Relationship Between Sedentary Lifestyle and Fiber Intake Primary Dysmenorrhoea in Overweight Adolescent Girls

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Abstract: Overweight female adolescents (FA) have a 36.8% risk of primary dysmenorrhea (PD) compared to FA with normal nutritional status. PD can be minimized by increasing daily physical activity and consumption of fiber found in vegetables and fruit by nutritional adequacy rates. This study aimed to analyze the relationship between a sedentary lifestyle and daily fiber intake on PD in overweight FA in Padang. This research method is cross-sectional and conducted at MAN 1 and SMA 1 Muhammadiyah Padang. The research subjects were all female students who met the restriction criteria with a total of 38 people. Data collection was carried out by anthropometric measurements and interviews using the NRS, ASAQ, and SQ-FFQ questionnaires. The results of data analysis using the Spearman rank correlation test showed that there was a relationship between fiber intake and the pain scale in primary dysmenorrhea (p=0.007), and a sedentary lifestyle was not related to primary dysmenorrhea (p=0.73). The conclusion is that the primary dysmenorrhea pain scale is associated with daily fiber intake consumed according to the nutritional adequacy rates of overweight female adolescents in Padang.

Keywords: Fiber; Primary dysmenorrhea; Sedentary

Introduction

The problem of excess nutritional status among teenagers in Indonesia continues to increase. Based on the results of primary health research (Riskesdas) in 2018, it is stated that the problem of overweight nutritional status in the adolescent age group in Indonesia has increased by two times from the previous year, in 2013 it was 7.3%, rising to 13.5% in 2018 (Kementrian Kesehatan, 2018). The problem of overweight nutritional status is widespread in almost every region of Indonesia, one of which is in West Sumatra Province, where overweight teenage girls were found to be higher, namely 16.45%, compared to male teenagers, namely 6.67%. Apart from that, as the provincial capital, Padang City has the highest prevalence of overweight teenagers, namely 14.86% (Balitbangkes, 2019). The increase in overweight nutritional status in adolescents is directly proportional to the increase in various diseases or disorders in the adolescent's body (Kurdaningsih et al., 2016).

One of the disorders found in overweight adolescent girls is primary dysmenorrhoea, with higher pain intensity compared to ordinary adolescent girls. Research conducted by Akunna proves that adolescent girls with higher nutritional status have a greater risk of experiencing primary dysmenorrhoea by 36.8% compared to adolescent girls with normal nutritional status (Akunna et al., 2020). Primary dysmenorrhoea is a pain in the suprapubic area that can spread to the upper thighs or back. It is felt by young women every menstrual period without any other organic abnormalities (Wu et al., 2022). The prevalence of primary dysmenorrhoea in the female group is relatively high, and a trend is found to continue to increase every year. Data from the World Health Organization (WHO) in 2017 stated that as many as 90% of women experienced primary dysmenorrhoea (Karout et al., 2021). The results of research by Kusnaningsih (2020) also state that primary dysmenorrhoea occurs more often in adolescent girls by 86% compared to adults (Kusnaningsih, 2020). The incidence of primary

dysmenorrhea in adolescent girls in Padang City is also relatively high, based on research conducted by Rusydi (2022), which states that 83.95% of adolescent girls will experience primary dysmenorrhea in 2021 (Rusydi, 2022).

Primary dysmenorrhoea in adolescent girls can be caused by two factors, namely factors that cannot be controlled and factors that can be controlled (physical activity and daily fiber intake). Adolescents' physical activity is currently categorized as lacking due to a shift in lifestyle from a conventional to a sedentary lifestyle due to instant and sophisticated technological developments and advances so that all types of needs can be met without much physical activity. A high sedentary lifestyle in adolescent girls indicates low physical activity in adolescent girls. Based on research by Tsamara (2020), low physical activity can cause primary dysmenorrhoea in young women (Tsamara et al., 2020). In addition, adolescents who have a sedentary lifestyle are 2.9 times more likely to have over-nutrition, which is caused by a decrease in the body's basal metabolism and an increase in body fat (Mandriyarini et al., 2017).

The second factor is the amount of daily fiber intake in overweight teenage girls. Fiber consumption is a non-pharmacological therapy in treating primary dysmenorrhea. Abadi Bavil (2018) explains that the fiber content in vegetables and fruit can increase the amount of globulin production as a sex hormone, which plays an essential role in suppressing the synthesis of the leading cause of primary dysmenorrhoea, namely prostaglandins (Abadi Bavil et al., 2018). Based on the Regulation of the Minister of Health of the Republic of Indonesia number 28 of 2019, adolescent girls aged 13-18 must consume 29 grams of fiber/day. However, the reality is very different in people's lives; based on the results of the 2018 Riskesdas, it was found that 98.4% of Indonesian teenagers do not consume enough vegetables and fruit (Kemenkes, 2019). A similar problem also occurred in Padang City; it was found that 82.53% of teenagers did not consume enough fiber (Balitbangkes, 2019).

Based on the explanation above, it is understood that physical activity and low fiber consumption are related to each other, so researchers are interested in studying, researching, and analyzing the relationship between a sedentary lifestyle and the amount of daily fiber intake on the incidence of primary dysmenorrhoea in overweight adolescent girls in Padang City.

Method

This is a quantitative analytical research with a cross-sectional approach. The research was carried out in January-February 2023 at SMA 1 Muhammadiyah and MAN 1 Padang, which are in the Pasar Ambacang Community Health Center, Padang City working area. The research subjects were all female students who met the restriction criteria and signed the informed consent form, totaling 38 people. The restriction criteria in this study consisted of inclusion criteria and exclusion criteria. The inclusion criteria were female students of MAN 1 and SMA 1 Muhammadiyah Padang City with an age range of 15-18 years, had an overweight nutritional status, experienced primary dysmenorrhoea during the last three months of menstruation, were willing and agreed to be research subjects. Meanwhile, the exclusion criteria were female students who were undergoing hormone therapy or were on a diet using certain products such as body slimming products, female students who had pelvic pathology, and female students who did not take part in all series of research.

The data collection process began by carrying out anthropometric measurements and screening for primary dysmenorrhea events in all female students. The research instruments used were an anthropometric measurement form and a Numeric Rating Scale (NRS) form to measure the intensity of menstrual pain (primary dysmenorrhoea). Next, data was collected using interview techniques to explore the sedentary habits and lifestyle of all female students using the Adolescent Sedentary Activity Questionnaire (ASAQ) form. At this stage, the research subjects' daily fiber intake was also measured with the help of the Semi Quantitative Food - Frequency Questionnaire (SQ-FFQ). Data analysis is carried out using the Pearson Product Moment correlation test if the data is normally distributed. However, the analysis uses the Spearman Rank Correlation Test if the data is not.

This research has received approval from the research ethics committee of the Faculty of Medicine, Sebelas Maret University, Surakarta, with ethics number 05/UN27.06.11/KEP/EC/2023.

Result and Discussion

Primary Dysmenorrhoea in Overweight Adolescent Girls

The results of data measurements and screening on all female students at MAN 1 Padang and SMA 1 Muhammadiyah Padang found that 38 female students had an overweight nutritional status and had felt menstrual pain (primary dysmenorrhoea) for the last three months. The following is a picture of the measurement and data screening implementation on female students.

Figure 1. Image of research data collection

Data on the characteristics of each research subject collected in this study included age, nutritional status, intensity of menstrual pain (primary dysmenorrhea), sedentary lifestyle, and amount of daily fiber intake. The characteristics of the research subjects can be seen in Table 1 below.

Table 1. Description of Characteristics Subject Study

Variable	SMA 1 (n=18)		MAN 1 (n=20)		Total (n=38)	
	n	%	n	%	n	%
Age 15-18 years						
15 years	2	11.11	8	40	10	26.32
16 years	9	50	2	10	11	28.94
17 years	7	38.88	6	30	13	34.21
18 years	-	-	4	20	4	10.52
BMI						
Overweight	18	100	20	100	38	100
NRS Primary dysmenorrhoea						
Mild (1-3)	2	11.11	7	35	9	23.68
Moderate (4-7)	14	77.77	10	50	24	63.15
Severe (8-10)	2	11.11	3	15	5	13.15
Sedentary lifestyle						
Currently	15	83.33	14	70	29	76.32
Low	3	16.67	4	20	7	18.42
High	-	-	2	10	2	5.26
Fiber intake						
<29 grams/day (Less)	18	100	20	100	38	100

Based on the table above, it can be understood that in SMA 1 Muhammadiyah Padang City there are 38.88% of female students aged 17 years and MAN 1 Padang City students aged 15 years as many as 40%. All research subjects at both schools had a Body Mass Index (BMI) with an overweight status of 100%. Most of the female students experienced primary dysmenorrhoea on a moderate scale, which was found in SMA 1 Muhammadiyah students at 77.77% and at MAN 1 Padang at 50% of students. The female students of these two schools also have a sedentary lifestyle in the moderate category, namely 83.33% of the female students of SMA 1 Muhammadiyah and 70% of the female students of MAN 1 Padang. In the table, it is also known that the fiber consumption intake of all research subjects at both schools, namely 100% of female students, is less than what it should be, namely 29 grams/day.

Table 2. Distribution Frequency Primary Dysmenorrhea, Sedentary Lifestyle, and Fiber Intake

Variable	Minimum	Maximum	Mean
Primary dysmenorrhoea	2	10	5.39
Sedentary lifestyle (minutes/week)	85.20	482.40	207.05
Fiber intake (grams/ day)	2	20	7.89

Table 2 above explains more clearly the average primary dysmenorrhoea pain scale felt by female students, namely 5.39, which is in the moderate category. The average time spent by female students on sedentary activities during one week is around 207.05 minutes/week. Meanwhile, the average daily fiber intake for all female students is very low, namely 7.89 grams/day, and does not meet 50% of the required requirements.

Primary dysmenorrhea is normal pain felt by young women every time they menstruate without being accompanied by other genital organ abnormalities (Aksari, 2022). The pain will peak during the first 24-36 hours of menstruation and fluctuate over the next 72 hours (Ferries-Rowe et al., 2020). This pain arises due to the increased production of prostaglandins and leukotrienes in the myometrium, causing vasoconstriction and uterine contractions in women menstruation (Monday et al., 2019). The symptoms felt when young women experience primary dysmenorrhoea are colicky pain in the lower abdominal area, which will spread to the lower back. The pain in the suprapubic area is cramping, while in the pelvic area, you will feel heartburn that spreads to the inner thigh. Pain due to primary dysmenorrhoea in some individuals will cause nausea and vomiting, headaches, lethargy, diarrhea, emotional instability, and fainting (Ammar, 2016).

The intensity of primary dysmenorrhoea pain felt by each young woman is different, influenced by how the individual describes the pain from previous experiences. In this study, the average intensity scale of primary dysmenorrhea pain felt by female students was 63.15%. Determining the pain intensity category for primary dysmenorrhea is based on the Multidimensional Scoring of Andesrch and Milsom, which explains that the pain intensity of primary dysmenorrhoea consists of mild, moderate, and severe dysmenorrhoea. Mild dysmenorrhea means that at this level, the pain that occurs does not interfere with daily activities and is not followed by other systemic

complaints. Moderate dysmenorrhea, where the pain is considered quite annoying and is followed by several systemic complaints, requires analgesic medication to relieve the pain. Severe dysmenorrhea, namely the pain that arises, causes severe limitations in carrying out daily activities for the sufferer, giving rise to the condition of having to take analgesic drugs, but taking these analgesic drugs will cause systemic complaints such as vomiting (Larasati & Alatas, 2016).

Some literature explains that nutritional status influences the level of primary dysmenorrhoea pain in young women, which is described by body mass index (BMI). It was found in the results of Syafriani's (2021) research that adolescent girls who have an overweight nutritional status will have a 68.25% risk of primary dysmenorrhea in adolescent girls who are overweight (Syafriani, 2021). Based on the results of this study, it is known that all young women who have an overweight nutritional status experience primary dysmenorrhea pain on a moderate to severe scale. Similar results were also found in Taqiyah's (2020) research that as many as 44.4% of obese high school students experienced moderate-scale primary dysmenorrhea (Taqiyah et al., 2020). Oktorika's study (2020) explains the relationship between overweight teenage girls and excessive fat accumulation in body tissues, which will disrupt the menstrual blood flow process due to pressure or hyperplasia of blood vessels. This condition causes the blood vessels in the female genitals to become compressed by accumulated fatty tissue, disrupting blood flow during the menstrual process and causing pain in the lower abdomen during menstruation (primary dysmenorrhea) (Oktorika & Sudiarti, 2020).

The Relationship Sedentary Lifestyle with Primary Dysmenorrhoea in Overweight Adolescent Girls

A sedentary lifestyle is a lifestyle that has minimal body movement because individuals spend a lot of time sitting all day doing various activities. Hence, the body's total energy expenditure is deficient, only around one-third of the individual's total daily energy expenditure (Johansson et al., 2022). Young women often carry out sedentary activities: sitting or lying down while reading, writing, watching TV, and playing video games or gadgets or smartphones (Amrynia & Prameswari, 2022).

Based on the research results in Table 2, it is known that the average time spent by young women doing sedentary activities in this study was 207.05 minutes/week. The average amount of time spent on activities can be categorized as smooth according to the theory put forward by Maudyanti (2022) that a sedentary lifestyle is classified as soft if someone spends 120-400 minutes/week doing sedentary activities (Maudyanyi et al., 2022).

A highly sedentary lifestyle reflects the low level of physical activity carried out by young women. The theory put forward by Kusumaningrum in Wahyuni (2021) explains that intense physical activity will increase muscle contractions in the uterus, which are innervated by the sympathetic nervous system, thus stimulating the onset of primary dysmenorrhoea pain (Wahyuni & Zulfahmi, 2021).

Table 3. The Relationship Sedentary Lifestyle with Primary Dysmenorrhoea

Variable independent	Test		Variable dependent (primary dysmenorrhoea)
Sedentary lifestyle	*Rank-spearman*	R	0.056
		p	0.738
		n	38

Table 3 shows that the results of the analysis of the relationship between a sedentary lifestyle and primary dysmenorrhoea produced a correlation value of r=0.056, meaning that the strength of the relationship between the two variables is very weak. The significant level value for the two variables also obtained a value of p=0.738 (p>0.05). The results of this analysis explain that there is no significant relationship between a sedentary lifestyle and primary dysmenorrhoea in overweight adolescent girls.

Based on the Spearman Rank correlation test analysis, it can be explained that in this study, there was no significant relationship found between a sedentary lifestyle and primary dysmenorrhoea in overweight adolescent girls with a p-value of 0.738. The results of this research align with research conducted by Sholihah (2019), which stated that there was no relationship between physical activity and primary dysmenorrhea on the health of female students (Sholihah, 2019). Apart from that, the research results on female students in China found that one form of self-care that female students can do when experiencing primary dysmenorrhoea is reducing heavy physical activity and increasing time for rest (Chen et al., 2019).

However, these results contradict the theory put forward by Ade (2019) that young women who are less active will experience problems with the uterus due to decreased oxygen circulation, thereby stimulating pain during menstruation (Ade, 2019). The results of Fitraningsih's research (2021) also stated the same thing, namely that there was a relationship between the level of physical activity and the incidence of Primary Dysmenorrhea in female students (Fitrianingsih & Santanu, 2021). This difference in the results of Fasya's research (2022) could be due to the possibility that the triggering factor for the pain felt by the research subjects during menstruation was not due to a lot of activity (sedentary lifestyle) but was caused by other factors

such as nutritional status, family history, stress, etc. (Fasya et al., 2022).

The Relationship Fiber Intake with Primary Dysmenorrhoea in Overweight Adolescent Girls

Dietary fiber is a food substance from plants such as vegetables and fruit. The United States Food and Drug Administration (FDA) explains that dietary fiber is a type of complex carbohydrate that is resistant to the enzymatic processes of the digestive system which has the benefit of maximizing mineral absorption in the intestinal tract and reducing energy intake by providing a more prolonged feeling of fullness (Waddell & Orfila, 2023). Dietary fiber is also helpful as an alkaline agent in the digestive system, affecting the consistency of feces so that defecation is easier (Armin, 2022). Figures for fiber intake requirements for adolescent girls have been regulated by the Indonesian Minister of Health Regulation number 28 of 2019. The Indonesian government recommends that fiber intake for adolescent girls aged 13-18 years is 29 grams/day (Kemenkes, 2019).

Table 2 above shows that 100% of young women's fiber intake figure is categorized as less than 29 grams/day. Similar research results were also found in adolescents in Colombia that as many as 99.5% had intakes lower than the adequate levels recommended by the government (Mesa et al., 2023). According to Harti's explanation (2019), two factors influence the amount of fiber intake in young women, namely the availability and consumption habits of vegetables and fruits in the household (Harti et al., 2019).

Table 4. The Relationship Fiber Intake with Primary Dysmenorrhoea

Variable independent	Test	Variable dependent (primary dysmenorrhoea)	
Fiber intake	*Rank-spearman*	R	-0.433
		P	0.007
		n	38

Table 4 above shows a relationship between fiber intake and primary dysmenorrhea. The analysis results show that the correlation value is r = - 0.433 and p-value = 0.007 (p<0.05). This value means that there is a significant relationship between the amount of fiber intake and the intensity of menstrual pain (primary dysmenorrhea) suffered by overweight teenage girls. The negative sign on the r-value indicates that the relationship between the two variables is in the opposite direction. If fiber consumption continues to increase, pain intensity due to primary dysmenorrhea will decrease. The coefficient value r = -0.433 indicates that the relationship between the two variables is quite strong. If the coefficient of determination value is

calculated, it is obtained that r = 0.187; this value explains that overweight female adolescents who lack fiber intake have an 18.7% risk of experiencing primary dysmenorrhea.

Dietary fiber is also known to help relieve pain caused by primary dysmenorrhoea in adolescent girls. The results of bivariate analysis of the results of this study prove that there is a relationship between daily fiber intake and primary dysmenorrhoea in overweight adolescent girls with a p-value of 0.007. The results of this study a supported by Aydin and Akyus (2018), who stated that young women who experience primary dysmenorrhea are caused by not consuming enough vegetables and fruit, which are rich in fiber content (Aydın Kartal & Akyuz, 2018). Thania's research results (2023) also stated that there was a relationship between consuming low portions of fiber and an increase in the incidence of primary dysmenorrhoea in young women (Thania et al., 2023). Based on the literature, it's clear that dietary fiber can increase the concentration of globulin content. Globulin in plasma will bind sex hormones, influencing the amount of prostaglandin production, the main source of primary dysmenorrhea (Barnard et al., 2023). Apart from that, dietary fiber also contains many polyphenols, which will turn into bioactive compounds so that they can reduce inflammation in the body (Shivakoti et al., 2022).

Conclusion

Based on the analysis of this research, primary dysmenorrhea in adolescent girls only had a significant relationship with the amount of fiber intake (p = 0.007). Still, no meaningful relationship was found for the sedentary lifestyle variable (p = 0.738). Therefore, overweight young women who experience primary dysmenorrhea every menstrual period are advised to increase their daily fiber intake to reach the adequate level recommended by the government.

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