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The Relationship Between Healthy Food Choices and Calcium Intake in Dysmenorrhea Adolescents

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ABSTRACT

Several factors that can affect primary dysmenorrhoea are poor dietary habits and low intake of macro and micronutrients. One of the micronutrients that affect dysmenorrhoea is calcium intake. Calcium plays a role in regulating the work of hormones in growth. Calcium deficiency can encourage overproduction of prostaglandins which can lead to uncontrolled uterine contractions that can trigger pain. Based on data from the USDA Nationwide Food Consumption Survey in 48 countries, the average calcium intake at the age of 15-18 years is less than 70% of the RDA. A preliminary study conducted by the author at a public high school in Padang found that 80.2% had primary dysmenorrhoea. Individual eating habits can have an impact on behavior related to healthy food choices and can affect nutritional intake including calcium intake. This study aims to determine the relationship between healthy food selection and calcium intake in adolescent girls who experience primary dysmenorrhoea. 100 respondents were determined using the Slovin formula with the criteria of female students aged 15-18 years who experienced primary dysmenorrhoea. Data collection on healthy food choices was measured using a questionnaire of healthy food choices which consists of 30 statements with a score for selecting important healthy foods > 120. Calcium intake data uses the SQ-FFQ form with the adequate calcium intake category $\geq$ 1200 mg/day. Data analysis using Spearman rank correlation test. The results of statistical tests show that there is a relationship between healthy food choices and calcium intake ($r = 0.23$, $p = 0.021$). The results of this research can be used as a basis for providing therapeutic options for dysmenorrhoea. The implications for young women are knowing comprehensively the importance of choosing healthy foods and calcium intake to reduce the pain of primary dysmenorrhoea.

Keywords: Healthy food choices, calcium, dysmenorrhea, adolescents

Introduction

Primary dysmenorrhoea is menstrual pain without any disturbance to the genital organs and a fixed ovulatory cycle (Hong, 2014). Primary dysmenorrhoea is most often experienced by teenagers, while secondary dysmenorrhoea is most often found in reproductive age (Athiyatul, 2017). Adolescents more often experience primary dysmenorrhoea because at this age nerve optimization occurs so that prostaglandin secretion increases which results in discomfort felt during activities such as lack of concentration which can interfere with the learning process (Alviona, 2018).

Based on WHO data, the incidence of dysmenorrhea in the world is around 90% and 10-15% of them experience severe dysmenorrhoea. The highest prevalence of dysmenorrhoea is in adolescent girls, namely around 20-90% (Rahmawati et al., 2021). In Indonesia, the prevalence of primary dysmenorrhoea is quite high, namely 60-75% in young women (Delistianti et al., 2019). Meanwhile, in West Sumatra, the incidence of dysmenorrhoea was obtained from research conducted by Gusmaneri (2013) with results of 88.5% of female respondents in classes X and XI at SMK 6 Padang experiencing dysmenorrhoea. The research conducted by Riska (2022) revealed that the prevalence of dysmenorrhoea was 83.3% at SMAN 15 Padang. A preliminary study conducted by the author at four public high schools in Padang City showed that 678 students or 80.2% experienced primary dysmenorrhea from 845 students.

Primary dysmenorrhea can be influenced by several factors, namely age at menarche (age at first menstruation), body mass index, length of menstruation, menstrual cycle, pelvic inflammatory disease, depression, nutritional intake, diet or poor eating patterns (Nurwana, 2017). Individual eating habits can be influenced by their nutritional knowledge which has an impact on behavior related to choosing healthy and nutritious foods. Nutritional knowledge is very important for teenagers to have because if they choose the wrong food it will have a negative impact on their health (Masitah, 2017). Research conducted by Annisa (2022) proves that there is a relationship between the severity of dysmenorrhoea, indicating that the more important it is for teenagers to choose healthy foods, the lower the severity of dysmenorrhoea they experience.

Another factor related to primary dysmenorrhoea is nutritional intake. The nutritional content of food affects the production of sex hormones. Increased estrogen production can cause a higher estrogen progesterone ratio resulting in thickening of the endometrial lining increased prostaglandin production and increased vasoconstriction and myometrial contractions which can cause pain during menstruation. On the other hand, decreasing estrogen production can reduce the number of estrogen receptors which influences afferent nerve inflammation and increases the balance of pain perception (Sundari et al., 2020). So, by consuming healthy foods it is hoped that it will stimulate balanced production of the hormones estrogen and progesterone so that an increase in prostaglandins can be avoided. Abnormal prostaglandin production can trigger vasoconstriction and contraction in the myometrium which results in dysmenorrhoea (Annisa, 2022).

Minerals that are related to the incidence of dysmenorrhea are calcium, magnesium, and iron. Calcium is a mineral that plays a role in muscle movement. If the muscles do not have enough calcium, the muscles cannot relax, which results in muscle spasms and can cause pain (Athiyatul, 2017). Another role of calcium is to regulate the work of growth hormones. Calcium deficiency can encourage excess prostaglandins which result in increased production and release from the endometrium during menstruation, causing uncontrolled and irregular uterine contractions which can trigger pain (Alviona, 2018). Vitamin and mineral deficiencies can stimulate increased prostaglandin production. Calcium deficiency can cause pain during menstruation because calcium functions in relaxing muscle spasms during menstruation by actively releasing calcium ions through the plasma membrane and returning to the sarcoplasmic reticulum. When calcium ions are cleared, myosin will experience dephosphorylation so that it can no longer interact with actin which causes muscles to relax.

Based on data from *Nationwide Food Consumption* A USDA survey in 48 countries, the average calcium intake for 15-18 year olds is less than 70% of the RDA. Research conducted by Nahra et al. (2017) shows that 91.3% of adolescent girls have a calcium intake that is less than the AKG. Lack of calcium intake based on needs can be influenced by low levels of food sources of calcium consumed. This can be seen from the food frequency results which show that respondents rarely consume food sources of calcium. Another study, by Rosvita et al. (2018), proved that respondents who had more or less calcium intake experienced dysmenorrhoea compared to respondents who had sufficient

and good calcium. This study aims to determine the relationship between healthy food choices and calcium intake in female students who experience primary dysmenorrhoea.

Material and Methods

This research uses a quantitative analytical research design approach cross sectional. This research was carried out from November 2023 to January 2024 at SMAN 2, SMAN 3, SMAN 9 and SMAN 12 Padang. Sampling was carried out randomly, the first stage was carried out cluster random sampling and found four schools. The second stage was random sampling proportional random sampling. 100 respondents were determined using the Slovin formula with the criteria of female students aged 15-18 years who experienced primary dysmenorrhoea.

Data collection in the form of data on healthy food choices was measured using a questionnaire of healthy food choices (Nadya, 2021) which consists of 30 statements with a score for selecting important healthy foods > 120. Calcium intake data uses the SQ-FFQ form with the adequate calcium intake category ≥ 1200 mg/day. The research secondary data is a general description of the school and the number of female students obtained from the school.

Data analysis using the Spearman rank correlation test was used to determine the relationship between choosing healthy foods and calcium intake in female students who experience dysmenorrhoea. SPSS for Windows 16 version was used to analyze the data.

The Spearman rank correlation test was used to determine the relationship between healthy food choices and calcium intake in female students who experience dysmenorrhoea. SPSS for Windows 16 version was used to analyze the data. This research protocol has been approved by the Research Ethics Committee of the Faculty of Medicine, Sebelas Maret University, Surakarta with number 194/02/09/2023.

Results and Discussion

General characteristics of research subjects include age, primary dysmenorrhoea pain scale, healthy food choices, and calcium intake based on nutritional adequacy figures for the female adolescent age group. A total of 100 respondents consisted of female high school students aged 15 to 18 years. The characteristics of the research subjects can be seen in Table 1.

Table 1. Distribution of respondent characteristics

Variable	F (n=100)	%
Age		
15 years	61	61
16 years	30	30
17 years	7	7
18 years	2	2
Grade Level		
Class X	87	87
Class XI	13	13
Pocket money		
< 20.000	30	30
≥ 20.000	70	70
Primary Dysmenorrhea Pain Scale		
Mild pain	24	24
Moderate pain	50	50
Severe pain	24	24
Pain is very severe	2	2

Source: Primary Data (2024)

Based on Table 1, it can be seen that most of the research respondents were 15 years old (61%). The highest class level of respondents was class X at 87%. Most respondents have pocket money $\geq$ 20,000, namely 70%. Research respondents experienced primary dysmenorrhoea with a moderate pain scale of 50%.

Table 2. Distribution of respondents based on healthy food choices and calcium intake

Variable	F (n=100)	%
Healthy Food Choices		
Not important	28	28
Important	72	72
Calcium Intake		
<1200 mg/day (Less)	100	100

Source: Primary Data (2024)

Based on Table 2, it can be seen that 72% of respondents stated that choosing healthy food was important and 28% of respondents stated that choosing healthy food was not important. All respondents had calcium intake less than the normal limit of 1200 mg/day.

Table 3. Relationship between choosing healthy foods and calcium intake

	Calcium Intake	
	Correlation coefficient (r)	p-value
Healthy Food Choices	0,226	0,024

Source: Primary Data (2024)

Based on the Spearman rank correlation test, shows that there is a relationship between choosing healthy foods and calcium intake, which can be seen in Table 3 with a p-value of 0.021 and a correlation coefficient of 0.230.

The research results obtained based on the age of the respondents were mostly 15 years old (61%). Based on research conducted by Annisa (2022), it is stated that teenagers aged 15-17 years are a transitional age and there are changes in the body's physical and nutritional needs.

Most respondents have pocket money ≥ 20,000, 70%. Research conducted by Nadya (2021) states that pocket money influences determining healthy food choices because healthy food usually costs much more than less healthy food. Teenagers with higher pocket money tend to have greater opportunities to choose healthy foods (Araujo, 2017).

The pain scale for primary dysmenorrhoea in this study was the highest, namely moderate pain at 50%. According to research conducted by Annisa (2022), it shows that the more important healthy food choices are, the lower the severity of primary dysmenorrhoea. Adolescence is the peak period for eating disorders, but data regarding the relationship between dysmenorrhoea and nutritional deficiencies from food consumption is still lacking.

The research results based on the healthy food selection variable showed that 28% of respondents chose healthy food choices in the unimportant category and 72% chose healthy food choices in the important category. Meanwhile, the calcium intake data for all respondents was less than the normal limit of 1200 mg/day. There is a relationship between choosing healthy foods and calcium intake in this study, with a p-value of 0.021 and a correlation coefficient of 0.23, which means the strength of the relationship between the two variables is weak.

There is no direct research that shows a relationship between choosing healthy foods and calcium intake, but there are several other studies that suggest calcium is effective in reducing the severity of dysmenorrhoea. If calcium intake is low, the chance of suffering from dysmenorrhea will be greater. In line with research conducted by Utami (2016) on female students at MAN 1 Bandung, it was found that

85.9% of female students had insufficient calcium intake and 14.1% of female students had sufficient calcium intake. Female students who have low calcium intake have a 10.33 times chance of experiencing dysmenorrhoea compared to those with adequate calcium intake. Based on research conducted by Thys-Jacob (2007) in Mohammad-Alizadeh et al. (2017), consuming 1200 mg/day of calcium for 3 cycles can reduce symptoms of dysmenorrhoea such as lower back pain and stomach cramps and the reduction in pain occurs significantly.

Nutritional and metabolic conditions have an important role in the etiology and treatment of menstrual disorders (Zarei, 2017). Dysmenorrhea can be treated with good eating habits. (Fitrianingsih, 2021). Eating habits are a condition that describes a person's behavior regarding eating frequency, eating patterns, preferences, and food choices (Nadya, 2021). Food choices play an important role in establishing a good and healthy eating pattern. One indicator in choosing healthy foods is paying attention to calcium intake. Factors that can influence individuals consuming foods and drinks that contain calcium are diet, lifestyle, knowledge about nutrition, information related to calcium, preferences for food sources of calcium, and availability of food sources of calcium. Teenage girls not only need calcium for bone growth but it is also needed to reduce or even avoid the pain of dysmenorrhea (Zarei, 2017). Calcium intake affects nerve membrane permeability (Nurnaeni, 2022). Consuming foods and drinks that are sources of calcium regularly can prevent pain during menstruation, and adequate calcium intake in the body can help muscle cramps relax more so that it can relieve pain during menstruation (Alviona, 2018). Calcium has a role in regulating the ability of muscle cells to respond to nerve stimulation. Increased calcium in the blood can reduce the neuromuscular response, a high response can cause stiffness and muscle contractions, causing pain (Annisa, 2022).

Conclusion

There is a relationship between healthy food choices and calcium intake in female students who experience primary dysmenorrhoea with a p-value of 0.021 and a correlation coefficient of 0.230, although the relationship between the two variables is weak, this is because many of the indicators for healthy food choices do not only focus on calcium intake.

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