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Purwokerto, October 8th-9th, 2019

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"Improving Quality of Life for People with Non-Communicable Disease (NCDs)"

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All praises to Allah SWT the Most Gracious and the Most Merciful for His blessing and guidance given to us, so we, Research and Community Services of Harapan Bangsa University Purwokerto could conduct an international conference of research findings with the theme "Improving Quality of Life for People with Non-Communicable Disease (NCDs)".

This conference was aimed to facilitate academics and practitioners, mainly in the health to disseminate the results of their research. Therefore, it is expected that the results of these studies can be useful to help improve the quality of health services, especially those related to non-communicable diseases.

This event was conducted by Harapan Bangsa University on October 8th-9th, 2019, located in Java Heritage Hotel Purwokerto. The committee was the academic community of Harapan Bangsa University. The participants of this conference were the academics and practitioners in the health sector on non-health sector from Indonesia and overseas. Meanwhile, the outcome of this event was proceeding with ISBN on an international scale.

Hopefully, this event was beneficial for the development of Non-communicable Diseases Study Field. It is expected that in the future this kind of event be held decently.

Purwokerto, March 16, 2020

Chairperson

Ns. Azka Fathiyatir Rizqillah, MN

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THE RELATIONSHIP BETWEEN BODY MASS INDEX AND DYSMENORRHEA ON FEMALE STUDENT IN SENIOR HIGH SCHOOL 4 YOGYAKARTA

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ABSTRACT

Background: Dysmenorrhea is defined as lower abdominal pain, affecting half of all menstruating women. Dysmenorrhea is known to decrease daily activities. Body mass index is considered as one of the risk factors for experiencing dysmenorrhea. Some studies show dysmenorrhoea is prevalent among underweight and overweight women. This study aims to identify the relationship between body mass index and dysmenorrhea. Method: This study used a cross sectional design. The study population was 137 female students in Yogyakarta using simple random sampling technique. Data were collected using a visual analog scale and depression anxiety and stress scale 21. Data were analyzed using chi square for trends, prevalent ratios, and logistic regression. Results: Of 137 students, 94 (68.6%) suffered from dysmenorrhea, with 39 (34.2%) overweight and 17 (18.1%) underweight. Univariate analysis showed a p value of 0,000 in overweight BMI, underweight BMI had a p-value of 0.085. Based on the results of the study, overweight Ho was rejected and Ha was accepted, which means being overweight had a significant relationship (p value <0.05). The prevalence ratio for being overweight is 1.7. Multivariate analysis showed that the menstrual cycle did not have a significant relationship with dysmenorrhea, whereas stress was significantly correlated with dysmenorrhea. Conclusion: Dysmenorrhoea is very common among students with overweight BMI as well as stressed students compared to students without stress.

Keywords: body mass index, dysmenorrhea, stress, menstrual cycle

INTRODUCTION

Adolescent reproductive health is currently quite a concern, such as the lack of knowledge of adolescents about reproductive health, pregnancy before marriage, sexual transmitted diseases, menstruation, and other health problems. Entering the stage of adolescence, adolescents will experience a physical, emotional, and social changes as a characteristic of puberty (Panuju & Umami 2005). Adolescent girls will experience changes including menstruation, narrowed hips, high-pitched voice, and growing hair on certain body parts (Ramadani 2012).

Changes in adolescent girls entering puberty are menarche (first menstruation) which will then routinely undergo menstruation, before the menstrual cycle, teenage girls will experience Premenstrual Syndrome (PMS). Premenstrual Syndrome is an aggregate syndrome of physical, psychological and emotional symptoms associated with a woman's menstrual cycle (Halbreich et al. 2007).

Most teenagers often experience complaints of pain or extreme pain or also called dysmenorrhea during menstruation. Dysmenorrhea defined as pain that is felt when a woman having menstruation thus

it forces her to rest and the pain can result in decreased performance and reduced daily activities (Ju, Jones, and Mishra 2014). Dysmenorrhea is divided into two categories, primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea usually occurs in adolescents <20 years of age and there is no relationship with gynecologic abnormalities, while secondary dysmenorrhea occurs after the age of 20 years and associated with pelvic inflammatory disease (Laila 2011).

It is estimated about 29-90% of women experience dysmenorrhea worldwide and the statistics shown 10-12% of women experience severe dysmenorrhea (Khodakarami et al. 2015). Age, parity, and oral contraceptives use are associated with dysmenorrhea, and high levels of stress increased the risk of dysmenorrhea (Lindeque 2015). Half of adolescent girls in the United States experience dysmenorrhea during menstruation, 29-44% of 113 adolescents who consult a doctor's practice experience dysmenorrhea. According to several international reports the prevalence of dysmenorrhea is very high and at least 50% of adolescent girls experience dysmenorrhea throughout the reproductive years (Sari, Nurdin, and Defrin 2015).

Dysmenorrhea occurs in 60-70% of Indonesian women and 15% of them complaining that their activities are limited due to dysmenorrhea (Glasier 2005). Risk factors of dysmenorrhea involved family history, experiencing severe stress, smoking, nullipara, age <20 years, early puberty (before 11 years), history of experiencing dysmenorrhea, lack of activity, excessive caffeine consumption, diet, diagnosed with PID, and has a history of sexual harassment (Sari, Nurdin, and Defrin 2015).

Changes in lifestyle affect the emergence of new diseases related to the nutritional status in the community. Along with developments that occur globally, there is also an imbalance between food selection, eating behavior, and the level of physical activity. Indonesia, as a developing country, is also experiencing problems with changes in people's nutritional status.

Basic Health Research in 2013 presents the nutritional status of adolescents aged 16-18 years. National prevalence of underweight in adolescents 16-18 years is 9.4% (1.9% very thin and 7.5% thin). The prevalence of fat in adolescents aged 16-18 years was 7.3% which 5.7% is overweight and 1.6% obese. The DI Yogyakarta Province is included in the province with a very overweight prevalence above the national prevalence (Kementerian Kesehatan 2013). Body Mass Index is calculation of weight (kg) / height^2 (cm). The threshold for men is 20.1-25.0, and for women is 18.7-23.8.

Overweight and obesity rates in Indonesia based on body mass index measurements for Asian populations, are high (25% in women and 10% in adult men). Overweight or obesity increases the risk of hypertension, coronary heart disease, ischemic stroke, type II diabetes mellitus, and Cancer (Tesfaye et al. 2007). Study by Nohara et. al. (2011) shown that BMI has a significant relationship as a risk factor for primary dysmenorrhea (Nohara et al. 2011).Based on the existing background, researchers are interested in conducting research with the problem formulation "Is there a relationship between Body Mass Index with the incidence of dysmenorrhea in female students at Senior High School 4 Yogyakarta"

METHOD

This research uses analytic survey research method with cross-sectional approach, cross-sectional is a non-experimental research in order to study the dynamics of the correlation between risk factors and effects in the form of certain diseases or health status with a

point time approach model (Sumantri 2013). The study was conducted at Senior High School 4 Yogyakarta in grade 1 and grade 2, both in the natural science and social science majors. The study was conducted on January 5-19, 2017.

Eligible population is 137 students of Senior High School 4 Yogyakarta grade 1 and grade 2 majoring in Natural Sciences and Social Sciences selected as respondents through sampling. This study uses a sampling technique with simple random sampling. Inclusion criteria; already menstruating, being menstruating when the research is in progress, voluntary participate in research. Exclusion Criteria; history or suffered from reproductive disorders (uterine myoma, ovarian cyst, and benign breast tumor).

The questionnaire used to determine the intensity of dysmenorrhea pain is the Visual Analog Scale (VAS). Measurement of stress levels on students used Depression, Anxiety, and Stress Scale (DASS) sheets. The tools used are scales and height gauges (microtoise), scales and height gauges have been calibrated regularly. The statistical analysis used chi square for trend and chi square (x2) with a 3 x 2 contingency table because one of the variables consists of 3 categories. Analysis of the closeness relationship between the two variables, with the Prevalence Ratio (RP). The test used is Cox Regression to determine the closeness of the relationship using the prevalence ratio.

RESULT AND DISCUSSION

Result

Characteristics of respondents

General characteristics of respondents include the current age of the respondent, the age of menarche, the menstrual cycle, dysmenorrhea treatment behavior, stress, body mass index (BMI), and the incidence of dysmenorrhea.

Table 4.1 General characteristics of the subjects

	Dysmenorrhea				P-Value	RP	CI 95%
	Yes	%	No	%			
Underweight	17	18,1	6	6,4	0,085	1,38	0,997-1,912
Normal	38	40,4	33	35,1			
Overweight	39	34,1	4	3,5	0,000	1,69	1,337-2,148
Normal	38	33,3	33	28,9			

The general characteristics of the research subjects in table 4.1 above show the average age of girls is 15.99 ± 0.70 years, the mean age of menarche students is 12.39 ± 0.96 years. Out of 137 students, 100 students have regular menstrual cycles or 73.0%, from 94 students who experience dysmenorrhea, 69 students or 73.4% manage the dysmenorrhea in a non-medical treatment, More than half of the respondents who participated in the study did not experience stress with a total of 90 students or 65.7%.

Table 4.2 Frequency distribution of body mass index and dysmenorrhea

Characteristics	Frequency	%
Body Mass Index		
- Underweight	23	16,8
- Overweight	43	31,4
- Normal	71	51,8
Dysmenorrhea		
- Yes		
- No	94	68,6
	43	31,4

The characteristics of respondents based on BMI calculations is for underweight category 23 female students or 16.8%, overweight 43 female students or 31.4% and the normal category of 71 female students or 51.8%. There were 94 students who experienced dysmenorrhea or 68.6% and 43 students who did not experience dysmenorrhea or 31.4%.

The relationship of body mass index with dysmenorrhea

Table 4.3 shows that statistically

Characteristics	Mean	SD	N	%
Age (mean/sd)	15,99	0,70		
Age of menarche (mean/sd)	12,39	0,96		
Menstrual cycle				
- Irreguler			37	27,0
- Reguler			100	73,0
Treatment				
- Medic			25	26,6

- Non medic	69	73,4
Stress		
- Stress	47	34,3
- Not streas	90	65,5

there is no relationship between the BMI variable of underweight category with the incidence of dysmenorrhea, with p value 0.085 (p value> 0.05). Based on the Ratio Prevalence (RP) students who have a underweight BMI 1.38 times had greater risk of experiencing dysmenorrhea (RP: 1,381, α: 0.05, 95% CI). Based on table 4.3 the value of p value 0.000, in accordance to table 4.3 there is a relationship between BMI for overweight category with the incidence of dysmenorrhea (p value <0.05). Students who have an overweight BMI are 1.69 times more likely to experience dysmenorrhea (RP: 1,695, α: 0.05, 95% CI).

Table 4.3 Relationship of body mass index with dysmenorrhea

	Dysmenorrhea				P value	RP	CI 95%
	Yes	%	No	%			
Menstrual Cycle							
- Irreguler	25	18,2	12	8,8	0,873	0,97	0,726-
- Reguler	69	50,4	31	22,6			1,269
Stress							
- Stress	40	29,2	7	5,1	0,003	1,41	1,153-
- Not stress	54	39,4	36	26,3			1,744

Relationship of BMI with dysmenorrhea after external variables are added

Cox Regression Analysis was performed to determine the relationship of body mass index with the incidence of dysmenorrhea after adding stress and menstrual cycle variables. Table 4.6 shows BMI has a p value of 0.067, BMI of underweight category is 0.269, and BMI of overweight category is 0.021. Based on the table only the BMI overweight category has a significant relationship with the incidence of dysmenorrhea (p value <0.05), with the ratio prevalence of BMI overweight to the incidence of dysmenorrhea is 1.69. (IDR: 1,695, 95% CI).

Table 4.5 Relationship of body mass index with dysmenorrhea after external variables have been added

	P value	RP	CI 95%	
			Lower	Upper
IMT	0,067			
IMT (underweight)	0,269	1,38	0,780	2,447
IMT (overweight)	0,021	1,69	1,084	2,649

Discussion

Adolescence is marked by the occurrence of major changes from the biological, emotional, social, and cognitive of children that goes into adulthood. These changes can directly affect nutritional status. Growth and development experienced by adolescents dramatically increases their need for energy, protein, vitamins, and minerals. Nutritional problems can occur due to an imbalance between food consumed and physical activity, or inadequate intake of nutrients. Body mass index has been recommended and used globally to show overweight and obesity status in adults and adolescents(Hartyaningtyas 2013).

UNDERWEIGHT

Chi square test on BMI category underweight shows p value 0.085 which means there is no relationship between BMI category underweight with dysmenorrhea. The results of this study are in line with research from Mulastin. However, it differs from studies from Mandhubala which showed a significant relationship between dysmenorrhea and BMI (p <0.01) with an increased in the prevalence of dysmenorrhea in groups with low BMI (underweight) (Chauhan and Kala 2012).

Generally, nutritional deficiencies can cause abnormalities in the hypothalamic-pituitary-ovarian axis. Low body weight and fat mass, lack of calories and abnormalities in eating habits or intake can affect the secretion of pituitary gonadotropin (Bavil et al. 2016). Pituitary gonadotropin plays a key role in increasing the incidence of dysmenorrhea (Somani et al. 2015). For normal growth, adolescent girls needs adequate nutrition, energy, protein, fat, and supply all the

nutrients that are the basis of growth. Highly nutritious and high-fat foods of animal origin cause weight gain in young women, thus the estrogen levels increase (Beddu, Mukarramah, and Lestahulu 2015).
Estrogen plays an important role in the menstrual cycle.

Dysmenorrhea is caused by an increase or imbalance of hormone production in the endometrium during the menstrual cycle. Prostaglandins increased uterine muscle contractions and cause pain (Mei et al. 2007). One of the problems that can cause primary dysmenorrhea is nutritional status. Overweight is a risk factor for primary dysmenorrhea. However, on the other hand someone with underweight can also experience primary dysmenorrhea.

OVERWEIGHT

Based on chi square analysis test conducted to determine the relationship of BMI overweight category with dysmenorrhea obtained p value 0,000 which means there is a relationship between BMI overweight and dysmenorrhea. The results of this study are in line with Hong Ju et al who found that the prevalence of dysmenorrhea was higher in obese women (Ju, Jones, and Mishra 2015). In contrast to studies from Omidvar which showed results between BMI and the incidence of dysmenorrhea had no significant relationship (Fujiwara 2007).

The pathophysiology of dysmenorrhea is due to the presence of prostaglandin secretion (especially PGF2a) from the endometrium in the premenstrual and menstrual phases that cause vasoconstriction and contraction of the uterus (Lindeque 2015). Adipose tissue plays a role in the menstrual cycle and ovulation. This adipose tissue forms androgens into estrogen, body weight affects estrogen metabolism. Excessive body weight in women can reduce the capacity of estrogen to bind to the hormone binding globulin (SHBG). The reduced SHBG can increased estrogenic stimulation in the endometrium which causes prostaglandin production increase, especially PGF2α (Ju, Jones, and Mishra 2015). People with more body mass index shown an increase in excess prostaglandin levels, thereby triggering myometrial spasm triggered by substances in menstrual blood that look like fat. Naturally found in uterine muscles.

Another theory explains the relationship between BMI and dysmenorrhea, women with an overweight or obese body mass index have excess fat tissue that can push the blood vessels in the reproductive organs causing vascular vasoconstriction, during menstruation there is a phase of progesterone withdrawal wherein these levels increase prostaglandins which cause vasoconstriction of blood vessels and myometrial contractions. Excessive fat tissue found in women who are overweight or obese will further increase a person's dysmenorrhea due to pressure on blood vessels (French 2005).

MENSTRUAL CYCLE

Menstrual cycle is defined as the period of time from the first day of menstrual bleeding and counts until the first day of menstrual bleeding in months or later periods (Kordi, Mohamadirizi, and Shakeri 2013). The Cox Regression Test shows a p value of 0.908 which means there is no relationship between the menstrual cycles with dysmenorrhea (because of p value> 0 .5). The results of this study are in line with research from Purba who conducted research on 171 students, the chi square test obtained p value of 0.330 which means there is no relationship between the menstrual cycle and dysmenorrhea (Purba, Sarumpaet, and Jemadi 2013). However, differ from Wang et al study which states there is a relationship between the menstrual cycle length or irregularity and duration of menstrual

bleeding can cause pain during menstruation (Wang et al. 2004).

STRESS

The prevalence and severity of dysmenorrhea is different in each group of people and culture. Based on bio-psychosocial, symptoms of menstruation not only result from biological factors such as hormonal disorders and lifestyle (exercise and nutritional status), but are also influenced by psychological and social factors such as menstrual patterns, anxiety, depression, interactions with friends, family, and colleagues (Kordi, Mohamadirizi, and Shakeri 2013). Stress is a universal phenomenon that occurs in everyday life and can't be avoided, everyone can experience stress.

Stress can affects individuals, physically, psychologically, intellectually, socially, and spiritually (Saputri, Musfiroh, and Ropitasari 2012). Chi square analysis test shows that there is a relationship between stress and dysmenorrhea. This is in line with research from Saputri which shows a p value of 0,000 in a stress variable analysis test with dysmenorrhea (Saputri, Musfiroh, and Ropitasari 2012). Similarly, study from Wang states that stress in the follicle phase is more influential on dysmenorrhea events compared with stress in the luteal phase (Omidvar and Begum 2012).

Stress can affect the physical function of the body including endocrine factors. Stress can change the regulation of Hypothalamic-Pituitary-Gonadal (HPG) permanently. Menstruation is influenced by stressors that activate HPG. This incident leads to menstrual abnormalities such as irregular menstrual cycles, menstrual problems, especially pain during menstruation (Kordi, Mohamadirizi, and Shakeri 2013). When a person experiences internal or external stress, they will experience neuroendocrine response. Hypothalamic, which acts to respond stress in mammals, is regulated by Cortictropin Releasing Hormone (CRH), which affects the pituitary gonadotropin hormone which in turn increases adrenal cortisol secretion (a stress-related hormone) (Omidvar and Begum 2012).

Stress is also known to inhibit the release of follicular stimulating hormone or FSH and luteinizing hormone or LH, which leads to disruption of follicular development. Generally the synthesis of progesterone increases in the luteal phase followed by ovulation, but because stress interferes with follicular development, the synthesis and release of progesterone are also disrupted. Progesterone has an important role in the occurrence of dysmenorrhea. Menstrual pain only occurs in the menstrual cycle. Low progesterone affects the high synthesis of PGF2α and PGE2 prostaglandins. Prostaglandins are known to affect uterine muscles and blood vessel fibers, and prostaglandin imbalance has been shown to be associated with the appearance of dysmenorrhea (Omidvar and Begum 2012).

COX REGRESSION

Cox regression analysis test showed the results of p value 0.288 which means there is no relationship between stress and the incidence of dysmenorrhea because p value> 0.05. This is different from the results of the chi square test conducted. The difference in these results can be due to other variables in the Cox regression test that affect the results of the stress variable. Based on the cox regression test, it can be concluded that overweight BMI is a variable that is very influential on the incidence of dysmenorrhea.

CONCLUSION

The percentage of dysmenorrhea in Senior High School 4 Yogyakarta is relatively high. The highest percentage of body mass index (BMI) is BMI normal, then overweight, and the lowest is underweight. The percentage of students

who have regular menstrual cycles is greater than students who have irregular menstrual cycles. The percentage of students who experience stress is less when compared to the percentage of students who are not stressed. There is a relationship between overweight BMI in students with the incidence of dysmenorrhea. There is no relationship between the menstrual cycle and the incidence of dysmenorrhea. There is a relationship between stress and the incidence of dysmenorrhea in the chi square test. However, in the stress cox regression test there was no significant relationship with dysmenorrhea.

The need to design programs related to adolescent reproductive health and counseling to high schools from several related parties, because currently there is no education program that covers high school students about reproductive health.

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