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The relationship between junk food consumption and other factors with the incidence of dysmenorrhea in adolescent girls

The relationship between junk food consumption and other factors with the incidence of dysmenorrhea in adolescent girls

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Abstract

Dysmenorrhea has an impact on the disruption of daily activities and a decrease in physical conditions such as fatigue and lethargy, decreased appetite, and decreased sleep quality. More than 50% of women worldwide experience dysmenorrhea. The prevalence of dysmenorrhea in Indonesia is 64,25%. This study aimed to determine factors associated with the incidence of dysmenorrhea in adolescent girls. The study used a cross-sectional design and was conducted from May to June 2023. The sample consisted of 63 students at SMA Negeri 11 South Tangerang, using a random sampling technique. Data were collected by completing questionnaires on dysmenorrhea, junk food consumption, and sleep quality. Interviews were conducted for calcium intake data using a 2 x 24 hour food recall and measuring height and weight. Data analysis using chi-square tests. Results: There was a relationship between junk food consumption (p=0,022), sleep quality (p=0,035), calcium intake (p=0,030) and the incidence of dysmenorrhea. Meanwhile, there was no significant relationship between percent body fat (p=1,000), nutritional status (p=0,638) and the incidence of dysmenorrhea. In conclusion, junk food consumption, sleep quality, and calcium intake were associated with the incidence of dysmenorrhea, while body fat percentage and nutritional status were not associated with the incidence of dysmenorrhea in adolescent girls.
Keywords: Junk food, calcium intake, nutritional status, sleep quality

Abstrak

Dismenore berdampak pada terganggunya kegiatan sehari-hari serta penurunan kondisi fisik seperti letih dan lesu, penurunan nafsu makan serta kualitas tidur yang menurun. Lebih dari 50% wanita di dunia mengalami dismenore. Prevalensi kejadian dismenore di Indonesia sebesar 64,25%. Tujuan penelitian untuk mengetahui faktor-faktor yang berhubungan dengan kejadian dismenore pada remaja putri. Penelitian menggunakan desain *cross sectional*, dilakukan pada Mei-Juni 2023. Sampel merupakan siswi SMA Negeri 11 Tangerang Selatan sebanyak 63 orang diambil secara acak. Data dikumpulkan dengan melakukan pengisian kuesioner untuk data dismenore, konsumsi *junk food* dan kualitas tidur. Wawancara dilakukan untuk data asupan kalsium menggunakan *food recall* 2 x 24 jam serta melakukan pengukuran tinggi badan dan berat badan. Analisis data menggunakan uji statistik Chi-Square. Hasil, menunjukkan hubungan antara konsumsi *junk food* (p=0,022), kualitas tidur (p=0,035), dan asupan kalsium (p=0,030) dengan kejadian dismenore. Sedangkan tidak terdapat hubungan antara persen lemak tubuh (p=1,000) dan status gizi (p=0,638) dengan kejadian dismenore. Kesimpulan, konsumsi *junk food*, kualitas tidur dan asupan kalsium berhubungan dengan kejadian dismenore, sedangkan variabel persen lemak tubuh dan status gizi tidak berhubungan dengan kejadian dismenore pada remaja putri.
Kata Kunci: Asupan kalsium, *junk food*, kualitas tidur, status gizi

Introduction

Menstruation is a normal condition experienced by women of childbearing age regularly every month, and is caused by the breakdown of the endometrial wall, resulting in bleeding (Kojo et al., 2021). Dysmenorrhea is a common complaint felt when women experience menstruation, which can be caused by a buildup or increase in prostaglandin levels in the endometrium, resulting in pain and cramps in the lower abdomen (Savitri et al., 2019).

Dysmenorrhea has an impact on disrupting daily activities and has an impact on reducing mental conditions such as anxiety. In addition, declining physical conditions, such as getting tired and lethargic, decreased appetite, and poor sleep quality are also some of the impacts that women experience when experiencing dysmenorrhea (Rita & Sari, 2019). More than 50% of women worldwide experience dysmenorrhea during menstruation. The prevalence of dysmenorrhea is 85%, in Italy it is 84,1%, 80%, in Malaysia it is 69,4%, and it is 84,2% in the United States, Italy, Australia, Malaysia, and Thailand, respectively. The prevalence of dysmenorrhea among women of childbearing age in Indonesia is 64,25%, consisting of 54,89% with primary dysmenorrhea and 9,36% with secondary dysmenorrhea (Aulya et al., 2021).

Nutritional status is one of the factors that can contribute to the incidence of female dysmenorrhea. Individuals with abnormal nutritional status, such as underweight (less) and overweight (excessive), are more likely to experience dysmenorrhea than those with normal nutritional status (Yani et al., 2023; Larasati & Alatas, 2016). Insufficient food intake can cause poor nutritional status, which can disrupt the growth and function of the reproductive organs (Hikma et al., 2021). In addition, excessive nutritional status results in a large amount of fat tissue in the body, so that blood vessels can be compressed, especially in reproductive organs. This disrupts menstrual blood flow and causes pain during menstruation (Rahmadhayanti & Rohmin, 2016).

Another factor that causes dysmenorrhea is consumption of junk food. Various kinds of junk food are consumed such as fried chicken, french fries, hamburgers, and so on (Soviyati & Nurjannah, 2019). Junk food contains excess energy and fat; therefore, so if consumed excessive consumption in inappropriate portions can cause an overweight nutritional status, which can lead to dysmenorrhea (Pamelia, 2018).

Obesity and excess adipose tissue influence high body fat mass. This has an impact on the production of the hormones estrogen and progesterone. If estrogen and progesterone increase in the body, it will cause high levels of prostaglandin, which causes increased uterine contractions and ischemia, resulting in dysmenorrhea during menstruation (Putri et al., 2021).

Dysmenorrhea can also be caused by lack of calcium intake. Mineral calcium can relieve dysmenorrhea complaints through contraction and relaxation of the smooth muscles of the uterus. This can result in normal blood flow in the uterus that has previously experienced hypoxia (Nahra et al., 2019). A lack of calcium intake causes muscle cramping, resulting in dysmenorrhea pain (Sofia & Fathur, 2019). Other factors that increase the risk of dysmenorrhea include poor sleep quality and lack of sleep (Lestari et al., 2018).

This research has one novelty when compared with other studies, namely, one of the variables, the correlation between body fat percentage and dysmenorrhea, which is still rarely studied. In addition, research related to dysmenorrhea has never been conducted at State Senior High School 11, South Tangerang. Based on the background above, this research aimed to determine the relationship between junk food consumption and other factors in cases of dysmenorrhea in adolescent girls at State Senior High School 11, South Tangerang.

Methods

The study was analytical and observational with a cross-sectional design. This study was conducted in State Senior High School 11, South Tangerang, in 2023. The population comprised 457 female students in Grades 10 and 11. The sample calculation used the same formula to test the hypothesis of two population proportions with a CI of 95%. The calculation results show that the minimum sample required was 57 respondents, but to avoid female students dropping out, the sample was increased by 10% of the minimum sample, namely a total sample of 62 respondents. We used a simple random sampling method for sampling.

Five independent variables will be studied: consumption of junk food, percentage of body fat, sleep quality, calcium intake, and nutritional status. Data on the dependent variable, dysmenorrhea, were obtained using the Numeric Rating Scale (NRS) questionnaire completed by respondents. There are four pain criteria: no menstrual pain (scale 0), mild pain (scale 1-3), moderate pain (scale 4-6) and severe pain (scale 7-10). The four categories were then combined and scored as follows: no dysmenorrhea (scale 0) and dysmenorrhea (scale 1-10).

Junk consumption is the habit of eating foods high in fat, salt, and sugar (Aulya et al., 2021). Data were obtained using an FFQ questionnaire that contained various types of commonly consumed junk foods, such as fried chicken, burgers, and fritters, and adapted to the research location. The questionnaire was filled according to the junk food consumed during the last month. There were two categories of measurement results: frequent consumption of junk food (score 29-85) and rarely (score 0-28).

Percent body fat was obtained by measuring subcutaneous fat in the supra-iliac area using a skinfold caliper. The measurement results were then converted into percent body fat using the formulas of Durnin and Womersley (1974) and Siri (1961). There are two categories of body fat percentage: abnormal (<13% to >24%) and normal (13–23%).

The PSQI was used to determine how well a person sleeps. There were two categories of sleep quality: poor (score>5) and good (score≤5).

Calcium intake data in this study were obtained using the food recall interview technique, in which respondents were asked to remember and provide information about all food or drinks consumed for two consecutive days. There are two categories of calcium intake: insufficient (intake <80% RDA) and sufficient (intake 80-100% RDA).

Nutritional status was assessed by measuring body height using a stature meter and weighing body weight with scales. The results were then calculated in the form of BAZ to determine the nutritional status of respondents. In this study, nutritional status was divided into two categories: abnormal and normal.

Data analysis was performed using the chi-square test with a significance test using α= 0,05 and a Confidence Interval of 95%. This study was approved by the Health Research Ethics Commission (KEPK) FKK UMJ (number 46/PE/KE/FKK-UMJ/V/2023).

Result and Discussion

The results of the analysis of dysmenorrhea, consumption of junk food, percent body fat, sleep quality, calcium intake, and nutritional status of 62 female adolescent respondents at State Senior High School 11, South Tangerang are listed in Table 1.

Table 1. Distribution of factors associated with the incidence of dysmenorrhea in adolescent girls at State Senior High School 11, South Tangerang (n= 62)

Variable	Category	n	%
Dysmenorrhea	Dysmenorrhea	57	91,9
	No Dysmenorrhea	5	8,1
Consuming Junk Food	Often	44	71
	Seldom	18	29
Percent Body Fat	Abnormal	36	58,1
	Normal	26	41,9
Sleep Quality	Bad	51	82,3
	Good	11	17,7
Calcium Intake	Not enough	58	93,5
	Enough	4	6,5
Nutritional Status	Abnormal	19	30,6
	Normal	43	69,4

Table 2. The relationship between independent variables and the incidence of dysmenorrhea in adolescent girls at State Senior High School 11, South Tangerang

Variable	Dysmenorrhea						p-value	OR
	Yes		No		Total			
	n	%	n	%	n	%		
Consuming Junk Food								
Often	43	97,7	1	2,3	44	100	0,022	12,29 (1,27-119,25)
Seldom	14	77,8	4	22,2	18	100		
Percent Body Fat								
Abnormal	23	91,7	3	8,3	36	100	1	
Normal	24	92,3	2	7,7	26	100		
Sleep Quality								
Bad	49	96,1	2	3,9	51	100	0,035	9,19 (1,32-63,87)
Good	8	72,7	3	27,3	11	100		
Calcium Intake								
Not enough	55	94,8	3	5,2	58	100	0,03	18,33 (1,89-178,98)
Enough	2	50	2	50	4	100		
Nutritional Status								
Abnormal	17	89,5	2	10,5	19	100	0,638	
Normal	40	93	3	7	43	100		

The research results in Table 1 show that the prevalence of dysmenorrhea among female adolescents was higher than that among adolescents who did not experience dysmenorrhea. Based on the World Health Organization (WHO), shows that the incidence of dysmenorrhea in young women is quite high, between 16,8-81%. The highest prevalence of dysmenorrhea is often found in adolescent girls, estimated to be between 20-90% (Sari et al., 2023). This research is also in line with the research conducted by Amany et al. (2022); the majority of young women who experienced dysmenorrhea were 85 respondents (94,4%) and those who did not experience dysmenorrhea (5,6%).

Based on Table 2, the results of the analysis show that there is a significant relationship between junk food consumption, sleep quality, and calcium intake ($p<0,05$) and the incidence of dysmenorrhea in young women. There was no significant relationship between percent body fat and nutritional status ($p<0,05$) and the incidence of dysmenorrhea in adolescent girls at State Senior High School 11, South Tangerang.

Junk Food Consumption with Dysmenorrhea

The results of the analysis show that there is a relationship between the consumption of junk food and the incidence of dysmenorrhea in young women in State Senior High School 11, South Tangerang. This study is supported by studies conducted by Kusumawati & Aniroh (2020), which state that there is a relationship between the consumption of junk food and the incidence of dysmenorrhea in adolescent girls.

The nutrients contained in junk food are high in fat, salt, and sugar but low in fiber and vitamins, such as pizza, hamburgers, Kentucky fried chicken, and canned food. Junk also contains unsaturated fatty acids, namely trans fatty acids, which are dangerous and harmful to health. Free radicals formed in the body can be produced from the consumption of trans fatty acids (Aulya et al., 2021). One of the adverse effects caused by the formation of free radicals is damage to the cell membranes. Phospholipids are part of the cell membranes that help produce arachidonic acid, which can then be converted into prostaglandins (Amany et al., 2022).

When a woman menstruates, prostaglandins help the uterus contract and shed the uterine wall (Diana et al., 2023). Damage to the cell membrane caused by free radicals can cause an accumulation of prostaglandins. Increased levels of prostaglandins cause excessive contraction of the uterus and hamper the process of shedding of the uterine wall, which can result in reduced blood flow. This causes pain during menstruation, commonly known as dysmenorrhea (Thania et al., 2023).

According to Aulya et al. (2021), the more often the intensity of consuming junk food is, the more it can influence the occurrence of dysmenorrhea. Junk food is absorbed by the body for a long time because some of its nutritional content exceeds the normal limits. As a result, it can impair the function of reproductive organs, which can lead to dysmenorrhea.

Percent Body Fat with Dysmenorrhea

The results of the analysis showed that there was no relationship between the percentage of body fat and dysmenorrhea in young women in State Senior High School 11, South Tangerang.

This study is supported by the study conducted by Gustini et al. (2017), who stated that there was no significant relationship between body fat percentage and dysmenorrhea. Other studies along these lines were also conducted by Singh et al. (2015) in Meerut, India, which stated that there was no relationship between percent body fat and dysmenorrhea. However, this study does not match the studies conducted by Fahimah et al. (2017), who state that there is a relationship between body fat percentage and dysmenorrhea. Other factors cause dysmenorrhea, including stress (Rahmadianta & Adiningsih, 2020). Therefore, further studies regarding other risk factors are needed to obtain more valid results.

Sleep Quality with Dysmenorrhea

The results of the analysis show that there is a relationship between sleep quality variables and dysmenorrhea in young women in State Senior High School 11, South Tangerang. This study is supported by studies conducted by Hikma et al. (2021), which state that there is a relationship between sleep quality and dysmenorrhea in adolescent girls.

Indicators of a person's sleep quality are the amount of time spent sleeping and various problems faced when falling asleep or waking up (Delia et al., 2021). A person who has good quality sleep will feel fresh and fit when he wakes up and will be ready to carry out various activities while awake (Woran et al., 2020). A person with poor sleep quality will experience various physiological balance disorders, such as easily feeling tired, weak, decreased body immunity, and decreased ability to perform daily activities. Other psychological impacts include anxiety and difficulty concentrating, which disrupt daily activities (Azzulfa et al., 2019).

Insufficient sleep decreases serotonin levels, making the body more sensitive to pain and triggering stress and anxiety. The body produces more prostaglandins, estrogen, progesterone, and adrenaline during stress. Excessive uterine contractions can be caused by an increase in estrogen and prostaglandins, which causes pain during menstruation. An increase in adrenaline in the body causes the muscles to become tense, one of which is the uterine muscle, which causes dysmenorrhea. The release of various body hormones is influenced by poor sleep quality (Nurfadillah et al. 2021).

Studies have shown that reducing sleep hours by 4 hours increases pain mediators and inflammatory agents such as interleukin-6 (IL-6) and Tumor Necrosis Factor Alpha (TNFα), which cause pain. Another study also stated that women who experienced insomnia had more severe dysmenorrhea than those who did not experience insomnia (Lestari et al., 2018).

Calcium Intake with Dysmenorrhea

The results of the analysis show that there is a relationship between calcium intake variables and dysmenorrhea in young women in State Senior High School 11, South Tangerang. This study is supported by the study conducted by Indrawati (2022), which states that there is a relationship between calcium intake and dysmenorrhea in adolescent girls. Another parallel study by Zitri et al. (2022) stated that there is a relationship between calcium intake and dysmenorrhea.

Almost all respondents had a calcium intake lower than their daily needs. The causal factors that can lead to low calcium intake can be the tendency to choose food as well as environmental influences and eating habits in the family (Sofia & Fathur, 2019). Another factor that supports this is the influence of body image. Young women at this age are very concerned about their ideal body shape, which reduces their food intake. When conducting recall interviews, many young women had small portions of food even when eating once a day. In addition, many teenagers consume foods low in vitamins and minerals, such as junk food and other snacks, which reduces their calcium intake (Cia & Ghia, 2020).

Based on experimental research conducted by Zarei et al. (2017) in Iran using a Randomized Controlled Trial method, it was found that administering 1000 mg/day calcium supplements had a significant effect in reducing the intensity of dysmenorrhea pain.

Nutritional Status with Dysmenorrhea

The results of the analysis showed that there was no relationship between nutritional status variables and dysmenorrhea in young women in State Senior High School 11, South Tangerang. This study is supported by a study conducted by Rosvita et al. (2018), who found no relationship between nutritional status and the incidence of dysmenorrhea in adolescent girls. Another study that is in line is a study carried out by Hikma et al. (2021), which states that there is no relationship between nutritional status variables and dysmenorrhea.

Nutritional status can be interpreted as the final result of the achievements produced by the balanced intake of nutrients needed by the human body. A well-maintained nutritional status can be obtained by consuming food that is based on balanced nutrition and moderation (Pratama & Winarno, 2022). Poor nutritional status results from insufficient nutritional intake. Meanwhile, over-nutrition status is generally associated with the habit of eating large portions that are not for nutritional needs and frequent snacking (Oktaviana et al., 2019). Changes in eating patterns in adolescents can lead to abnormal nutritional status. Eating patterns include consuming junk food that is high in sugar, salt, and oil and low in fiber and vitamins, accompanied by a sedentary lifestyle that causes a lack of physical activity (Rahmad et al., 2023; Widiyanto et al., 2020).

However, this study is not supported by the one run by Syafriani (2021), which states that there is a relationship between nutritional status and dysmenorrhea in adolescent girls. A situation like This can occur because nutritional status is only one of many factors that can cause dysmenorrhea. Several other factors correlate with the incidence of dysmenorrhea. Other factors such as physical and psychological stress can also influence the incidence of dysmenorrhea (Ginting, 2021). Adolescents with a family history of dysmenorrhea are another factor that contributes to the occurrence of dysmenorrhea. Family history and genetics play a role in the occurrence of dysmenorrhea (Oktaviana et al., 2019).

The absence of a relationship could be because each nutritional status category can experience dysmenorrhea equally. Underweight nutritional status indicates that a person's nutritional intake is inadequate and can affect the growth and function of the reproductive organs. Overweight nutritional status indicates that a person has excess fat mass; therefore, blood vessels are compressed by fatty tissue, which causes dysmenorrhea. Adolescents with a normal BMI are also likely to experience dysmenorrhea because other factors, such as hormonal imbalances or stress factors, influence it (Astuti, 2018).

The limitation of this study is that the research method used a cross-sectional design, so the possibility of sampling in exposed and unexposed groups is not comparable. In addition, several variables require the respondent's memory so that it can cause memory bias, and the sample size is still relatively small.

Conclusion

Dysmenorrhea was experienced by almost all young women in this study. Junk food consumption, sleep quality, and calcium intake were associated with the incidence of dysmenorrhea in adolescent girls. The percentage of body fat and nutritional status were not related to the incidence of dysmenorrhea in adolescent girls.

It is hoped that schools can provide education about the dangers of consuming junk food by collaborating with health agencies such as community health centers. Schools can also provide outreach to snack sellers in the canteen to sell food with a better nutritional content. There is also a need for more awareness among young women to prevent dysmenorrhea, such as reducing excessive consumption of junk food, maintaining normal nutritional status, and maintaining good sleep quality by implementing a sleep duration of 7-8 hours at night. In addition, suggestions for other researchers are to use a case-control design so that risk factors for exposure can be identified.

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