favorable (92.11%) when it came to successfully control COVID-19 by government and winning the battle, false information distributed by social networks, due to the fear and anxiety that exists in these cases can be mitigated by a culture of proper information use (Azwar, 2013). Anwar also mentioned that social attitude is the result of social interaction. Through social interaction, a person shows a certain attitude towards the psychological object encountered (Domènech-Abella et al., 2017). Various factors can influence attitudes, for example, personal experiences (Irving et al., 2017), information received (Forsman & Svensson, 2019), the culture where a person comes from (Faller et al., 2018), education (Casemiro et al., 2018), religion (Bakhtiari et al., 2019), and emotional factors in a person (Mohammadpour et al., 2018). Attitude changes occur when the information they receive they can understand, accept and agree with it.

Regarding the practices, most are adequate (90.54%). Most of them reported not having gone to places with mass attendance, wore a mask, and washed hands before and after activities. Next, table 3 explained the results of all domain of the role of elderly caregivers to prevent the transmission during the outbreak were keep the elderly from contracting COVID-19 by encouraging the elderly to do physical distancing 99.1%, treated elderly at home by not going to the hospital (64.%), wore masks (89.6%) and washed their hand after activity (96.5%), (Table 3). Another study by (Ratnasari et al., 2019) revealed that cadres' occupation and behavior are the defined factors affecting their role in early TB cases detection in the community.

Besides, the Indonesian government has also appealed to the public to maintain social distancing during the outbreak. Social distancing is known to reduce mortality and morbidity. But the benefits of social distancing depend on the individual's understanding (Reluga, 2010). This protocol also encourages the public to avoid gathering with friends or family (Ghinai et al., 2020), as well as sports in public places (Zhang et al., 2020), ceremonies, and other gatherings (Courtemanche et al., 2020), to avoid the transmission of the corona virus (McCloskey et al., 2020).

The main problem with the protocol regulation is most Indonesians do not adhere to health protocols. They still do other activities outside the home, such as going on vacation, going to various places, or even going to their hometown (Saifulloh, 2020). Many people ignore the importance of maintaining social distancing because of other interest (Abdullah, 2020). Fortunately, from this result study on physical/social distancing, most of the caregivers obey the government regulation to avoid the virus transmission both for the caregivers themselves and the elderly. In table 4, the study revealed that respondents agreed that the information provided by the government regarding the outbreak of COVID-19 was clear enough (92.4%). They also believe that government will finally successfully control COVID-19 as much as 90.2%. (Table 4)

Table 3. Descriptive Statistic of the Role of Caregivers to Prevent Transmission of the COVID-19

	Frequency	Percent
Wearing facial mask		
Yes	284	89.6
No	33	10.4
Total	317	100.0
Wash hands before and after activity		
Yes	306	96.5
No	11	3.5
Total	317	100.0
Physical distancing		
Yes	314	99.1
No	3	9
Total	317	100.0
Self-care not to go to clinic or hospital		
Yes	203	64.0
No	114	36.0
Total	317	100.0

Source: primary data, 2020

Table 4. Descriptive Statistic of Response to the Government in Handling COVID-19

		Frequency	**Percent**
Information on COVID-19 clear enough			
	No	24	7.6
	Yes	293	92.4
	Total	317	100.0
Government able to handle the COVID-19			
	No	31	9.8
	Yes	286	90.2
	Total	317	100.0

Source: primary data, 2020

Nevertheless, this survey is the first survey conducted to assess KAPs of elderly caregivers on COVID-19 by online surveys. The result might be useable to formulate targeted for health care workers (Roberta Hunt, 2013) and or caregivers in the incidents of COVID-19 in Indonesia.

Conclusion

In conclusion, the knowledge on COVID-19 of the caregivers in 4 cities (Jakarta, Depok, Bandung, and Yogyakarta) of Indonesia population during the outbreak was acceptable, attitudes have been mostly favorable, the practices are adequate, and so do the role of caregivers in caring for the elderly. They agreed that the government would finally successfully control COVID-19. However, it is necessary to implement massive education campaigns for caregivers, to increase the proportion of knowledge about COVID-19 to stop its spread. With the awareness of the community and the health authorities, it is possible to stop and decrease COVID-19 cases throughout the Indonesia territory.

This study recommends further studies to the caregivers, formal and informal, across the country regarding their KAP of the COVID-19. And the role in caring for the elderly against the virus. Other than that,

providing education and training, especially regarding symptoms and transmission, is very important in increasing caregivers' knowledge on COVID-19. The survey results also suggest that interventions in COVID-19 must be carried out comprehensively to overcome social stigma and discrimination before they become uncontrollable.

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Demographic Characteristics Related to First Married Age in Indonesia

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Abstract

Quantitative population growth but does not compensates with the quality will be a problem. One of the efforts to reduce the population growth rate is the age of first marriage. Based on BPS data in 2017, early marriage in Indonesia is 25.71 percent, meaning that in every 100 marriages, there are 25 couples less than 18 years. This study aims to study the factors affecting the age of first marriage (UKP) in Indonesia. The data used were the results of the 2017 RPJMN Survey with a sample of 51,493 people. The data was taken by systematic random sampling, then the unit of analysis was taken FAW (15-49 years) married as many as 40,268 respondents. The variables studied included residence, wealth quintile, education level, employment status, and age at first marriage. The analysis was performed using descriptive and inferential methods using binary logistic regression models. The results showed 21,405 (53.2%) women at first marriage were more than 20 years old. Meanwhile, those under 20 years of age totaled 18,863 people (46.8%). Statistically, there is a significant relationship between the variables of age at first marriage and residence, wealth quintile, education level, and employment status. Women aged 15-49 years tend to marry or have a high risk of experiencing the age of first marriage over 20 years are those who live in urban areas, high economic status, highly educated, and working.

Introduction

Very high population growth will harm the socio-economic life of the community. When it is not followed by the increase in human quality. Therefore, it is necessary to control the population so that there is no population explosion resulting in a demographic disaster. The Central Statistics Agency (BPS) and Bappenas predicted that from 2000 - 2025 young people will dominate Indonesia's population structure. Of the 66.8 million reproductive-age female population (15-49 years), around 10.7 million are adolescent girls aged 15-19. In 2025, the reproductive-age female population will be 70.8 million, and the number of girls aged 15-19 will increase by 10.1 million (BPS et al., 2013).

The increase in population in an area is caused by, among others, fertility, mortality, and migration. Fertility is a factor that most plays an important role in population growth. The term fertility is the same as live birth, which is the release of a baby from a woman's womb with signs of life; for example, screaming, breathing, heart beating, and so on (Muharry et al., 2018). Based on IDHS data, trends in the total birth rate (TFR) show a decrease in the average birth rate from 1991 to 2017. Indonesia's TFR figures fell from 3.0 (1991 IDHS) to 2.6 (2007 and 2012 IDHS) and 2, 4 (2017 IDHS). Although the total birth rate has decreased by 0.4, it has not yet reached the target of 2.1 as stipulated in the 2015-2019 RPJMN to achieve a balanced population growth.

One of the factors causing the high or low fertility of women is the age at first marriage (UNICEF, 2005). In his research, Muharry (2018) stated factors affecting fertility are demographic and non-demographic, including

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the age of first marriage. Studies in Uganda showed that age at first marriage has a higher effect on fertility changes (Ariho & Kabagenyi, 2020). Research in Manipur has a significant relationship between age at first marriage and fertility (Kameih & Kshatriya, 2018). The age of first marriage is the age of first marriage for a woman through a legal and biological marriage bond, which means that the reproductive period of fertilization begins (BPS et al., 2013). According to BKKBN, the age at first marriage is the age a woman married for the first time. Age at first marriage and fertility are inversely related. If the younger the age of first marriage, the woman tend to have more children because she experiences a longer reproductive age. And the opposite applies to women who marry at adulthood have a short reproductive age and have the opportunity to have fewer children.

The age at a first marriage under the age of 20 in Indonesia is still high. We can see this situation from the results of the 2017 SRPJMN of 20 years. But in 2019, it became 19.6 years (SKAP 2019). This means that there is a tendency for WUS to marry under 20 years of age in 2019. The 2012 IDHS data shows that the median age at first marriage has increased from year to year, from 17.7 years in 1991 to 20.1 years in 2012. The median age at first marriage for women age 25-49 years is 20.4 years, while for women who have been married age 25-49 years is 20.1 years. The median age at first marriage for currently married men aged 25-54 years is 24.3 years. In general, women aged 25-49 who live in urban areas marry two years later than women who live in rural areas, namely 21.5 years compared to 19.1 years. (BPS et al., 2013).

Meanwhile, based on data from the Central Statistics Agency in 2017, the rate of early marriage in Indonesia is 25.71 percent, meaning that 25 out of 100 or 1 in 4 marriages in Indonesia are less than 18 years old (Adi, 2016). Marriage is an important part of a person's life. It increases the responsibility of each partner. Such as meeting daily needs, both material and non-material. For couples marriage at a young age is usually not ready psychologically, socially, and economically. It is in line with Blom and Reddy's (1984) statement mentioning the age at marriage has a strong influence on demographic, social, and economic phenomena.

In society, there is a belief that girls who are not married soon will become spinsters. It will be difficult to find a spouse. So that most parents, especially in rural areas, marry off girls at a relatively young age. It aligns with what Wahyuni expressed, the culture positions a young woman who is not married as a spinster (Wahyuni, 2013). Parents tend to encourage their daughters to marry even though they are still children. They hope that the marriage will be financially and socially beneficial. In general, the phenomenon of young marriage is difficult to change because it is related to tradition and culture (Fadlyana, 2009).

Ketut Sudibia mentioned in his research that factors affecting the decline in age at first marriage in Bali province are education, access to mass media, the value of parental assets, and work status. Each has a positive effect on age at first marriage (Sudibia, 2015). Meanwhile, research conducted by Nazilatur Rohmah regarding "the factors that influence the age of first marriage of women in Sidayu sub-district, Gresik Regency" shows that there is a significant influence between education, work status, and knowledge on a young marriage. There is a difference in the research conducted by Lia Kurniawati in 2017 related age at first marriage in Malang. It said no significant relationship between work status and the age of a woman's first marriage (Lia Kurniawati, 2017).

The National Population and Family Planning Board (BKKBN) has a marriage age maturity program (PUP). The goal is to increase the age of first marriage, 20 years for women and 25 years for men. It is different from previous studies that examine factors of age at first marriage in certain areas. This study was broader. It examined the factors affecting it in Indonesia and how much effect of each factor. The information gained will be used to form an effective and targeted solution in dealing with the age of first marriage in various countries. The purpose of this study is to analyze the relationship between age at first marriage in Indonesia concerning the following factors: residence, education, work status, and economy (wealth quintile).

Method

This type of research is quantitative. The data source is from the 2017 BKKBN National Medium Term Development Plan (Rancangan Pembangunan Jangka Menengah Nasional/ RPJMN) Survey. The population is women of reproductive age 15-49 years in Indonesia. A sample of 51,493 people was taken by systematic random sampling, while the unit of analysis was fertile age women (15-49 years) who were married, namely 40,268 people. The data collection used a structured questionnaire.

In this study, there is a dependent variable, namely the age of first marriage. The independent variables are demographic characteristics include the residential area, education, work status, and economic status (wealth quintile) of the household. The residential area is urban and rural. The education is whether or not they have never attended school, SD, SLTP, SLTA, D1 / D2 / D3 / Academy, and Higher Education. Employment status is obtained from work or not work. Meanwhile, the economic status variable (wealth quintile) is categorized into five groups, namely lowest, lower-middle, middle, upper, and upper-middle class.This research carried out processing and data analysis in three parts. First, univariate analysis. Second, bivariate analysis using cross-tabulation (crosstab) through the chi-square test. Third, multivariate analysis with logistic regression to see whether the variables used significantly affect the first marriage age.

Result and Discussion

In this study, the dependent variable was the women's age on first married and grouped by age. Researchers have categorized it into two groups: first, women with first marriage under the age of 20 years and the second, women with first marriage aged equal to or above 20 years. This grouping is by the age limit of first marriage for women programmed by the BKKBN, namely 20 years old, while men aged 25 years.

Table 1 shows that almost half of the ever-married women are married at the age below 20 years. This situation is not in line with the BKKBN program target in its efforts to decrease young marriages. It was related to the marriage age maturity (Pendewasaan Usia Perkawinan/ PUP) program release implemented in the Planning Generation (Generasi Berencana/ Genre) program expecting women to get married at the age of ≥ 20 years and men aged ≥ 25 years both in urban and rural areas.

From the regional characteristics view, of 15,412 women who live in urban areas, 9,873 or 64.1% were age at first marriage was equal to or over 20 years, and 5,539 women (35.9%) had first marriage age under 20 years. Meanwhile, in rural areas, 11,532 women (46.4%) had their first married age equal to or more than 20 years and 13,324 women (53.6%) had their first married under the age of 20. Thus based on the residential area of women whose age at first marriage was under 20 years, the percentage occurred more in rural than urban areas. Research results in Nepal also show that early marriage and early motherhood are relatively common among Nepalese women, especially in rural areas (Choe et al., 2005). In Bangladesh, one of the major determinants of early marriage is residence (Kamal et al., 2015). In line with this research, Blom and Reddy's stated that the age of marriage has a strong influence on demographic, social, and economic phenomena (Bloom & Reddy, 1986).

When viewed from the formal education level, the higher the level of education or length of schooling, the higher the percentage of a woman's first-marriage age. Of the women whose education level only primary school, 35.5% had their first marriage on over 20 years, while 64.5% were married under 20. Meanwhile, at the tertiary level, women whose age at first marriage was above 20 years amounted to 89.6%, and the remaining 10.4% were married under the age of 20. It is in line with Ketut Sudibia's research in 2015 regarding factors affecting the decline in age at first marriage in Bali province, which stated that education, access to mass media, parental assets value, and work status have a positive effect on first-marriage age. Other research found first-marriage age was significantly positively related to the education level of men and women with employment status in Iran (Mahdaviazad et al., 2019). Aryal's study mentioned education and age are the most influenced factors in determining the age of first marriage in Nepal

Table 1. Percentage Distribution of First Marriage Age (FMA) on Ever-marriage Women Age 15-49 Years Based on Individual Characteristics

Variable	FMA Category		Total	P value
	FMA ≥ 20 years	FMA < 20 years		
Age	53,2%	46,8%	100%	
	21405	18863	40268	
Residential area				
Urban	64,1%	35,9%	100%	
	9873	5539	15412	0.0000
Rural	46,4%	53,6%	100%	
	11532	13324	24856	
Welfare Quintile				
Bottom-low	44,80%	55,20%	100%	
	3282	4040	7322	
Bottom-middle	47%	53%	100%	
	3618	4079	7697	
Middle	50%	49,90%	100%	0.0000
	4012	3992	8004	
Middle-up	55,40%	44,60%	100%	
	4669	3757	8426	
High-up	66,10%	33,90%	100%	
	5825	2994	8819	
Education				
No education	37,90%	62,10%	100%	
	248	406	654	
Elementary	35,50%	64,50%	100%	
	5114	9293	14407	
Junior High	43,60%	56,40%	100%	
	3981	5159	9140	0.0000
Senior High	69,50%	30,50%	100%	
	8092	3549	11641	
Diploma	89,80%	10,20%	100%	
	1227	139	1366	
Graduate	89,60%	10,40%	100%	
	2744	317	3061	
Employment Status				
Working	58,40%	41,60%	100%	
	8168	5814	1392	0.0000
Not working	50,40%	49,60%	100%	
	13237	13049	26286	

*significant on p-value< 0,01
Source: SRPJMN Data Process Result, 2017

(Aryal, 2007). Statistically, education, work, place of residence, and poverty are associated with early marriage (Wahyudi et al., 2019).

Women who undergo higher education will indirectly delay their marriage. Education hinders a woman's desire to marry. Education is the most important thing for a person to be able to improve his quality of life. Related to education, BKKBN is involved in providing various kinds of access and information and

facilities related to welfare programs. One of which is reproductive health education and eight family functions.

In terms of working status, women who were first married under 20 years of work were 41.6%, while those who did not work were 49.6%. Research conducted by Nazilatur Rohmah regarding "the factors affecting first-marriage age of women in Sidayu sub-district, Gresik Regency" shows significant influence between education, work status, and knowledge on a young marriage. Aryal also stated work is the most influential factor in determining the first-marriage age in Nepal (Aryal, 2007). In Bangladesh, a study found employment status and parent's decisions are factors determining early marriage (Rahman et al., 2005). Findings in Iran mentioned that age of the first time married is significantly related to work status (Mahdaviazad et al., 2019)

The regression model suitable for this study is to test the influence between the Y and X variables, namely using binary logistics. Before carrying out binary logistic regression, a model fit test is needed to determine whether the model formed is correct or not, using the Hosmer and lime-show test. The test was able to meet the adequacy test of mode 1, namely 66.9 percent and a significance value of 0.000. This section describes the differences in the tendency or risk of ever-married women aged 15-49 years to have the age of first-marriage based on the demographic and socio-economic factors studied. The variables tested, Y is the age at first-marriage classified into two categories, namely ≥ 20 years and <20 years. Whereas for variable X, namely residence, wealth quintile, education level, and work status.

Table 2 presents the results of multivariate data processing using a binary logistic regression model. The result of multivariate analysis data processing using binary logistic regression models showed that all independent variables used in the study had a significant effect (p-value <0.05) on the chance of the incidence of age at first marriage in ever-married women aged 15-49 years. Women who live in cities tend to experience marriage (first marriage age/FMA) at maturity (≥20 years), 1.411 times greater than women who live in villages. Therefore, the age at first marriage for women in the city is more than/equal to 20 years. It is in line with the results of the IDHS reporting conducted by the BKKBN. It mentioned women aged 25-49 who live in urban areas marry two years later than women living in rural areas, namely 21.5 years compared to 19.1 years (BKKBN,2013). Women with low welfare or low wealth quintile tend to marry at maturity (≥20 years), 0.016 smaller than the most prosperous. Women with middle and upper-middle welfare levels tend to be 0.048 and 0.033 less than those with the highest income. The interpretation of it that of all welfare levels, the ones most likely to marry at mature age are those with the highest, middle, upper-middle, and lowest welfare levels. Research in Pakistan showed that early marriage is significantly associated with indicators of low social justice. Namely poverty, rural residence, and no formal education (Nasrullah et al., 2014).

The women's tendency who do not work to marry at a mature age (≥20 years) is 0.891 smaller than women who work. It means that working women are more likely to marry at a maturer age than those who do not work. Women who do not work tend to marry under the age of 20. The tendency of women who have not or do not go to school to get married at the mature age is 0.078, less than those who go to college. The tendency of women who graduated from elementary school to get married at a mature age is 0.072, less than those with graduate education. The tendency of women who graduated from high school to get married at a mature age is 0.279, less than those with graduate education. The tendency of women with D3 (diploma 3) education to get married at a mature age is 1.032, more than women with higher degrees education. So we can conclude that the possibility of women getting married over the age of 20, sequences from highest to lowest, are D3, graduate, senior high, junior high, not going to school, and the smallest being elementary school graduates. It is the leading role of the government as the policymaker. They must be able to open up as much access as possible for women to obtain higher education. Education often being seen as the key to preventing child marriage (UNICEF, 2005). The results of this study show that ever-married women aged 15-49 years who have the

highest tendency or risk to experience FMA at the age of ≥ 20 years have some characteristics. They are: living in urban areas, coming from families with the highest economic status, educated relatively high, and at the time of the survey stated work. A study in China mentioned education is one of the factors significantly affecting the age of first marriage for both men and women (Jin et al., 2005). A study result in Madagascar mentioned that education and parent's wealth have a significant influence on school and marriage (Glick et al., 2015).

Overall, the results relatively the same as the results of other national and international researchers. As Wahyudi et. al. find employment, education, housing, and poverty are associated with young marriage (Wahyudi et al., 2019). From an economic point of view, it turns out that the younger the woman, the more expensive the dowry. So it will indirectly affect the wealth quintile of a household. But in terms of reproductive health, women aged less than 20 years of marriage have a high risk, both physically and psychologically. For parents, the faster a child gets married, the less burden on the parents. It will change the stages of welfare from the lowest quintile to the higher quintile.

The results showed that the level of education affects young marriage. Lack of family understanding of adolescent reproductive health exacerbated it. Which will result in the inability to establish good communication between parents and children, especially concerning things that are still considered taboo, such as fertility, menstruation, puberty, etc. Muharry's research results et al. stated that women with low father's education and poor family background have a greater chance of getting married earlier (Muharry et al., 2018).

Table 2. Logistic Regression Model for First Marriage Age of Women Age 15-49 Based on Demographic, Education and Social-economic Characteristic.

Variabel	B	S.E.	Wald	Sig.	Exp(B)
Tempat tinggal					
Perkotaan	.346	.025	191.993	.000	1.414
Perdesaan					
Status Bekerja					
Tidak bekerja	-.115	.024	23.870	.000	.891
Bekerja					
Jenjang Pendidikan			3933.392	.000	
Belum/tidak pernah sekolah	-2.546	.102	626.997	.000	.078
SD	-2.625	.064	1697.923	.000	.072
SLTP	-2.303	.064	1279.696	.000	.100
SLTA	-1.278	.064	401.927	.000	.279
D1/D2/D3/Akademi Perguruan Tinggi	.031	.108	.083	.773	1.032
Kuintil Kekayaan			29.865	.000	
Terbawah	.094	.039	5.847	.016	1.098
Menengah Bawah	-.016	.037	.183	.669	.984
Menengah	-.071	.036	3.923	.048	.932
Menengah Atas	-.074	.035	4.540	.033	.928
Teratas					
Konstanta	2.027	.064	997.203	.000	7.595

Source: SRPJMN data process result, 2017

Conclusion

The results of the bivariate analysis showed that there is a significant relationship between each independent variable and the dependent variable. Related variables include residence, wealth quintile, education level, and employment status. The binary logistic regression test results showed that the most significant variable affecting women on the age of marriage is residence OR = 1.414, wealth quintile OR = 1.098, education level OR = 1.032, employment status OR = 0.891. Women who live in rural areas and have low education, namely women who have graduated from elementary school, are not working, and have low economic status have a greater tendency and risk to experience the age of first marriage under the age of 20. On the other hand, women who live in urban areas, have a higher education level, have a job, and have high economic status have a higher chance of experiencing first marriage at over 20 years old.

The government must provide greater access for women to formal education and aggressively promote 12-year compulsory education. Besides, the government and the private sector are expected to create more job opportunities. So they can encourage women to enter the world of work in both the formal and informal sectors, especially in rural areas. Also, there are more basic efforts to protect women's interests to achieve gender equality and empower women. One of which is by ratifying existing regulations. Finally, to promote the Marriage Age Maturity program and the need for legal support in its application to reduce the level of FMA under 20 years of age for women.

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Wet Cupping Therapy to The Arterial Baroreflex Sensitivity on Hypertensive Elderly

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Abstract

Wet cupping therapy can remove toxins and prevent atherosclerosis. This process will stimulate the sensitivity of the arterial baroreflex which will stimulate a decrease in blood pressure. This is to determine the impact of cupping therapy on the sensitivity of arterial baroreflex with blood pressure indicators in the elderly suffering from hypertension. Quasi-experimental research using pre and post-test and group control design approaches. The sampling technique was simple random sampling, consisting of 21 respondents which was carried out from January to April 2020. The statistics used the General Linear Model Repeated Measures (GLM-RM) test. There was a significant difference between the sensitivity of arterial baroreflex on blood pressure measurement indicators before and after 2 weeks of follow-up period at systolic BP p-value = 0.000 (24.29 ± 8.11 mmHg) and diastolic BP p-value = 0.001 (5.24 ± 6.02); between 2 weeks and 4 weeks at systolic BP p-value = 0.000 (10.95 ± 6.25 mmHg) and diastolic BP p-value = 0.000 (9.05 ± 6.25 mmHg); Between 4 weeks and 6 weeks there was no significant difference in the sensitivity of arterial baroreflex on the measurement indicator systolic BP p-value = 0.267 (-1.43 ± 5.73) and BP diastole p-value = 0.771 (-0.48 ± 7.40). Wet cupping therapy effectively increases the sensitivity of arterial baroreflex with an indicator of decreasing blood pressure in the elderly suffering from hypertension to a limit of 4 weeks after therapy and measurement after 6 weeks of having increased blood pressure.

Introduction

Hypertension is one of the causes of the risk of increasing the prevalence of diseases in cardiovascular system disorders (Nurdiantami et al., 2018). This disease can be experienced by young to old age groups, both rich and poor (Utaminingsih, 2015). Another term for hypertension is the silent killer because sufferers often feel a disorder/symptom without knowing the cause (Qureshi et al., 2017). From various studies, it has been found that adults over 50 years of age have a risk of developing hypertension reaching 90% (Kementerian Kesehatan RI, 2018). Therefore, the elderly age group is more at risk of suffering from hypertension.

Based on Basic Health Research (Riskesdas) in 2018, the prevalence of hypertension according to age classification is the age group 35-44 years (31.6%), 45-54 years (45.3%), 55-64 years (55.2%), and> 65 years (69.5%). Meanwhile, the prevalence based on gender was mostly women (36.85%). The highest hypertension was in the province of South Kalimantan (44.13%). And the lowest was in Papua (22.22%), while for the region of South Sulawesi (31.68%). By 2025, estimated there are 63.3 million people will suffer from hypertension (Kementerian Kesehatan RI, 2018). So the prevalence of hypertension in Indonesia is potentially higher than the available data.

The risk factor for hypertension that can't be modified is age (Islam et al., 2020). People with old age or the elderly will experience stiffness in the blood vessels which can cause

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the heart to pump stronger. It results in hypertension (Gasowski and Piotrowicz, 2017). Hypertension in the elderly is characterized by an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg (Beddhu et al., 2018). According to previous research, the elderly ≥ 50 years with a systolic blood pressure of 130-180 mmHg require early treatment (Pareek et al., 2019). Hypertension can cause various damages affecting the quality of life so that the damage that occurs is in the arterial baroreflex (Qureshi et al., 2017). The arterial baroreflex is an autoregulatory system regulating blood pressure. It is located in the carotid sinuses in the aorta stimulating efferent autonomic nerve activity to the heart and other blood vessels (Lohmeier and Iliescu, 2015).

Physiological changes caused by age in the elderly can increase sympathetic activity and peripheral resistance. The arterial baroreflex sensitivity in the elderly as regulating blood pressure has decreased (Palesa and Sridani, 2019). The condition of the elderly who suffer from hypertension must require treatment or therapy in the form of non-pharmacological. Among the non-pharmacological therapies is complementary therapy using the wet cupping method, a traditional one (Aboushanab and Alsanad, 2018). Cupping therapy can control the hormone aldosterone levels reducing the amount of blood that flows blood vessels. It will trigger the arterial baroreflex sensitivity and providing a stimulus to increase sensitivity to conditions causing hypertension (Aboushanab & Alsanad, 2018).

Research from Saudi Arabia stated wet cupping therapy effectively reduces systolic blood pressure in hypertensive patients for up to 4 weeks, so that there is an increase in baroreceptors, without serious side effects (Aleyeidia et al., 2015). Another study explained that the cupping point location in the hypertension treatment only focuses on two points (Elizabeth et al., 2019). Based on previous studies, wet cupping therapy can reduce blood pressure in people with hypertension. But this therapy is still rarely done in the working area of Puskesmas Empagae, Sidrap Regency because they are more focused on pharmacological ones.

Many people think that hypertension among the elderly is a common thing. So treatment is not needed because it is considered not to affect life. Based on the studies that blood pressure always increases, it can cause complications such as a heart attack or stroke (Beddhu et al., 2018). Increased sensitivity of the arterial baroreflex will cause sympathetic and parasympathetic activity. The increase resulting in a decrease in heart rate and blood pressure, and vice versa, decreased arterial baroreflex sensitivity will cause an increase in blood pressure (Aboushanab & Alsanad, 2018; Kazimierska et al., 2019). The objective of this study is to determine the effect of wet cupping therapy intervention on the arterial baroreflex increased sensitivity in hypertension elderly people in Sidrap, eastern Indonesia.

Method

This research is a quantitative study with a quasi-experimental research design using a pre and post-test approach and a control group design (Ingham-Broomfield, 2015). The objective is to determine the difference in the sensitivity increase of arterial baroreflex to blood pressure indicators, before and after the wet cupping therapy intervention. The research was conducted in Sidrap Regency, South Sulawesi, eastern Indonesia, conducted from January to April 2020. Before data collection, this study received approval from the STIKES Muhammadiyah Sidrap Research Ethics Commission (No.092 / KEP / II.3.AU / F / 2020) uses ethical principles by obtaining informed consent beforehand in the elderly.

The population was all hypertension elderly, based on data from the examination results by the manager of Non-Communicable Diseases (NCD) at Empagae Health Center, Sidrap Regency. The elderly included in this study were those suffering from grade I and grade II hypertension. The sample met the criteria if had high blood pressure at the research time (systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg), aged between 45 and 65 years old, and male. The elderly on grade III hypertension (systolic blood pressure of 180 mmHg or more and diastolic blood pressure of 110

mmHg or more), having complications such as DM, was excluded in this study. The sampling technique was simple random sampling (Polit and Beck, 2017), with 21 respondents who met the criteria.

After re-checking the feasibility and written approval of the respondent then the researcher does the sample randomization process. In this study, We kept the respondents' identities secret during the research process. This research applied the lottery method as a randomization process. The researcher processed randomizing and recruiting respondents into groups. If respondents want to drop, they are free, and there is no coercion element and maintain the respondent's confidentiality.

Wet cupping therapy is the intervention in this study. The research was taken place in Sidrap Regency, South Sulawesi, eastern Indonesia. Wet cupping therapy procedures, namely; measure blood pressure, prepare wet cupping equipment (hands-on, mask, apron, cupping cup, cupping pump, lancing, lancet, tray, com, sterile gauze, scissors, and herbal oil). Clean the area using herbal oil and put a header. Then do suction for 3-5 minutes, do a lancing device injury, put the cupping back on, and do the suction. After 3-5 minutes, open the header, then wipe around the cupped area. Wet cupping therapy is applied at three points on the body. The first point is on two fingers posterior to the lower jaw corners on both sides. Below the skull bone at the hairline (Al-Akhda'ain). The second point is the upper part of the spine that extends to the neck, the top third of the spine consisting of six vertebrae or the C7 cervical spine (Al-Kaahil). The other point is Azh-Zahrul A'la on both sides of the front shoulder point. In this study, wet cupping therapy was carried out once a month for three consecutive months on the 17th, 19th, and 21st of the Arabic calendar (Hijrah) (Qureshi et al., 2017).

The result of this research is the measurement of blood pressure. Each measurement was taken in a seated position. The researcher used a digital oscillometric sphygmomanometer to minimize the results of the observation bias. Measurement of blood pressure after wet cupping therapy is viewed weekly to determine the average value of blood pressure reduction and to determine the maximum daily limit for the effect of cupping therapy on blood pressure. Based on the guidelines, patients should rest 3-5 minutes after giving wet cupping therapy and take blood pressure measurements in the arm during the initial visit. Patients are also advised not to consume foods containing nicotine or caffeine for 1 hour before measuring blood pressure. The measurement results recorded were documented at least twice per visit, as for the schedule of visits every once a week for the next eight weeks.

Statistical analysis uses the SPSS version 21.0 program. The researcher compared arterial baroreflex sensitivity to blood pressure indicators since the baseline of measurement, two weeks and four weeks after the intervention. The test used was the General Linear Model Repeated Measures (GLM-RM) (Heavey, 2014). A p-value <0.05 was considered significant and the average difference in blood pressure indicators, with a 95% confidence interval.

Result And Discussion

This study result showed that the respondents' mean age was 57.6 ± 6.5 years, with 7.4 ± 1.8 years suffering from hypertension. The cholesterol level value measurement from the average low-density lipoprotein value in the high category was 160.7 ± 11.5 gr / dL. So this is one of the triggers for an increase in blood pressure. Meanwhile, 41.5% had a family history of heart disease. Other risk factors were a smoking history of 19.0% and lack of activity in 21.4% (Table 1).

Based on table 2, baroreceptor sensitivity in the elderly with hypertension have a visible difference from the average value of lowering blood pressure. Based on the BP systolic indicator before, after a follow-up period of 2 weeks to 4 weeks, there was a significant difference in the elderly (p-value = 0.000). This result is different from the measurement at the period after four and six weeks. There was no significant difference in systolic BP (p-value = 0.267) (Table 3). So the systolic BP at week four had reached normal limits as well as at week six. But the 6-week follow-up period saw a mean increase of 1.43 ± 5.73 mmHg so that the limit

of effect of wet cupping therapy was only up to week 4 (Figure 1).

Tabel 1. Respondents Characteristics (n=21)

Characteristics	Result
Age average, year (±SD)	57.6±6.5
Time of hypertension average, ratio (±SD)	7.4±1.8
LDL average, mg/dL (±SD)	160.7±11.5
Family history of cardiac disease, n (%)	17 (41.5)
Smoking history, n (%)	8 (19.0)
Physical activity, n (%)	9 (21.4)

SD= standard deviation; LDL= Low Density Lipoprotein.
Source: Primary Data, 2020

Diastolic blood pressure indicator also decreased every time the follow-up measurement period except at week six experienced an increase of 0.48 ± 7.40 mmHg (Figure 1). These results indicate that after a follow-up period of 2 to 4 weeks, there is a significant difference in the elderly (p-value = 0.000). Measurements after four by six weeks had no significant difference (p-value = 0.771). So the limit of the cupping therapy effect on the sensitivity of arterial baroreflex on the diastolic blood pressure indicator is only up to week four (Table 3). The cupping effect on high blood pressure has the benefit of relaxing the sympathetic nervous system. Furthermore, triggers the secretion of an enzyme having a role as angiotensin renin in lowering blood pressure (Aboushanab & Alsanad, 2018).

Table 2. Comparison of arterial baroreflex sensitivity on systolic blood pressure (BP) indicator before and after 2 to 6 weeks wet cupping therapy (n=21)

Variation of measurement result (n=21)	Mean difference±SD	Min-Max (CI95%)	T	P*
Systolic BP (mmHg)				
Before --> 2 week after	24.29±8.11	20.59-27.98	13.73	<0.001
2 week after --> 4 week after	10.95±6.25	8.11-13.79	8.03	<0.001
4 week after -->6 week after	-1.43±5.73	-4.04-1.81	-1.14	0.267

Source: Primary Data, 2020

Table 3. Comparison of arterial baroreflex sensitivity on diastolic blood pressure (BP) indicator before and after 2 to 6 weeks wet cupping therapy (n=21)

Variation of measurement result (n=21)	Mean difference±SD	Min-Max (CI95%)	t	*P**
Diastolic (mmHg)				
Before --> 2 week after	5.24±6.02	2.50-7.98	3.99	0.001
2 week after --> 4 week after	9.05±6.25	6.20-11.89	6.64	<0.001
4 week after --> 6 week after	-0.48±7.40	-3.85-2.89	-2.95	0.771

Source: Primary Data, 2020

The results showed a significant increase in the arterial baroreflex sensitivity. Before and after the intervention of wet cupping therapy. It was indicated by the blood pressure measurement of 10.95 ± 6.25 mmHg systolic BP and 9.05 ± 6.25 mmHg diastolic BP after four weeks of follow-up. After six weeks of follow-up, the wet cupping effect was gone, and there was no significant difference in blood pressure reduction. The result is in line with previous studies finding a significant difference in blood pressure and diastolic values after two weeks of follow-up (Darmawan et al., 2017). Another study from China stated that wet cupping

therapy could lower blood pressure in the 4th week after (Xing et al., 2020). Thus, it has an effect that lasts 2-4 weeks.

Comparison of blood pressure before wet cupping therapy, the follow-up period was two weeks to four weeks after therapy. There is a significant difference in systolic blood pressure p-value = 0.000 and diastolic blood pressure p-value = 0.000. It is different from the follow-up period of four weeks by six weeks. There was no significant difference on systolic blood pressure p-value = 0.267 and diastolic blood pressure p-value = 0.771. But the decrease in blood pressure was not very significant. It could be influenced by the follow-up period was too short. Respondents are aware of the results and change their diet to a low salt diet and their daily lifestyle such as physical activity. Physical conditions significantly affect the increase in the arterial baroreflex sensitivity, as the autoregulator to blood pressure or heart health (Subramanian et al., 2019).

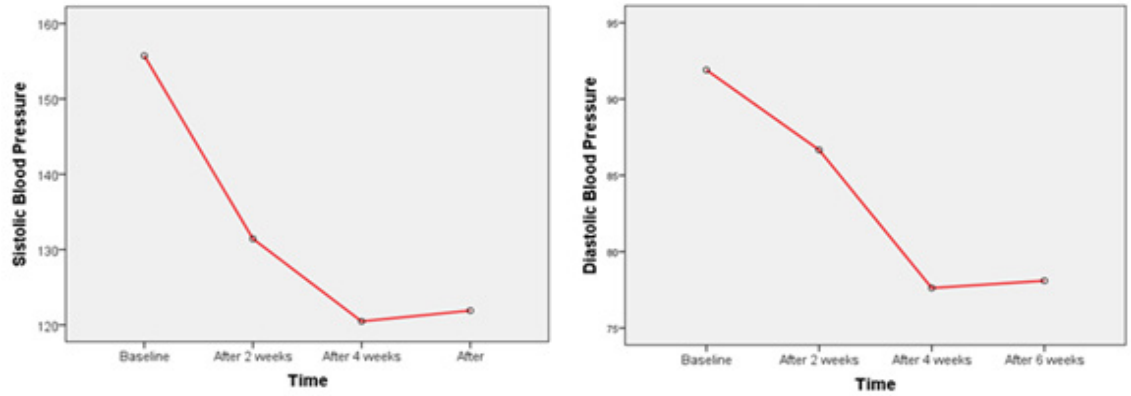

Image 1. The difference in the decrease in systolic and diastolic blood pressure for each measurement period before, after 2 weeks to 6 weeks of wet cupping therapy.

A study from Arabia used the wet cupping therapy method. By comparing the results of blood pressure before and after two months of therapy, there was a result of p-value = 0.001 with a decrease in blood pressure from 149.2 mmHg to 130.8 mmHg (Al-Tabakha et al., 2018). This result is different from this study. The initial period with the follow-up period after wet cupping therapy can increase the baroreceptors at week two. At week four, blood pressure is within normal limits and at week six has an increase of 1.43 ± 5.73 mmHg in systolic BP and 0.48 ± 7.40 mmHg in diastolic BP from normal limits at four weeks of the follow-up measurement period. Wet cupping therapy worked as an alternative therapy. The effect could be lasting up to four weeks in arterial baroreflex sensitivity maintenance as blood pressure and heart rate regulator in hypertension elderly.

The procedure in this study, every 17th, 19th, and 21st (hijrah), is the process of giving wet cupping therapy selected based on Islamic literature (Qureshi et al., 2017). Another study stated that it was not conducted on days other than recommended by Islamic literature. Which once a month for three consecutive months (Zhang et al., 2020). Therefore, it is necessary to do further research on the differences between certain days and other days on the results of wet cupping therapy. Related with the changes in blood pressure in hypertensive elderly.

Although wet cupping therapy can affect the increase in baroreceptor with an indicator of a decrease in blood pressure, it is affected by several factors. One of which is the amount of blood removed during suction (Al-bedah et al., 2019). In this study, the amount of blood removed was not measured. The more blood clots, the better the results (Lu et al., 2019). The wet cupping therapy mechanism can remove toxins mixed with blood or oxidants from the body through the skin surface (Kim et al., 2017). The release of toxins can increase blood flow and prevent atherosclerosis. It will stimulate the arterial baroreflex sensitivity, which will provide a stimulus to the autonomic nerves (reduce the work of sympathetic nerves). Then it will inhibit the vasomotor center, which causes vasodilation and blood pressure

decreases (Lohmeier & Iliescu, 2015; Beddhu et al., 2018).

The "Taibah Theory" explained the increasing baroreceptors mechanism indicated by decreased blood pressure as the effect of wet cupping therapy. The "Taibah Theory" stated that it could dry out intestinal fluid, excess intravascular fluid, and harmful metabolic substances (El-shanshory et al., 2018). It can also stimulate the production of endogenous nitric oxide and the excretion of accumulated vasoactive substances and free radicals, which lead to reduced blood pressure measurements (Almaiman, 2018). That is why cupping therapy can be used to prevent a decrease in the sensitivity of baroreceptors which can stimulate an increase in blood pressure.

This study has a good effect, one of which is to monitor the respondent's condition after therapy for up to 6 weeks. The study has limitations since it does not measure blood clots per cup taken on the "Al-Akhda'ain, Al-Kaahil, and Azh-Zahrul A'la" points. This study is different from previous studies because focusing on determining the sensitivity of the arterial baroreflex, which functions as a regulating system for blood pressure using the "Taibah theory" approach. So the results of this study are useful for medical personnel in providing interventions related to the handling and prevention of increased blood pressure in the elderly with wet cupping therapy, affecting up to week four and provide a stimulus to increase the sensitivity of the arterial baroreflex in the carotid sinuses.

Conclusion

Wet cupping therapy can effectively increase baroreceptors sensitivity which can lower blood pressure in elderly with hypertension, lasting up to a limit of 4 weeks and without any relevant side effects. This research recommends wet cupping as a therapy for the prevention of hypertension. Further research, the researcher should notice the number of blood clots per cupping cup and not using anti-hypertensive drugs simultaneously. We also recommend conducting research development on heart rate measurement

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"Gizi COVID-19 Bagi Remaja" Application as A COVID-19 Prevention

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Abstract

Adolescents are a vulnerable group in fulfilling nutrition for body defence as an effort to prevent COVID-19. Nutrition education is needed for adolescents to increase their knowledge of nutrition consumption. One of the models to improve nutrition knowledge used the Android-based smartphone nutrition application model. This research aimed to design and develop a nutrition android application model to increase adolescents' nutritional knowledge in the prevention of COVID-19. The method used Research & Development with four stages: the analysis stage, the design stage, the development stage, and the testing stage. This research produced the "Gizi COVID-19 Bagi Remaja" as a nutrition application android-based with 3 main menus, namely BMI and calories checking, nutrition info, and COVID-19 info. The N-Grain test results show that this application effectively increases nutritional knowledge in 10 high school-adolescents (N-Grain=88.21%). The Android-based "Gizi COVID-19 Remaja" application is expected to be a comprehensive media for adolescents nutrition education during the COVID-19 pandemic in Indonesia to prevent the transmission of COVID-19.

Introduction

More than 200 countries in the world have experienced the COVID-19 problem. The total number of COVID-19 cases until October 5th, 2020, were 34,804,348 instances exposed to the coronavirus, cumulative cases with 1,030,738 deaths (WHO, 2020). Indonesia is one of the countries with the highest number of cases in the world. Recorded until October 8th, 2020, Indonesia's confirmed cases were 320,564 cases with 11,580 deaths and 244,060 recoveries. The four provinces with the highest Indonesia cases are DKI Jakarta, East Java, West Java, and Central Java. Central Java contributed to 25,259 cases (NDMA, 2020). One of the areas with the highest cases in Central Java is Semarang City. A total of 8,808 confirmed cases with 817 deaths in Semarang City until October 9th, 2020 (Dinas Kesehatan Kota Semarang, 2020).

The high number of COVID-19 cases requires prevention efforts. One of them is the fulfilment of nutrition. Nutrition plays a role in shaping the immune system's work and reducing risk factors for COVID-19 (Ausrianti et al., 2020). The immune system against viruses must be strengthened by eating nutritious foods, physical activity, and always happy thinking (Kemenkes, 2020). Nutritious eating contains vitamins A, B, C, D, E, omega three fatty acids, and minerals such as selenium, zinc, iron, copper, and vegetable and animal protein (He et al., 2020).

Adolescents are one of the nutritionally vulnerable groups, where they are vulnerable to high nutritional needs for growth, lifestyle, and diet and are vulnerable to environmental influences (Devine & Lawlis, 2019; Forthing, 1991; Perry-Hunnicuft & Newman, 1993). A study found that adolescents currently do not

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meet the criteria for a nutritionally balanced diet and causes obesity in adolescents (Rouhani et al., 2014). The consumption pattern of adolescents who do not meet balanced nutrition is caused by a lack of knowledge about nutrition (Wang et al., 2014). Therefore, there is a need for nutrition education for adolescents. One of the strategies for changing behaviour is providing information through health promotion. Health promotion will increase public knowledge, and then awareness will arise and cause them to behave by their understanding (Laverack, 2017).

Technology in the communication process is always developing. According to data from the Indonesia Central Statistics Agency (in Bahasa Indonesia: Badan Pusat Statistik, BPS) 2018, 39.9% of Indonesia's population has accessed the internet. The high use of the internet in Indonesia reflects society's openness to technological developments (BPS, 2018). One of the fastest-growing mobile communication technologies in society is smartphones (Nasution et al., 2017). A study found that the highest number of smartphone users per month was 15-25 years old, 85.6%). On average, they surf the internet and send messages (Akanferi et al., 2014). The high use of smartphones among young people can be used as a media for health promotion, especially for improving adolescent nutrition in preventing COVID-19. This study aimed to design and develop educational media and Android-based applications to increase adolescent knowledge about nutrition in preventing COVID-19.

Method

The method used in this research was Research & Development (R&D), referring to Gall's technique (Gall et al., 1983). This study applied four main stages, including the analysis stage, design stage, development stage, and testing stage. The four-stages of this study are presented in Figure 1.

The first main stage was the analysis stage. We began by looking for literature studies and gathering information to strengthen the product's design to be produced. It includes reviewing literature about mobile systems, android application, COVID-19 prevention, and nutrition, especially for adolescents. Need analysis has software functional analysis and software interface design. This stage to meet user needs (targets). Besides, this process was conducted by finding and reviewing information about the tools being developed. The second stage is the design stage, which is modelling object-oriented software development. The

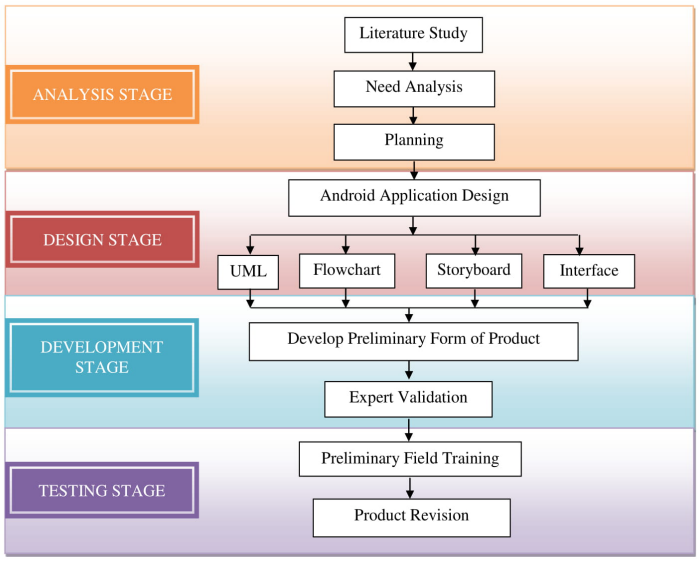

FIGURE 1. Research diagram of Nutrition Android Application Model

modelling used UML (Unified Modeling Language) to facilitate developers in coding the software being developed. At the design stage, we made flowcharts, storyboards, and interface designs. A flowchart was a comprehensive depiction of the program flow created with a specific symbol to provide an overview of the flow and process path of software to comfortable users to understand. The storyboard is the graphic organizer in the form of illustrated images displayed sequentially for visualization purposes.

The development process was undertaken by the design and planning described. In this process, we tested the feasibility of the experts related to this product, namely Nutritionist and Media Expert, through a desk evaluation to assess the feasibility of the draft model, both the basic feasibility of the concept and the suitability of the theory. From the results of expert validation, the draft application model was refined.

The next stage was preliminary field training, a trial for the application media of "Gizi COVID-19 Bagi Remaja" limited to users, namely high school adolescents. The purpose of this trial was to test the appropriateness of this application in increasing adolescent knowledge about nutrition as an effort to prevent COVID-19. We used a pre-experimental method with a one-group pretest-posttest design on ten adolescents in one of the High School in Semarang City, aged 16-19 years. The instrument used was the application media for the "Gizi COVID-19 Bagi Remaja" as media for intervention and pre-post to measure the level of knowledge and the effectiveness of media use in increasing adolescent nutritional understanding. Data were analyzed using the Paired Sample T-Test and N-Grain Score Test. After that, we revised the product according to the results of the trials conducted.

Results and Discussion

This research resulted in a product in the form of a Nutrition Android Application specifically intended for adolescents to control their nutritional needs and help increase their daily nutritional needs during the current pandemic.

The Development of "Gizi COVID-19 Bagi Remaja" Mobile Application

"Gizi COVID-19 Bagi Remaja" is an android-based nutrition application that was developed to make it easier for teenagers to find information about ideal nutrition for adolescents as well as to provide education in preventing COVID-19 through fulfilling nutrition. This educational application was designed to be as simple, easy, and attractive as

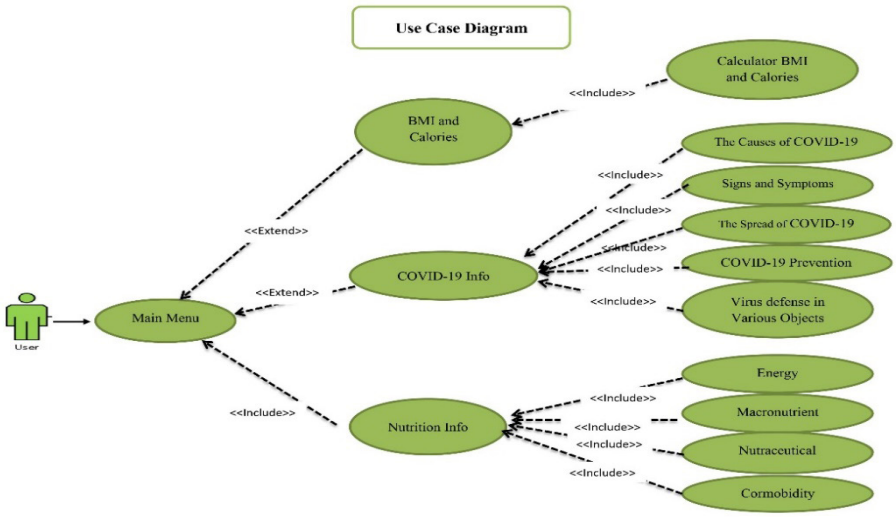

FIGURE 2. Use Case Diagram Flowchart of "Gizi COVID-19 Bagi Remaja" Applicati

possible to be operated by teenagers of school age. In today's technological era, teenagers spend more and more time with their gadgets, especially smartphones (Kim, 2013). Especially with the current COVID-19 pandemic, all school children in Indonesia were required to do online learning, forcing them to deal with gadgets and more time to study independently at home. With the development of nutrition education media in preventing COVID-19 through this application, it is hoped that it can help increase knowledge and information about adolescent nutrition and the prevention of COVID-19. Such technology can be applied to various programs because it can provide favourable execution in learning and understanding concepts (Harjunowibowo et al., 2015).

Figures 2 and 3 presents a flowchart on operating the "Gizi COVID-19 Bagi Remaja" application. The flowchart illustrates the main menu consisting of 3 menus, namely 1) BMI and Calories, 2) Information media about COVID-19, and 3) information media about nutrition. All main menus can return to the initial menu (extend), which is included in the first menu, namely the BMI and calorie calculator. There is the second menu (include) sub-menus, namely the causes of COVID-19, signs and symptoms, the spread of the coronavirus, prevention of COVID-19, and the coronavirus's defence in various objects. The third menu contains (include) energy, macronutrients, micronutrients, nutraceuticals, and comorbidities. After finishing the menu, the user can return to the nutrition info sub-menu and return to the main menu.

"Gizi COVID-19 Bagi Remaja" Mobile Application

This Android Nutrition application displays 3 main menus, namely: 1) Check Body Mass Index (BMI) and Calories, 2) Media Information about COVID-19, and 3) Recommendations for Management of COVID-19 Nutritional Therapy. A splash page will appear when the application is opened, as shown in Figure 4a.

When opening the application, the initial display will appear the title, image, university logo, and researcher's name. Next, 3 main menus will be displayed, seen in Figure 4b. Users can view the contents of the menu by pressing the image button on the menu. In general, this media component is displayed on

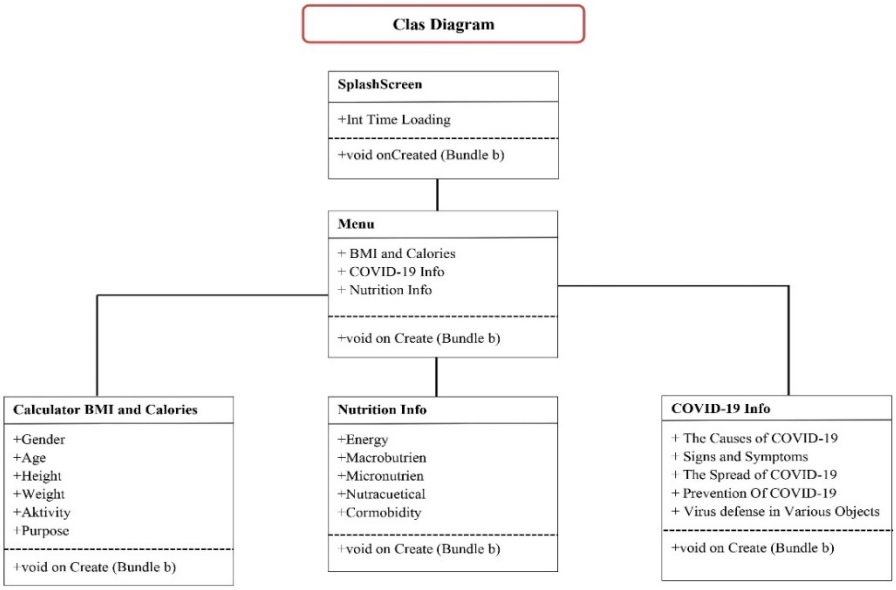

FIGURE 3. Class Diagram Flowchart of "Gizi COVID-19 Bagi Remaja" Application

the main menu; there are BMI and calories, information media about COVID-19 and information media about nutrition.

When the user selects and presses the *"BMI dan Kalori"* menu button, then a sub-menu will be displayed for calculating the user's BMI and calories, as in Figure 4c. The initial menu presents the gender, age, height, weight, activity, and desire. Height is filled in centimetres (cm), and body weight is entered in kilograms (kg), which is the unit of measurement commonly used in Indonesia. This measurement of height and weight is for calculating BMI. In the *"Aktivitas"* sub-menu, there are various activities in relaxing activities, light, moderate, high, and very high activities. Users can choose one according to the action at that time.

Furthermore, the sub-menu *"Ingin"* is a sub-menu that presents several goals that the user wants to achieve in terms of body weight. Some of these options include losing weight, gaining weight, and maintaining weight. After the data is filled in, the calculation results will appear regarding the Basal Metabolic Rate (BMR), Total Daily Energy Expenditure (TDEE), and Body Mass Index (BMI). Calculation results can be saved and viewed again in the *"Lihat Riwayat"* menu.

In the BMI measurement, we applied BMI adjusted for the adolescent's age and sex or called the adjusted-BMI (Adj-BMI). This calculation is used in the application media that we have developed because it is proven to have a reasonable correlation with adiposity (National Health and Medical Research Council, 2013; Todd et al., 2015). Besides, BMI is an essential indicator of nutritional status and nutritional needs, such as micronutrients (Sumarmi et al., 2017). The World Health Organization (WHO) recommends screening children for overweight and obesity using BMI measurements because BMI correlates with body fat and is easy to apply (Clemente et al., 2011; WHO, 2021). Many studies have measured BMI as an indicator in determining children in the under, normal, overweight, and obese categories and linking them to various variables related to nutrition. As in the research of Eker et al., who used the measurement of BMI in children to determine the prevalence of obesity among boys and girls. From his research results, the BMI value in boys is higher than girls (3.32 kg/m2) (Eker et al., 2018).Similarly, the study by Buscemi et al. Linked changes in BMI to desire and calorie intake. The results found a relationship between changes in food craving and BMI changes that varied depending on the change in calorie intake (Joanna Buscemi et al., 2017). It explains that BMI is an essential indicator in determining nutritional status. Even in the conditions of the COVID-19 pandemic, obesity is a risk factor for COVID-19 infection and worsening disease if COVID-19 infection occurs (CDC, 2020). Besides, BMI is used in determining health policy (Nuttall, 2015).

In the second main menu, *"Media Informasi tentang COVID-19"* presented in Figure 4d, there is information about COVID-19 presented in the menu. This sub-menu aims to provide information to teenagers about all general matters about COVID-19 and the efforts that can be made to prevent it so that their knowledge increases. The menus, including COVID-19's cause, signs and symptoms, the spread of the coronavirus, COVID-19 prevention, and the defence of the COVID-19 viruses in various objects. If the user presses the COVID-19 spread menu, it will explain the causes of COVID-19 in a brief, clear, and easily understood way for teenagers. Likewise, the sub-menu of signs and symptoms of eating will explain the signs and symptoms of COVID-19 that are often encountered, along with pictures to make them attractive and easily understood by teenagers as users. The COVID-19 prevention menu contains an explanation of preventing transmission of the coronavirus and the correct cough etiquette. The coronavirus defence sub-menu in various objects, including plastic, paper, glass, wood, iron, cardboard, gloves, aluminium, copper, and air, the virus survives.

Figure 4e is the main menu of *"Rekomendasi Penatalaksanaan Terapi Nutrisi COVID-19"* where information media about nutrition and recommendations on COVID-19 nutritional therapy management. The menu explains energy, macronutrients, micronutrients, nutraceuticals, and comorbidities. At the energy point, it contains any food that has life. The next issue is a

FIGURE 4. Nutrition Android Application Display; (a) splash page (front view); (b) the main menu includes checking Body Mass Index (BMI) and Calorie, COVID-19 information, and recommendations for managing COVID-19 nutritional therapy; (c) display BMI and Calorie check; (d) COVID-19 information display; (e) recommendations for managing COVID-19 nutritional therapy display.

macronutrient, which is about animal protein sources and vegetable protein sources. Furthermore, at the micronutrient point, there is an explanation of vegetables and waste containing vitamins (A, B, C, D, E, and K), including zinc, selenium, and calcium. Point nutraceutical contents regarding whole foods, food products, and ingredients in food. And the last point is comorbid/congenital disease that can exacerbate the condition if exposed to COVID-19. Click the back menu to go to the previous menu.

Experts Validation

The validity of the instrument or model developed is obtained from expert judgment or, in other terms, is content validation. The reliability test of the android application model for nutritional problems uses the reliability of observations or by finding the coefficient of agreement among observers. The following table shows the results of the validation assessment by experts.

TABLE 1. The results of the validation of the Nutrition Android Application by experts

Expert	Evaluation result
Nutritionists	The nutrionistst's validation assessment was 83.87%, and it was included in the good criteria.
Media Expert	The media expert's validation assessment was 92.8%%, and it was included in the good criteria.

TABLE 2. The results of pre and post-test, the effect, and the effectiveness on increasing nutritional knowledge in adolescents (N=10)

	Mean	Correlation (p-value)	p-value	N-Grain Score (%)		
				Mean	Min.	Max.
Pre-Test	6.40	0.11	<0.01	88.21	66.67	100
Post-Test	15.80					

Application Trial

This tool was tested on high school-adolescents to analyze and evaluate this application's usefulness according to its purpose, namely as an educational medium to increase adolescents' nutritional knowledge to prevent COVID-19. We conducted this trial on ten high school-adolescents. Adolescents who participate were aged 16-19 years and had a smartphone with the Android operating system. This trial was carried out by giving a pre-test and post-test in the form of questions related to nutritional measurement and those available in the application "Gizi COVID-19 Bagi Remaja". A pre-test was given before the application was installed and operated by them. After completing the pre-test, they were invited to use the application with guidance and direction from us. When they understood and finished using the application, a post-test was given to them. These pre and post-test aimed to measure the increase in knowledge about adolescent nutrition before and after being given the nutrition application media.

The test results are presented in Table 2. Based on these results, the ten adolescents' mean pre-test score is 6.40, while the post-test average score is 15.80. However, there was no difference between the pre-test, and post-test variables, which can be seen from the p-value on correlation (0.11) was more than 0.05. The p-value is known to be <0.01. It can be concluded that there was an average difference between the pre-test and post-test results, which means that there was an effect of providing educational media based on the android application "Gizi COVID-19 Bagi Remaja" in increasing nutritional knowledge in adolescents.

Based on the results of the N-Grain test in Table 2, it is known that the average N-Grain score of 10 high school-adolescents was 88.21%. If the N-Grain score is above 75%, it is categorized as an effective medium or product. It means that providing educational media in the form of the application "Gizi COVID-19 Bagi Remaja" effectively increased nutritional knowledge in high school adolescents. The minimum score for the N-Grain score for adolescents was 66.67, while the maximum score was 100.

Provision of nutrition education through the application "Gizi COVID-19 Bagi Remaja" in the trial proved to affect increasing nutritional knowledge of high school adolescents positively. Adolescent knowledge on nutrition and prevention of COVID-19 increased after being given intervention with this application. The practical and attractive design makes it easy for adolescents to operate the application and understand their nutritional needs more. Interventions such as nutrition education are recommended to improve adolescent nutritional status (Hill et al., 2020; Kroeze et al., 2006; Oenema et al., 2001; Pérez-Rodrigo & Aranceta, 2001; Story et al., 2002). Adolescents

who lack knowledge of nutritional needs lead to uncontrolled food intake into the body so that it will be easy for malnutrition and obesity. During this pandemic, obesity is a significant concern because obesity is a risk factor for the severity of COVID-19 and increases death likelihood (Cuschieri & Grech, 2020). So, knowledge of nutrition must be given to adolescents from an early age to avoid obesity in the future. Previous research stated that misinformation and knowledge were related to people's healthy diets (Dickson-Spillmann & Siegrist, 2011).

This android-based application product, "Gizi COVID-19 Bagi Remaja" is an educational medium developed with a design that is attractive to teenagers, easy, and practical to use. Android-based development is carried out because, currently, technological developments are increasingly advanced and fast. Smartphones with Linux-based operating systems specifically for mobile devices are like a mobile phone technology proliferating (Ibrahim & Ishartiwi, 2017). The use of Android as the operating system used in Indonesia has grown to 92.14% as of August 2020 and dominates the smartphone market (Statista, 2020). The choice of Android as the operating system is due to its ease of use. This android operating system is open source and has a vast opportunity to develop applications. Research conducted by Horace H. Dedue shows that Indonesia ranks fifth in the list of the world's largest smartphone users (Azmi et al., 2017). The highest number of smartphone users per month is in the 15-25 year age group (85.6%) (Akanferi et al., 2014).

"Gizi COVID-19 Bagi Remaja" application as an educational medium for solving research problems, especially in nutrition for the prevention of COVID-19, is an innovation by the target group's characteristics. Adolescence is a transition period to adulthood, where reaching a healthy adult requires adequate nutritional intake. Nutrition plays an essential role in this process. Malnutrition in adolescents is often associated with child growth, cognitive maturation, impaired intellectual intelligence, and behavioural problems. Not only that, the risk of contracting both infectious and non-communicable diseases will be greater (Onyango, 2013; Salam et al., 2020). Even a systematic review study concluded that not half of the adolescents, especially girls in low and middle-income countries, have a balanced intake of foods such as milk, fruit, meat, and vegetables and do not meet the WHO dietary guidelines. (Keats et al., 2018).

In the current state of the COVID-19 pandemic, the use of online platforms among adolescents is more intensive and is increasing by about five hours per day compared to before the COVID-19 pandemic (Pietrobelli et al., 2020). They will stare more at the screen to play games, access social media, and do lessons. It can raise concerns for their mental and physical health. Reduced physical activity in children and increased consumption of light to heavy metals are associated with grown children's weight (Cuschieri & Grech, 2020; Marsh et al., 2013). Pietrobelli's research found that since the COVID-19 pandemic occurred, children's exercise activities decreased significantly 2-4 hours per week. There was a correlation with changes in exercise activity, changes in the amount of food consumed per day, and screen time changes. Boys had more food consumption per day than girls (Pietrobelli et al., 2020).

Given these conditions, the application "Gizi COVID-19 Bagi Remaja" will help children increase their knowledge of nutrition. The high intensity of using online platforms to smartphones in adolescents will be favourable if this application is included in their activities. It is hoped that the easy use of the application "Gizi COVID-19 Bagi Remaja" can be applied by all adolescents, especially adolescents, to improve healthy behaviour, especially in COVID-19 conditions. Even so, parental assistance is still needed, in using smartphones and this application. Parents' role is essential in fulfilling children's nutrition and choosing children's food (Cohen et al., 2020; Fadare et al., 2019). Parents can use this application to study together with children so that children are more interested in learning the menus in the application "Gizi COVID-19 Bagi Remaja". Besides, parents can monitor and explain the application to children.

The research limitation is that the application "Gizi COVID-19 Bagi Remaja" has been developed and tested on adolescents and has proven to increase adolescent nutrition

knowledge. Still, this application is only created with the android operating system. A smartphone/device with an operating system other than Android cannot install and operate this application. It is hoped that we can register this application on Google Playstore so that all teenage smartphone users can use this application easily.

Conclusion

The development of an android-based product in the form of the "Gizi COVID-19 Bagi Remaja" application has been proven effective in increasing adolescent nutrition knowledge as an ongoing effort to prevent COVID-19. The "Gizi COVID-19 Bagi Remaja" application was developed in 3 main menus, namely checking BMI and calories, nutritional information, and COVID-19 information that is friendly to use for adolescents can become an android-based educational media. This application is expected to be used on a broader and comprehensive scale for all adolescents by registering on the Google Playstore and available for all operating systems so that high smartphone use in adolescents positively impacts this nutritional health education insert.

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Human Papilloma Virus Vaccination Acceptance of Elementary School Student's Parents

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Abstract

A costless vaccination program had been implemented in Badung Regency, but there were parents of elementary schoolgirls who did not give written consents to their daughters for joining the program. The research intended to determine the factors of HPV vaccination program acceptability comprised of age, education level, knowledge, perception, and doctor recommendation. The research design was quantitative-based cross-sectional from January – May 2020. The population study was elementary schoolgirls' parents in Badung Regency. The respondents were 92 parents who were selected based on two strata and using simple random sampling. The source of primary data was collected through interviews and online questionnaires. It was analyzed with descriptive and analytical techniques with a logistic regression test. The result showed that 64,13% of respondents accepted the HPV vaccination program. The multivariate analysis showed that the perceived barrier was the most influential factor towards the acceptability of the HPV vaccination program (AOR = 6,056; 95%CI 1,754-20,906). Education would be needed to decrease the barriers to the HPV vaccination program.

Introduction

Cervical cancer is the third most common disease that causes death in women. As much as 85% of deaths in women due to cervical cancer occur in developing countries (Khan, M, et al, 2021). In Indonesia, cervical cancer has an incidence rate of 23.4 per 100,000 population with an average death rate of 13.9 per 100,000 population. In 2018, the prevalence of cervical cancer in Bali Province was 2.3 per mile (Kementerian Kesehatan RI, 2018). In 2016, in Badung Regency, there were 238 new cases of cervical cancer (Dinas Kesehatan Kabupaten Badung, 2019).

Cervical cancer is the growth of abnormal cells in the lining of the cervix or cervix. Cervical cancer is caused by the Human Papilloma Virus (HPV). The main types of HPV that cause cervical cancer are types 16 and 18 causing precancerous lesions. It can be prevented with the HPV vaccine, clinically proven to be safe and effective. The HPV vaccine has an efficacy of 96% – 98% in preventing cervical cancer caused by HPV types 16 and 18 (Siddhart, A.R., et al, 2021). HPV vaccination is recommended to be given to adolescent girls starting at the age of 11-12 years as prevention before being sexually active and potentially exposed to HPV (Escobar, B, et al, 2021).

Concerning efforts to prevent cervical cancer cases in Badung Regency, the government has held a free HPV vaccination program since 2012. In 2020, the Badung District Health Office will focus on the vaccination program only at the elementary school level. So primary school level vaccination coverage must be optimized. The target coverage of the free HPV vaccination program in Badung Regency is 99% per school (Dinas Kesehatan Kabupaten Badung, 2019).

The implementation of the HPV

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vaccination program in the Badung Regency still has problems. Even though it has been provided free of charge by the government, there are still some parents of elementary school students who do not give consent for their daughters to participate in the HPV vaccination program. For two consecutive years, in 2017 and 2018, the realization of vaccination achievements was still lower than the number of targets. In 2017 there were 6%. While in 2018 by 4% did not receive the HPV vaccination. In the South Kuta Health Center area, 11 schools have coverage below the target (< 99%). Three of them have low coverage (33.33% – 66.67%). It shows that the program has been implemented in each of these schools, but there are groups of pros and cons to the implementation of free HPV vaccination. Two schools have HPV vaccination coverage of 0% (Dinas Kesehatan Kabupaten Badung, 2019).

The non-achievement target is closely related to the lack of acceptance of HPV vaccination by parents. In the implementation of HPV vaccination, written consent is required as an acceptance of the vaccination program. At the age of elementary school children, they are classified as underage so that the decision is still in the hands of the parents. Therefore, people have a vital role (Newman, *et al* 2018). In addition, the HPV vaccination program has not yet become a mandatory vaccination program from the Ministry of Health of the Republic of Indonesia, so it requires parental consent (Dinas Kesehatan Kabupaten Badung, 2019). Parental acceptance of HPV vaccination is essential to achieve high vaccination coverage. According to research that has been done that the reason parents do not receive HPV vaccination is that they think that HPV vaccination increases early sexual activity in their daughters (Lee, *et al.*, 2018; Robbins & Timothy, 2010)

Factors that influence parental acceptance of HPV vaccination are knowledge about cervical cancer and HPV vaccination (Rodriguez, *et al.,* 2019), perceived susceptibility, perceived severity, perceived benefits, perceived barriers, the experience of obtaining doctor's recommendations, age, and level of care. parent education (Degarege, *et al.,* 2019; Newman, *et al.,* 2018; Zhang, 2013)*(2*. This study is based on the absence of previous studies that have examined the factors that influence the acceptance of the HPV vaccination program by parents of elementary school students using logistic regression analysis in the South Kuta Health Center area. We used regression analysis because it has an easier mathematical calculation and does not have many assumptions that must be met. Based on this, the researchers are interested in researching logistic regression analysis of the factors that influence the acceptance of the Human Papilloma Virus (HPV) vaccination program by parents of elementary school students in the South Kuta Health Center area in 2020.

Method

The design of this study was cross-sectional with a quantitative approach. The factors studied consisted of age, education level, knowledge, perceived vulnerability, perceived severity, perceived benefits, perceived barriers, and doctor's recommendations. The target population in this study were all parents of elementary school students in Badung Regency, while the affordable population was parents of fifth and sixth-grade elementary school students in the South Kuta Health Center area in March-May 2020.

The calculation of the minimum sample size in this study was carried out using a two-proportion hypothesis test sample determination technique, obtained 30 samples. The researcher uses the Sample Size 2.0 application. The estimated minimum total sample size is 60 samples. 10% of the total sample is added to obtain 66 samples. Researchers used 92 parents of elementary school students. The sample selection used strata based on the elementary schools, which had low and high HPV vaccination coverage. We took three schools from each stratum. The sample selection used simple random sampling using a sample frame of absenteeism for grade 5 and 6 students. We collect the data through interviews and online questionnaires. The questionnaire used in this study was modified from Dethan & Suariyani (2017) and Madhivanan, et al. (2014) which has been tested for validity and reliability on 92 respondents of parents of fifth and sixth-grade elementary

school students. Data quantitative analysis used three data analysis techniques. They are univariable, bivariable with simple logistic regression, and multivariable with multiple logistic regression tests. This research has been declared ethically worthy by the Research and Development Ethics Commission of the Unud Medical Faculty/Sanglah Hospital with the number 2020.01.1.0313 on April 17, 2020.

Result and Discussion

Based on the descriptive analysis in Table 1, we can see that respondents aged > 35 years were 71.74%. 71.74% of respondents are female, while respondents with low education amounted to 59.78%. In this study, acceptance of the HPV vaccination program may involve the female respondents (mother) participation or male respondents (father). It related to the parents' decision based on the tendency of the largest shareholder in receiving vaccines for their daughters. Based on gender characteristics, the percentage of respondents who are female in this study is 71.74%. A study by Nickel, et al. (2017) in two countries shown similar results. In the United States (USA) and the United Kingdom (UK), the proportion of female respondents is higher than male respondents. The percentage of female respondents who live in the USA is 68.7%, while those who live in the UK are 64.4% (Nickel, *et al.,* 2017). Research conducted in Thailand by Grandahl, et al. (2018) also mentions that most respondents are mothers. Because, in Thailand, mothers are often the decision-makers on matters relating to the health of their children (Grandahl, *et al.*, 2018). It shows that mothers play a role as the front line in determining the acceptance of the HPV vaccination program to protect the health of their daughters.

The acceptance of the HPV vaccination program in this study can be influenced by several factors. Following is a further discussion of the factors that influence the acceptance of the HPV vaccination program by parents of elementary school students.

Based on the data presented in Table 2, we can see that the respondents who received the HPV vaccination program in this study amounted to 64.13% of the total respondents. It shows that the acceptance of the HPV vaccination program in this study is still lower

Table 1 Respondents' Characteristics Description

Respondents' Characteristics	Frequency (n = 92)	Percentage (%)
Age		
≤ 35 years	26	28,26
>35 years	66	71,74
Gender		
Male	26	28,26
Female	66	71,74
Education		
Low	55	59,78
High	37	40,22

Source: Primary Data, 2020

Table 2 Acceptance of HPV Vaccination Program Description

Variable	Frequence (n=92)	Percentage (%)
Acceptance of HPV Vaccination Program		
Accept	59	64,13
Not Accept	33	35,87
Total	92	100

Source: Primary Data, 2020

than the target of HPV vaccination coverage in the Badung Regency (99%) even though it has been implemented free of charge. Increasing HPV vaccination coverage is certainly still needed to achieve the expected target. The results of this study are not much different from those conducted by Fu, et al. (2019) that respondents of African and American parents who received HPV vaccination were only 54.5% (Fu, *et al.,* 2019). Also shown in a study conducted in Italy by Della, et al. (2020) that respondents whose children have been vaccinated against HPV are 57.9% (Della, *et al.*., 2020). Another study conducted in South Africa by the Senate & Dolamo (2018) also showed that 53% of respondents received HPV vaccination (Senatla & Dolamo, 2018). It shows that low acceptance of HPV vaccination by parents can occur in various parts of the world.

Based on the results of the bivariable analysis in Table 3, four variables have a significant relationship with the acceptance of the HPV vaccination program, namely age, knowledge, perceived benefits, and perceived barriers ($p < 0.05$). Based on the age variable, parents aged > 35 years were 5.9 times more likely to receive the HPV vaccination program than those aged 35 years (OR = 5.90; 95%CI 2.20-15.80). Similar research results were also shown by Lee, et al. (2017) that age was significantly associated with acceptance of HPV vaccination ($p = 0.046$) (Lee, *et al.,* 2017). The same thing in the research conducted by Siamanta, et al. (2018) found age is significantly associated with receipt of HPV vaccination ($p = 0.01$) (Siamanta, *et al.,* 2018).

A person's age can cause differences in their experience of health problems or diseases and decision-making (Noor, 2000). The results of this study indicate that older respondents have a higher acceptance of the HPV vaccination program than those who are younger. It can happen because with the increasing age, the experience, knowledge, and wisdom in making decisions are getting better. This statement is in line with Hudhah (2017) that the age of the respondent who has increased can increase the experience in parenting so that it affects the prevention and control of disease (Hudhah, 2017). The study's results also showed that the percentage of parents aged > 35 years was more than those aged 35 years, which was 71.74%. It is in line with research conducted by Saqer, et al. (2017) that respondents aged > 35 are 64% (Saqer, *et al.,* 2017). It shows that most respondents' parents have more experience and knowledge in preventing cervical cancer through HPV vaccination.

Based on the knowledge variable, parents who have a good level of knowledge about cervical cancer and the HPV vaccine are 4.21 times more likely to receive the HPV vaccination program (OR = 4.21; 95%CI 1, 70-10.43). Respondents with good knowledge have a higher probability of receiving the HPV vaccine than respondents with poor knowledge. Aligned with the research conducted by Yuen, et al. (2018) showed parents who have good knowledge of cervical cancer have a 1.88 times greater tendency to receive HPV vaccination (OR = 1.88, 95%CI 1, 22 – 2.90) (Yuen, *et al.,* 2018). A similar study conducted by Nickel, et al. (2017) also proved that the knowledge that parents have about HPV is a factor that influences vaccination acceptance ($p < 0.001$). Similar to the study conducted by Wang, et al. (2018) that parents of daughters with good knowledge of HPV were 4.97 times more likely to receive HPV vaccination than those who had less (OR = 4.97; 95%CI = 1.35 – 18.37) (Wang, *et al.,* 2018). A study conducted in Yogyakarta Province, Indonesia by Sitaresmi, et al. (2020) showed that knowledge about cervical cancer and HPV vaccination had a significant relationship with acceptance of HPV vaccination ($p < 0.001$) (Sitaresmi, *et al.,* 2020). It shows that the better the knowledge and understanding possessed by the respondents, the greater awareness of the importance of taking preventive measures and the motivation to accept the HPV vaccination program.

The interviews with several respondents shown they got health education or promotion held in schools before the HPV vaccination program was carried out. Most parents understand that cervical cancer can be prevented with HPV, thus increasing interest and becoming the basis of motivation to take a stand to accept the HPV vaccination program. However, some indicators have not been properly understood by parents. The indicators like the number of doses received,

the recommended age for receiving the vaccine, the type of vaccine, and the side effects caused. Based on the results of the distribution of answers in the questionnaire.

Based on one of the theories that underlie this research, the HBM theory stating that knowledge exists before perception formation and can have an indirect effect on attitudes by influencing perceptions of vulnerability, perceived severity, perceived benefits, and perceived barriers (Snelling, 2014). The additional analysis showed that there was a significant relationship between knowledge and perceived severity and knowledge and perceived barriers. Respondents having good knowledge tend to be 2.59 times higher to have a high perception of severity (OR = 2.59; 95% CI 1.11-6.03). Meanwhile, respondents who have good knowledge tend to be 7.88 times higher to have a low perception of barriers (OR = 7.88; 95% CI 2.76-22.48). It suggests that it is possible to describe the relationship between knowledge and attitudes towards the acceptance of the HPV vaccination program not only as simple as logistic regression analysis but requires an analysis that considers the direct and indirect relationships between variables.

Based on the analysis results, the respondents' parents' good knowledge about cervical cancer and HPV vaccination was 55.43%. It shows that the proportion of respondents with good knowledge and poor knowledge is almost equal in proportion. It shows that although health promotion efforts have been carried out, the percentage of respondents with good knowledge is not too high. So, health education is still needed with materials and media easily understood by ordinary people and, of course, interesting.

Based on the perceived benefit variable, it was shown that parents who had a high perceived benefit were 4.05 times more likely to receive the HPV vaccination program compared to those with a low perceived benefit (OR = 4.05; 95% 1.22-13). ,37). The variable perception of benefits regarding HPV vaccination was significantly associated with acceptance of the HPV vaccination program. Respondents who have a high perceived benefit are more likely to receive the HPV vaccination program. These results are aligned with The Health Belief Model (HBM) theory proposed by Rosenstock (1974) explaining that individual perceptions of the benefits or benefits obtained affect the choice of healthier behavior, namely in this study acceptance of the HPV vaccination program (Snelling, 2014).

A study by Wang, et al. (2018) proved that parents with a high perceived benefit were 1.48 times more likely to receive HPV vaccination than those with a low perceived (OR = 1.48; 95%CI 1.18-1.85) (Wang, *et al.,* 2018). Similar results in a study by Degarege, et al., (2019) finding that parents who had a high perceived benefit were 1.48 times more likely to receive the HPV vaccine compared to parents who had a low perceived benefit (= 0.39, OR = 1.48, p < 0.001) (Degarege, 2019). Research conducted by Madhivanan, et al. (2014) also stated that parents who considered HPV vaccination the right way to protect their daughters from cervical cancer were 8.95 times more likely to receive the HPV vaccine (OR = 8.95, 95%CI 3.15-25,45) (Madhivanan, et al., 2014). Research by Yuen, et al. (2018) mentioned parents who consider the benefits of the HPV vaccine to protect their daughters from HPV infection are 3.16 times more likely to receive HPV vaccination than those who do not, to protect their daughters from HPV infection (OR = 3, 16, 95%CI 1.39-7.15) (Yuen, et al., 2018). It shows that the more benefits parents and their daughters got when vaccinating against HPV, the greater the desire to receive the HPV vaccination program. In this study, the benefits obtained may include the effectiveness of the HPV vaccine, the assurance of the safety of the HPV vaccine, and the ease of accessing the program in schools Particularly, when the program is implemented free of charge. It aligned with the research of Lin, et al. (2020) that parents' desire to vaccinate HPV is higher in those who perceive that HPV vaccination has satisfied effectiveness. Therefore, the perception of the benefits of HPV vaccination to prevent cervical cancer is a primary factor influencing parents' willingness to vaccinate their daughters (Lin, et al., 2020).

The perceived barrier variable showed that parents who had low perceived barriers were 5.21 times more likely to receive the HPV vaccination program than those with high

barriers perceptions (OR = 5.21; 95%CI 1.99-13,65). The variable perception of barriers to cervical cancer is significantly related to the acceptance of the HPV vaccination program. Respondents with low perceived barriers are more likely to receive the HPV vaccination program. The results are following The Health Belief Model (HBM) theory proposed by Rosenstock (1974). It explains that an individual's perception of performing a certain behavior will result in a negative impact that can affect individual behavior change (Snelling, 2014).

Based on qualitative research conducted in Utah, United States by Warner, et al. (2014), parents who are respondents feel they are not informed about the HPV vaccine. The lack of information obtained by parents is an obstacle to vaccinating their children. In addition, the majority of parents perceive that the vaccine can cause serious complications or side effects. Parents are worried that their children will have free sex as a consequence of the HPV vaccine. So they are reluctant to receive the HPV vaccine. On the other side, the views and emotional side of teenagers are considered. Some who do not participate in the HPV vaccination program are reported to be afraid of the pain caused by injections. It has a vital role in influencing parents' decisions (Yuen, *et al.,* 2018). This study shows that the greater the number of obstacles and negative impacts obtained when vaccinating HPV, the lower the desire to receive the HPV vaccination program. In this study, these barriers could include side effects after HPV vaccination, discrepancies with beliefs, too young a child, and concerns about injections. This statement is also supported by research by Warner, et al. (2014) and Grandahl, et al. (2014) that the higher and more barriers parents perceived, the more reluctant they are to receive HPV vaccination for their children (Grandahl, *et al.,* 2014; Warner, *et al.,* 2014).

Based on the results of the bivariable analysis in Table 3, four variables do not have a significant relationship with the acceptance of the HPV vaccination program, namely education level, vulnerability perception, severity perception, doctor's recommendation ($p > 0.05$). The education level variable showed no significant relationship with the acceptance of the HPV vaccination program. In a study conducted by Saqer, et al. (2017) also showed that education level was not correlated with willingness to receive the HPV vaccine ($p > 0.05$) (Saqer, *et al.,* 2017). The research conducted by Zhang, et al. (2013) obtained different results that education level was associated with acceptance of HPV vaccination ($p = 0.009$). In this study, respondents with low levels of education do not necessarily have broad insights. Insights, information, and knowledge can be obtained not only through formal but can also from non-formal education. Nowadays, it is easy to access reliable information through the internet and mass media. The research of Grandahl, et al. (2017) also shows a similar event that the internet is the primary source of information for parents to obtain information about HPV (Grandahl, *et al.,* 2017). Based on the results of this study, it is also shown that the percentage of respondents with higher education is less than those with low education, which is 40.22%. A similar study, also shows that higher education has a lower percentage, which is 29.1% (Maric, 2018).

The variable perception of susceptibility to cervical cancer does not have a significant relationship with the HPV vaccination program acceptance. Similar results in a study conducted in Alabama by Litton, et al. (2011) that the perception of susceptibility does not have a significant relationship with the desire to receive HPV vaccination ($p > 0.05$) (Litton, *et al*., 2011). In a study conducted by Madhivanan, et al. (2014), the items on the perception of susceptibility were not significantly related to the acceptance of HPV vaccination. Namely the belief in the likelihood that their daughters would be exposed to HPV in the future (OR = 1.31; 95%CI 0.78-2.22), belief in the probability that their daughter will be at risk of HPV infection (OR = 1.07; 95%CI 0.66-1.74), and belief in the probability that their daughter will develop cervical cancer one day (OR = 1.47; 95%CI). 1.09-2.32) (Madhivanan, *et al.,* 2014)530,000 women are diagnosed with cervical cancer and 275,000 die annually. India bears the greatest burden of the disease with 132,000 cases and 74,000 deaths yearly. Widespread uptake of human papillomavirus (HPV. Research by Grandahl, et al. (2017) also

showed that the perception of susceptibility was not significantly associated with acceptance of HPV vaccination ($p > 0.05$) (Grandahl, *et al.,* 2017). There are also different research results, namely a study conducted by Degarege, et al., (2019) which stated that parents who believed that their daughters were susceptible to HPV infection and cervical cancer were significantly associated with the desire to receive HPV vaccination ($p < 0.01$) (Degarege, *et al.,* 2019).

The absence of a relationship between perceived susceptibility and acceptance of the HPV vaccination program in this study could be due to the respondent's lack of understanding about the susceptibility of his daughters to HPV and cervical cancer, as evidenced by the low percentage of respondents with good knowledge in this study. Based on the results of the analysis, it was shown that there were quite some respondents who had high susceptibility perceptions, but among them still did not receive the HPV vaccination program (30.87%). It allows for other factors to be considered by parents in accepting the program. Even though in the bivariable analysis, the perception of vulnerability did not have a significant relationship, the p-value of the perceived vulnerability variable was still eligible to be included in the multivariable analysis ($p < 0.25$).

The severity perception variable about cervical cancer does not have a significant relationship with the acceptance of the HPV vaccination program. In a study conducted in Alabama by Litton, et al. (2011) that perceived severity has no significant relationship with the desire to receive HPV vaccination ($p > 0.05$) (Litton, *et al*., 2011). In a study conducted by Madhivanan, et al. (2014) also stated that the item in the perception of severity, namely the belief that cervical cancer is a dangerous disease, was not associated with receiving HPV vaccination (OR = 1.42, 95% CI 0.74-2.72) (Madhivanan, *et al.,* 2014)530,000 women are diagnosed with cervical cancer and 275,000 die annually. India bears the greatest burden of the disease with 132,000 cases and 74,000 deaths yearly. Widespread uptake of human papillomavirus (HPV. Research conducted by Grandahl, et al. (2017) also showed similar results that perceived severity was not significantly associated with acceptance of HPV vaccination ($p > 0.05$) (Grandahl, *et al.,* 2017). Other studies show different results, namely one conducted by Wang, et al (2018) that parents with a high level of severity perception are 1.39 times more likely to receive HPV vaccination compared to parents with a low level of severity perception (Wang, *et al.,* 2018).

The absence of a relationship between perceived severity and acceptance of the HPV vaccination program in this study could be caused by the respondent's lack of understanding about the cervical cancer severity, as evidenced by the low percentage of respondents with good knowledge in this study and that knowledge affects perceptions of severity. The analysis results show that there were quite some respondents who had a high perception of severity. But some of them still did not receive the HPV vaccination program (32%). It allows for other factors to be considered by parents in accepting the program.

The absence of a relationship between doctor's recommendations and acceptance of the HPV vaccination program in this study could occur because nowadays in obtaining sources of information, especially health, of course, it does not only come from doctor's recommendations. In a study by Saqer et al. (2017), respondents consider media such as TV, the internet, and the work or school environment to be the largest sources of information. The highest source of information was from TV, such as knowledge about cervical cancer (51.6%), HPV (35%), and HPV vaccine (34.5%) compared to other sources of information (Saqer, *et al.,* 2017). A study conducted by Grandahl, et al. (2017) also mentioned that parents use mass media and the internet as the primary source of obtaining information about HPV vaccination (Grandahl, *et al.,* 2017). Therefore, there is a possibility in this study that the same thing happened, namely more respondents and trusting information obtained through the internet and mass media.

Based on the bivariable analysis described earlier, five factors met the requirements to be included in the multivariable analysis consisting of age, knowledge, perceived vulnerability, perceived severity, and perceived benefit ($p < 0.25$). Based on the results of multivariable analysis using the forward variable selection

Table 3 Bivariabel Analysis of Factors Affecting HPV Vaccination Program Acceptance

Variable	HPV Vaccination Program Acceptance					
	Accept (n=59)	Not Accept (n=33)	Total	OR	95%CI	p Value
Age						
≤ 35 years	9 (34,62%)	17 (65,38%)	26	Ref		
> 35 years	50 (75,76%)	16 (24,24%)	66	5,90	2,20-15,80	0,00
Education Level						
Low	37 (67,27%)	18 (32,73%)	55	Ref		
High	22 (59,46%)	15 (40,54%)	37	0,71	0,30-1,69	0,44
Knowledge						
Poor	19 (46,34%)	22 (53,66%)	41	Ref		
Good	40 (78,43%)	11 (21,57%)	51	4,21	1,70-10,43	0,00
Vulnerability Perception						
Low	16 (53,33%)	14 (46,67%)	30	Ref		
High	43 (69,35%)	19 (30,87%)	62	1,98	0,81-4,86	0,14
Severity Perception						
Low	25 (59,52%)	17 (40,48%)	42	Ref		
High	34 (68%)	16 (32%)	50	1,45	0,61-3,40	0,40
Benefit Perception						
Low	5 (35,71%)	9 (64,29%)	14	Ref		
High	54 (69,23%)	24 (30,77%)	78	4,05	1,22-13,37	0,02
Barrier Perception						
Low	10 (37,04%)	17 (62,96%)	27	Ref		
High	49 (75,38%)	16 (24,62%)	65	5,21	1,99-13,65	0,00
Doctor Recommendation						
Accept	22 (59,13%)	15 (40,54%)	37	Ref		
Not Accept	37 (67,27%)	18 (32,73%)	55	0,71	0,30-1,69	0,44

Source: Primary Data, 2020

method (p 0.25), the results are presented in Table 4 which shows that three factors influence the acceptance of the HPV vaccination program, namely age, perceived susceptibility, and perceived barriers. Based on the age factor, parents aged > 35 years were 6,044 times more likely to receive the HPV vaccination program compared to parents aged 35 years (AOR = 6,044; 95%CI 1,824-20,021). Similar research results were shown by Lee, et al. (2017) that age was significantly associated with acceptance of HPV vaccination (p = 0.046) (Lee, *et al.,* 2017). The same thing in the research conducted by Siamanta, et al. (2018), age is significantly associated with receipt of HPV vaccination (p = 0.01) (Siamanta, et al., 2018). A person's age can cause differences in their experience of health or disease problems and decision-making. The results of this study indicate that older respondents have a higher acceptance of the HPV vaccination program. It can happen due to the increasing age, experience, knowledge, and wisdom in better decisions making. This statement is in line with Hudhah (2017) that the age of the respondent who has increased can increase the experience in parenting so that it affects efforts to prevent and control the disease (Hudhah, 2017).

Based on the bivariable analysis described earlier, five factors met the requirements to be included in the multivariable analysis consisting of age, knowledge, perceived vulnerability, perceived severity, and perceived benefit (p < 0.25). Based on the results of multivariable analysis using the forward variable selection method (p 0.25), the results are presented in Table 4 which shows that three factors influence the acceptance of the HPV vaccination program, namely age, perceived susceptibility, and perceived barriers. Based on the age factor, parents aged > 35 years were 6,044 times more likely to receive the HPV vaccination program compared to parents aged 35 years (AOR = 6,044; 95%CI 1,824-20,021). Similar research results were shown by Lee, et al. (2017) that age was significantly associated with acceptance of HPV vaccination (p = 0.046) (Lee, et al., 2017). The same thing in the research conducted by Siamanta, et al. (2018), age is significantly associated with receipt of HPV vaccination (p = 0.01) (Siamanta, et al., 2018). A person's age can cause differences in their experience of health or disease problems and decision-making. The results of this study indicate that older respondents have a higher acceptance of the HPV vaccination program. It can happen due to the increasing age, experience, knowledge, and wisdom in better decisions making. This statement is in line with Hudhah (2017) that the age of the respondent who has increased can increase the experience in parenting so that it affects efforts to prevent and control the disease (Hudhah, 2017).

Based on perceived barrier factors, parents with low perceived barriers were 6,056 times more likely to receive the HPV vaccination program than parents with high perceived barriers (AOR = 6.056; 95%CI 1.754-20.906). There is a study that shows similar results, namely one conducted by Degarege, et al., (2019), stating that parents who have a low perception of barriers have a 1.67 times greater tendency to receive HPV vaccination compared to parents who have the perception of a high barrier (Degarege, 2019)"ISSN" : "18732518", "abstract" : "The study examined factors that affect parental intention-to-vaccinate adolescent daughters with HPV vaccine in Mysore district, India. A cross-sectional study was conducted among 1609 parents of

Table 4 Multivariable Analysis of Factors Affecting HPV Vaccination Program Acceptance

Variable	Final Model			p Value
	Adjusted OR	95% CI for AOR		
		Lower	Upper	
Age				
≤ 35 years	Ref			
> 35 years	6,044	1,824	20,021	0,003
Knowledge				
Poor	Ref			
Good	1,236	0,385	3,972	0,721
Vulnerability Perception				
Low	Ref			
High	3,179	1,007	10,030	0,048
Benefit Perception				
Low	Ref			
High	2,667	0,604	11,789	0,196
Barrier Perception				
High	Ref			
Low	6,056	1,754	20,906	0,004

Source: Primary Data, 2020

adolescent girls attending schools in Mysore District between February 2010 and October 2011. A validated questionnaire was used to assess parental attitudes, beliefs related with HPV infection, cervical cancer, HPV vaccine and vaccination in general. Structural equation modeling was used to estimate parameters and assess whether a model based on the integrative behavior theory would fit the current data. More than two-thirds (78.0%. In this study the greater the number of obstacles and negative impacts obtained when vaccinating HPV, the lower the desire to receive the HPV vaccination program. These barriers in this study could include side effects after HPV vaccination, discrepancies with beliefs, too young a child, and concerns about injections. This aligned with Warner, et al. (2014) and Grandahl, et al. (2014). The higher and more barriers parents perceived, the more reluctant they are to receive HPV vaccination for their children (Warner, *et al.,* 2014; Grandahl, *et al.,* 2014).

From the factors mentioned, the perceived barrier variable is the most influential in the HPV vaccination program acceptance. The factors in this study affect the HPV vaccination program acceptance by 26.13%. While 73.87% were by other factors. The limitations of this study are the data collection process using online questionnaires causing the possibility of information bias. There is also the possibility of recall bias, namely errors in remembering and reporting experiences that respondents have experienced, such as their daughter's HPV vaccination status and experience receiving doctor's recommendations.

Conclusion

Based on the characteristics of the respondents, the percentage of respondents aged > 35 years was 71.74%. Female respondents are 71.74%. Respondents with low education amounted to 59.78%. The percentage of respondents who received the HPV vaccination program was 64.13%. There are three factors that affect the acceptance of the HPV vaccination program, namely age, perceived susceptibility, and perceived barriers. The most influential factor in the acceptance of the HPV vaccination program is the perception of barriers.

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Rice Bran Substitution to Vitabran as A Snackyfication Trend Model and Diabetes Mellitus Prevention

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Abstract

Snackyfication is a trend where snacks as a substitute for staple food are more efficient. On the other hand, the Diabetes Mellitus case increases, and it is related to unhealthy foods, so there is a need for healthy foods on the market. The research objective was to find which product formula would be recommended as Vitabran. Vitabran is made from rice bran, while additional ingredients are yellow sweet potato pulp, cornstarch, soy milk, flour, eggs, honey, baking powder, margarine, and oats. The formula tested consists of 2 variations of bran content (20% and 30%). The product was made of biscuits in the form of bars. The tests consisted of 1) organoleptic test 2) hedonic test. 3) proximate test and 4) Glycemic Index test. The final result of functional food substitution is a synergistic effect of the functional substances contained therein.

Introduction

Currently, Indonesia is in 7th place in the world regarding DM sufferers. It tends to increase from 5.7% in 2007 to 6.9% in 2013 and 8.5% in 2018 (RI, 2014). The treatment is lasting for a lifetime, which results in family financial burdens, thus increasing the severity of symptoms and grievance in sufferers(Sneha & Jyotsna, 2017; Tol et al., 2013; Casqueiro & Casqueiro, 2012; Yu, 2014). Lifestyle-related to eating habit is the main reason for the increase in cases of DM (Begic & Arnautovic, 2016; Silva, 2012; M, 2016; Aye & Aung, 2014; Chakraborty et al., 2018; Handayani, 2019). It including snacks that are often consumed are high in carbohydrates, as well as high fat, which has a response to a potential increase in blood sugar or a high glycemic index (GI) (Handayani, 2019; Chakraborty et al., 2018; Malviya & Jain, 2010). Snackyfication is a new trend in consuming food by the millennial community, food in the form of snacks eaten several times a day and carried out simultaneously with activities (without special time), and can meet the body's energy needs. Snackyfication, which can be said to be a snack, must be supported by healthy food substances and does not affect the DM cases addition in the community.

The results found several local food ingredients that are also consumed as functional foods and have a low GI, which can be used to support the treatment of DM sufferers and prevention of non-sufferers, such as rice bran flour and sweet potato (W, 2015; Ayeleso & Ramachela, 2016; Chakraborty *et al.,* 2018; Sivamaruthi & Kesika, 2018; Das *et al*., 2014). Rice bran flour is a by-product of rice processing that is rich in nutrients such as dietary fiber, minerals, vitamin B complex, vitamin E, essential fatty acids, amino acids, and antioxidants (W, 2015; Das *et al*., 2014; Sivamaruthi & Kesika, 2018). Sweet potatoes

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contain carbohydrates, fat, and protein. It contains high fiber, vitamin A and potassium minerals (Aye & Aung, 2014; Rose IM, 2011). This food ingredient is widely grown in Indonesia and is easily available at an affordable price, so it is an effort to conserve food, and has an effect on improving blood sugar levels, as well as other health effects, such as anti-infection, anti-oxidant, so that it can be used for snackyfication in a form that is preferred, and selected in the form of a bar. The research problems are: 1) How is the acceptance of target consumers for products related to the organoleptic test and hedonic test at bran levels of 20% and 30%. 2) What are the proximate product test results at bran content of 20%, and 30%. 3) Which product formula to recommend as Vitabran. 4) What is the Vitabran IG value.

The urgency of this research is related to the trend of snacks as a substitute for staple foods. It is considered more efficient (snackyfication), an increase in DM cases in the community affecting the quality of human resources, health financing, decreased performance. On the other hand, the main cause of the increase in DM cases is related to the consumption of unhealthy food. So there is a need for availability or supply of healthy food in the market, favored and affordable by the community, both for preventive purposes and to support the successful treatment of DM sufferers. So it is necessary to test the usage of rice bran as a snack, which in this study the product produced is called Vitabran.

Method

The ingredients consist of rice bran as base ingredients. Additional ingredients include yellow sweet potato pulp, cornstarch, soy milk, wheat flour, eggs, honey, baking powder, margarine, and oats. The tested Vitabran formula consisted of 2 kinds of rice bran content (20% and 30%), with the formula according to Table 1.

To obtain fresh rice bran. Fresh rice bran is seen from its fresh brown color, not rancid aroma, and contains no contaminants. After that, the rice bran is sieved using an 80 mesh sieve. This sieve is chosen to ensure that all contaminants are properly filtered. The sieved rice bran is then sterilized using an autoclave at 121^{o}C for 3 minutes. After autoclaving, the bran is drained until the moisture is gone, then it is baked at 105^{o}C for 1 hour. Then, it is cooled and packed in plastic storage added with silica gel.

The Vitabran making begins with making a dough, which is made by mixing rice bran flour, yellow sweet potato porridge, cornstarch, soy milk flour, wheat flour, egg white, honey, baking powder, and margarine which is then kneaded into a smooth dough. The dough is then flattened in a pan having a thickness of 2 cm and then cut into pieces measuring 12 cm long and 3 cm wide. Before baking, the dough that has been molded is smeared with egg yolk and greased with oats. Roasting is then carried out for 20 minutes, with a reversal after the first 10 minutes.

The product was tested by organoleptic analysis to determine the value of the preferred color, texture, taste, aroma. The hedonic test was carried out to determine the preferred formula of all Vitabran formulas. Proximate analysis by moisture content and ash content

Table 1. Vitabran Formula

No	Substances	Formula 1	Formula 2
1	Rice Bran	20%	30%
2	Yellow sweet Potato porridge	40%	30%
3	Corn starch powder	14%	14%
4	Soy bean milk	10%	10%
5	Baking powder	1%	1%
6	Margarine	10%	10%
7	Honey	5%	5%
8	Oats		

using the oven method (Akhtar & Anjum, 2011; Hussain J, 2009), protein content using the Kjeldahl (Akhtar & Anjum, 2011). Micro method, fat content using the Soxhlet (Akhtar & Anjum, 2011) method, carbohydrate content using carbohydrate by difference (Akhtar & Anjum, 2011), Analysis of food fiber content (Aye & Aung, 2014; Hussain J, 2009).

Sensory analysis was carried out on trained panelists aged 25-40 years. Ten people (five male and five female) using a quality scale of 9 points, (1 very low quality and 9 very very good quality) (Saji *et al*., 2019; Civille, 2012). Aspects considered for analysis are color, texture, sweetness, aroma, and overall quality. The assessment of the level of product preference was carried out by 80 consumer panelists, with an acceptability test with a preference scale of 1 - 9. The value of 1 was very disliked, up to the value of 9 was very very like (Saji *et al*., 2019; Iannario *et al*., 2012). This proximate test was tested by an independent sample t-test to know the difference in the chosen formula.

Assessment of the Glycemic Index (GI), using adult human volunteer panelists, consisting of five males and five females, the criteria for the panelists are in good health, do not suffer from diabetes, aged 25-40 years, have a standard body mass index (BMI) (18 -25 kg / m2). The sample with the GI contains 40 g of total carbohydrates is then given to the panelists who have undergone a fast (except water) for one night (around 8.00 pm to 08.00 am). For 2 hours in 30 minutes intervals after giving the tested product, 20 µL of blood samples were taken using the finger-prick capillary blood samples method (measurement 0, 30,60,90, and 120 minutes). As a standard (reference food), blood sugar levels were also measured by giving 50 g of pure glucose (d-glucose anhydrous) to the panelists. Measurement of blood glucose levels between the reference food and product testing is given a 7-day interval (1 week). The data were analyzed by the t-test to compare the reference food GI with the product GI.

Results and Discussion

The process of making biscuit bars begins by trying six formulas for the combination of mixed ingredients to get a texture of biscuits that is not easily broken (compact). The color is not too brown, but with a crunchy taste, without changing the composition of the main ingredients, namely rice bran content of 20% and 30% with sweet potato content of 40% and 30%. We get two formulas which are then tested organoleptic, proximate, and GI test. The

Table 2. Results Of Sensory Quality Assessment (Organoleptic Test)

Product Assestment	Overall	Color	Aroma	Crispy/ Texture	Sweetness	Sweet Potato Taste	Total Score
	1	2	3	4	5	6	7
Vitabran F1	49	46	48	44	45	45	277
Vitabran F2	53	49	55	52	47	53	309

Table 3. Hedonic Test Assessment Results

Product Assestment	Overall	Color	Aroma	Crispy/ Texture	Sweetness	Sweet Potato Taste	Total Score
	1	2	3	4	5	6	7
Vitabran F1	488	484	438	429	447	475	2761
Vitabran F2	503	495	515	509	458	482	2962

Table 4. Proximate Content In Biscuits F1 And F2 And Difference Test Results

Biscuits	Average					
	Carbohydrate (%)	Protein (%)	Fat (%)	Water (%)	Ash (%)	Crude Fiber(%)
Vitabran F1	63.149	10.648	6.203	0.083	17.413	2.219
Vitabran F2	68.286	11.161	6.540	0.073	13.010	0.442
p-value	0.000	0.003	0.005	0.251	0.000	0.000

results of the sensory quality score were carried out on ten panelists. Overall the biscuit bar 2 had a higher value of 53, as well as the total value of each aspect assessed which was 309, while the highest value was in the aroma aspect of 55 (Table 2).

The results of the favorite value or hedonic test conducted on 80 consumer panelists. Overall, the highest value was in Vitabran F2, namely 503, and the highest total of all assessed aspects was also found in Vitabran F2, which was 2962, and the highest value was in this aspect. Aroma with a value of 515 (Table 3).

The results of the proximate test showed that the carbohydrate, protein, and fat content was higher in the Vitabran F2 while the water, ash, and crude fiber content was higher in the Vitabran F1 (Table 4). Meanwhile, the difference test resulted in a significant difference in carbohydrate, protein, fat, ash, and crude fiber between Vitabran F1 and F2. In the water content test, there was no significant difference between Vitabran F1 and F2.

Vitabran selected for the GI test is by the Vitabran F1, based on the following considerations: 1) Proximate test results, which contain lower carbohydrates, fat, higher protein, ash, and crude fiber. 2) hedonic test results, where the overall value between Vitabran F1 and F2 is not too striking (15 points or a value of 503 and a value of 488), or in other words, it is still acceptable to target consumers. GI results are calculated based on examination of blood sugar I (for panelists when consuming 50 g of pure glucose or anhydrous d-glucose) and blood sugar II (for panelists when consuming Vitabran which contains 40 g of carbohydrates or the equivalent of 63,277 g of Vitabran biscuits or about 5 pieces. biscuit Vitabran), the GI results were 65.091 (moderate category).

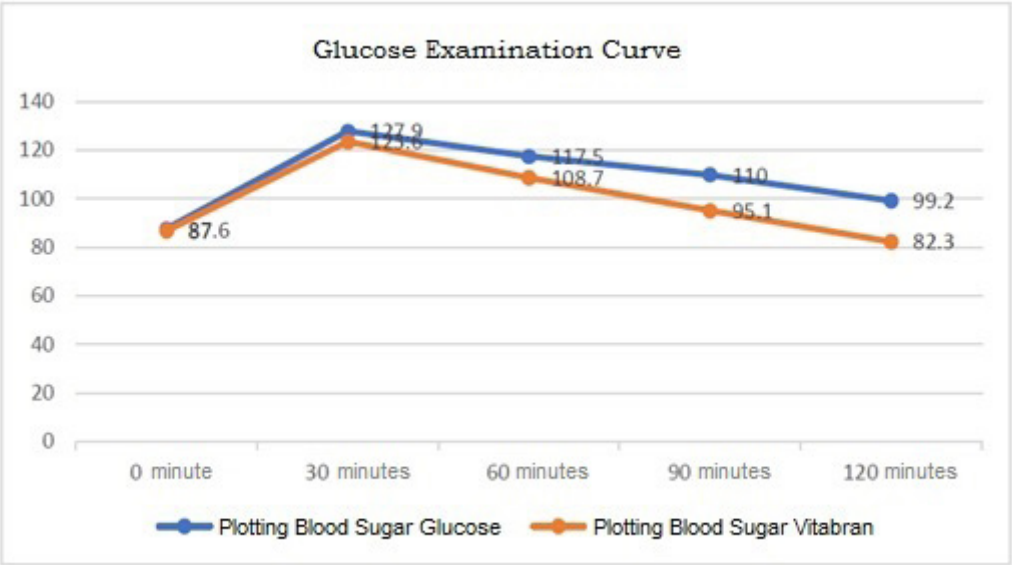

Figure 1. Glucose Examination Curve

The proximate and hedonic tests associated with the sensory and the preference test concluded that the biscuit bar 2 formula with higher rice bran content (30%) and lower yellow sweet potato (30%). The formula is preferred by the panelists (in terms of the value of sweetness, color, aroma, crunchiness, texture). Although the rice bran content in the Vitabran F2 is higher than the Vitabran F1, this is possible because the composition resulting from the added sweet potato content can make the aroma and crunchiness more delicious and received by the panelists. It was as expressed by the panelist :

"Biscuit number one is a bit soft or not crunchy, I really prefer number two. Is this made from rice bran? how come it doesn't taste, like biscuits made from flour, if it doesn't cause a rapid rise in blood sugar, I would also like to provide for snack"

Based on the proximate test results, Vitabran F2 has a higher carbohydrate content than Vitabran F1, with a difference of 5.355. Includes a higher content of protein and fat. Meanwhile, the ash and crude fiber content are low. It is probably due to the effect of the rice bran which is given in a higher concentration in the biscuit bar 2 formula where the bran contains higher carbohydrates and protein than the sweet potato. The results of other studies show that per 100 grams of rice bran contains 50 grams of carbohydrates, 16.5 grams of protein, 21.3 grams of fat, and 0.9 grams of magnesium, while per 100 grams of sweet potato contains 20.1 grams of carbohydrates, 1.6 grams of protein., 0.05 g fat and 25.70 mg magnesium (M, 2016; Chakraborty *et al*., 2018; Handayani, 2019).

The Vitabran formula chosen for the GI test on panelists is the most beneficial formula based on the proximate test, namely the Vitabran F1. Glycemic index is the time required for the increase or the increased speed in blood sugar levels after consuming food which is equivalent to 50 g carbohydrates (Rose, 2011; Sivamaruthi & Kesika, 2018; Aye & Aung, 2014). Such as the results of research which states that the rate of increase in blood sugar levels is different for each food ingredient, in this case, it is classified into low GI <55, medium GI 55-70, and high GI> 70 foods. Carbohydrates that are broken down quickly in the body during digestion have a high GI value, whereas carbohydrates that are broken down slowly will release glucose into the blood slowly so that they have a low GI (Marciani, 2013; Bornhorst, 2012; Lee, 2014). The results of the Glycemic Index (GI) examination on volunteers who were given Vitabran consumption was categorized as moderate (65.091). It is possible because the overall composition of Vitabran will have a synergistic effect that comes mainly from rice bran and sweet potato, as stated in the results which state that the effect on GI is a synergistic effect of the bran content consisting of 34% -62% carbohydrates, 15% -20% fat, 11% -15% protein, 7% -11% fiber, minerals, such as Phosphorus, Potassium, Magnesium, Calcium, and strong anti-oxidants (Chakraborty *et al.,* 2018; Sivamaruthi & Kesika, 2018). Other supporting research results suggest that the anti-diabetic effect that occurs after rice bran supplementation is a synergistic effect of various compounds such as acylated steryl glycerides, flavonoids, resveratrol, oryzanol, ferulic acid, policosanol, tocotrienol, hydroxycinnamic acid derivatives, and several bioactive peptides (Brennan *et al*., 2012; Saji *et al.*, 2019; Hong *et* al., 2017). Meanwhile, fortification of rice bran with wheat in the form of sausage and bread obtained an increase in satiety compared to sausage and whole wheat bread without rice bran, besides that fortification in snack products prolongs the glucose release period and shows the potential to increase satiety (Brennan *et al*., 2012; Sivamaruthi & Kesika, 2018; Akhtar & Anjum, 2011; Hallberg & Brune, 1986).

Magnesium in rice bran can cause increased glycemic control and prevent resistance to insulin from working optimally (Das *et al*., 2014), while the strong anti-oxidants in rice bran can help manage the incidence of DM associated with oxidative stress (Chakraborty *et al.,* 2018; JG, 2014).

The effect of adding sweet potato mixed to Vitabran (in the biscuit formula 1), which tested the Glycemic Index results in a proximate test that is more supportive towards lower GI results, if one looks at a lower content of carbohydrates (63,214), and higher in ash. (17.44) and crude fiber (2,232). The results of

the research are in line with the nutritional content of sweet potatoes per 100 grams, including calories (86kcal), carbohydrates (20.1g), fat (0.1 g), protein (1.6g), fiber (1.7g), high vitamin A (709µg), high in the mineral potassium (337mg). Or other proximate analysis results of yellow sweet potato per 100 grams are 20.12 g carbohydrates, 1.57 g protein, 3 g fiber, 0.05 g lipids, various kinds of vitamins such as Thiamin, Riboflavin, Niacin, B6, B9, vitamin C, vitamin K, and vitamin A, as much as 14187 IU. Various minerals such as Calcium 30.78 mg, Iron 0.61 mg, Magnesium 25.70 mg, Phosphor 47.81 mg, Potassium 337 mg, Sodium 55 mg. The effect of lowering blood glucose in sweet potatoes is associated with increased adiponectin levels, which is an adiposity hormone that functions as a metabolic process for insulin (Ayeleso & Ramachela, 2016; Kalyani, 2009). The sweet potato's carbohydrate content can be used as a source of calories and has a Low Glycemic Index (LGI 51) value (Murtiningsih, 2011; Aye & Aung, 2014; Kato C, 1976). It is a type of carbohydrate if it is consumed, will not increase blood sugar levels drastically. Sweet potato dietary fiber is a polysaccharide that is not digested and absorbed in the small intestine, which is a larger part of the biscuit bar 1 formula, which is also a determinant of the resulting GI value.

Conclusion

The biscuit bar test results concluded that Vitabran F1 with 30% bran and 30% yellow sweet potato was the formula preferred by the panelists (color, aroma, texture/crunchiness, sweetness). The proximate test results showed that the carbohydrate, protein, fat content was higher in the Vitabran F2, while the water, ash and crude fiber content was higher in the Vitabran F1. Vitabran selected for the GI test was the Vitabran F1, with consideration of proximate test results and hedonic test results which are favorable for the GI category and are still acceptable to target consumers, with the results of the Glycemic Index (GI) examination on volunteers categorized as moderate (65.091).

The results showed that the functional food substitution is a synergistic effect of the substances contained in it, so it needs to be tested in a more varied formula. The effect of food consumption on the metabolism (in this study is the effect on blood sugar) in the body can be estimated based on the proximate test, but the certainty of this effect requires a GI examination.

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