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CORRELATION OF MACRONUTRIENT INTAKE, NUTRITIONAL STATUS AND AGE OF MENARCHE WITH PRIMARY DYSMENORHORE

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Abstract

Background: Pain during menstruation that does not cause any abnormalities is called primary dysmenorrhea, while menstrual pain that is related to abnormalities in the pelvis is called secondary dysmenorrhea. According to data from WHO, 90% of women experience severe dysmenorrhea. The aim of this study was to find out the correlation between macronutrient intake, nutritional status, and age of menarche with primary dysmenorrhea in medical students at the University of Jember, Indonesia. **Method:** This type of research was carried out with a cross-sectional study design. The research was conducted online and carried out in December 2023-February 2024. Samples were taken using the proportionate stratified random sampling technique. The number of samples in this study was 79 pre-clinical female students. Data was obtained by respondents filling out Google Form and interviews via zoom to fill out the SQ-FFQ questionnaire. The analytical test used in this research is the Spearman test. **Result:** Correlation analysis showed there was no relationship between carbohydrate (p=0.518), fat (p=0.124) and protein (p=0.260) intake and primary dysmenorrhea. The correlation test of nutritional status with primary dysmenorrhea also produced a significance of 0.703 (p>0.05), which means there is no correlation. Correlation analysis of age of menarche with primary dysmenorrhea produced a significance of 0.003 (p<0.05), which means a correlation was found. **Conclusion :** No correlation was found between macronutrient intake and nutritional status and primary dysmenorrhea, and a correlation was found between age at menarche and primary dysmenorrhea.

keyword : dysmenorrhea, macronutrient, nutritional status

INTRODUCTION

Dysmenorrhea is pain experienced during the menstrual period in the form of cramp-like pain in the lower abdomen that spreads to the legs or back. Dysmenorrhea is classified into two types, namely primary dysmenorrhea and secondary dysmenorrhea. Pain during menstruation that is not caused by an abnormality is referred to as primary dysmenorrhea, while menstrual pain

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associated with abnormalities in the pelvis is called secondary dysmenore (Martire et al., 2023).

According to data from the WHO, 90% of women experience severe dysmenorrhea (Qomarasari, 2021). The prevalence of dysmenorrhea in Indonesia amounted to 107,673 people (64.25%), consisting of 54.89% experiencing primary dysmenorrhea and 9.36% experiencing secondary dysmenorrhea (Rattu et al., 2019). According to the results of the study by Sima et al. (2022), the prevalence of dysmenorrhea among medical students is high at 78.4%.

Dysmenorrhea has a negative impact on the quality of life of female students because it affects relationships with family and friends as well as activities at university. According to research by Sima et al. (2022), female students cannot concentrate in class due to the duration of dysmenorrhea that persists for 2 days or more. Dysmenorrhea can also affect university performance in other aspects, as in a study by Sima et al. (2022), some female students were unable to take exams due to the presence of dysmenorrhea (4.2%) and thought dysmenorrhea affected exam grades (18.4%) (Sima et al., 2022).

Various risk factors have been shown to increase the occurrence of dysmenorrhea, such as menstrual duration, age of menarche, smoking, menstrual flow, nulliparity, menstrual cycle, family history, and a higher body mass index (BMI) (Karout et al., 2021). Early menarche age, namely < 12 years old, is one of the risk factors for primary dysmenorrhea. Increased hormone levels in adolescents can cause the age of menarche to be faster, so that the reproductive organs are not ready to experience changes, and the narrow size of the cervical canal will cause pain during menstruation. The risk of experiencing dysmenorrhea increases the younger the age of menarche (Mouliza, 2020; Qomarasari, 2021).

Nutritional status with anthropometric indicators, namely BMI, has an effect on primary dysmenorrhea in much literature. In Aktas' study (2023), it was found that the risk of primary dysmenorrhea was 1.06 times higher among obese young women than the thin/normal group (Aktaş, 2023). According to a meta-analysis study by Wu et al. (2022), undernutrition can also increase the risk of primary dysmenorrhea (Wu et al., 2022).

Macronutrients are compounds required in large amounts that play an important role in the provision of energy (Morris dan Mohiuddin, 2023). The three macronutrients are protein, carbohydrate, and fat. Based on research by Bajalan et al. (2019), there was an association between consumption of eggs, fish, and cheese with dysmenorrhea, which is an example of macronutrient intake (Bajalan et al., 2019). According to research by Monday et al. (2019), foods containing omega-6 fatty acids play a role in increasing the risk of dysmenorrhea (Monday et al., 2019). This is in line with the research of Damayanti et al. (2022), who found a correlation between fat intake and the severity of dysmenorrhea in female students of SMK Negeri 2 Lumajang (Damayanti et al., 2022).

Based on the explanation above, researchers are encouraged to conduct research on dysmenorrhea that focuses on medical students. Therefore, this study was shown to determine the correlation of macronutrient intake, nutritional status, and age of menarche with primary dysmenorrhea in medical students at the University of Jember.

METHOD

The study was conducted using observational analytic research and a cross-sectional study design. This research was conducted online and was carried out in December 2023–February 2024. The population in this study were all preclinical students of the Faculty of Medicine, University of Jember, Indonesia total 366 people. The sample consisted of medical students of each generation, calculated using the Slovin formula, which amounted to 79 people. Samples were taken using the proportionate stratified random sampling technique. Participants in this research who fulfill the following requirements: Preclinical female students at the University of Jember's Faculty of Medicine (Class of 2020–2023); Female students are willing to sign an informed consent form and take part in the study; Female students are at least eighteen years old. The following are the criteria for exclusion: Respondents with a history of gynecological problems; Respondents with a history of abdominal trauma; Respondents had experienced anemia in the past. Data were obtained by respondents filling out Google Form and interviews via Zoom to fill out the SQ-

FFQ (Semi-Quantitative Food Frequency Questionnaire). The analytical test used in this study was the Spearman correlation test.

RESULT AND DISCUSSION

Research Result

The results of the questionnaires in the Google Forms and SQ-FFQ that have been filled out by medical students are presented in several tables.

Table 1. Distribution of research subjects

Variables	Frequency	Percentage (%)
Age		
18 years	14	17,7
19 years	14	17,7
20 years	18	22,8
21 years	24	30,4
22 years	8	10,2
23 years	1	1,2
Age of Menarche		
SD Grade 4 (9-10 years)	4	5
SD Grade 5-6 (11-12 years)	42	53,2
SMP Grade 7-8 (13-14 years)	30	38
>14 years	3	3,8
Nutritional Status		
Underweight	16	20,3
Normal	49	62
Overweight	14	17,7

Table 1 shows that the majority of respondents were 21 years old and experienced their first menstruation during elementary school grades 5-6 (11-12 years). The majority of nutritional status in medical students is normal.

Table 2. Distribution of macronutrient intake

Macronutrient	Frequency	Percentage (%)
Carbohydrate		
<80% RDA	75	94,9
80-110% RDA	4	5,1
>110% RDA	0	0
Fat		
<80% RDA	50	63,3
80-110% RDA	25	31,6
>110% RDA	4	5,1
Protein		
<80% RDA	54	68,4
80-110% RDA	22	27,8
>110% RDA	3	3,8

According to the National Widyakarya of Food and Nutrition (WNPG) (2004) macronutrient intake is categorized as normal if it is 80-110% of the RDA, while the category is less if it is less than 80% of the RDA and the category is more if it is more than 110% of the RDA (Widyakarya Nasional Pangan dan Gizi (WNPG), 2004). Table 2 shows that the intake of carbohydrates, fat and protein is in the deficient category.

Table 3. Correlation between macronutrient intake, nutritional status, and age of menarche with primary dysmenorrhea

No.	Variable	P Value	The Coefficient of Correlation
1.	Carbohydrate	0,518	0,074
2.	Fat	0,124	0,275
3.	Protein	0,260	0,128
4.	Nutritional Status	0,703	0,044
5.	Age of Menarche	0,003	0,326

Based on table 4 above, it showed that there is a weak correlation between menarche age and primary dysmenorrhea with a significance of 0.003 (<0.005). On the other hand, there was no correlation between nutritional status and macronutrient intake with primary dysmenorrhea.

Discussion

Correlation between macronutrient intake with primary dysmenorrhea

The correlation analysis of macronutrient intake with primary dysmenorrhea is divided into three intakes namely carbohydrate, fat, and protein. Carbohydrate intake and primary dysmenorrhea showed no correlation (p = 0.518). This is not in line with Adilah's research (2023), which found a relationship between the severity of dysmenorrhea and carbohydrate intake. Carbohydrate intake data in Adilah's study (2023) was grouped into rarely and often, which did not clearly state the method used for nutritional intake assessment. In this study, most of them consumed carbohydrates less than the RDA, namely 75 students (94.1%), so it

contradicts the results of Adilah's research (2023) that many students who consume excess carbohydrates experience severe dysmenorrhea (Adilah, 2023). The theory of carbohydrate intake associated with primary dysmenorrhea has not been well explained in several studies. Carbohydrate intake and primary dysmenorrhea are indirectly related. In the fat metabolism pathway, carbohydrates can be converted to acetyl-CoA and turned into fatty acids through the process of lipogenesis. Therefore, excessive carbohydrate consumption can increase fatty acids in the body so that prostaglandin hormones increase, which results in uterine contractions during menstruation and triggers menstrual pain and primary dysmenorrhea (Pratiwi dan Rodiani, 2015; Rodwell et al., 2015).

The correlation of fat intake with primary dysmenorrhea resulted in a significance of 0.124, indicating no correlation was found. This is also in line with Adilah's research (2023) that there is no relationship between fat intake and primary dysmenorrhea (Adilah, 2023). Most of the respondents in this study who experienced primary dysmenorrhea consumed less fat. Contrary to the research of Damayanti et al. (2022), subjects with excessive fat consumption tend to feel heavy menstrual pain (Damayanti et al., 2022). Pratiwi & Rodiani (2015) said that foods that contain more fat can increase prostaglandin levels, which play a role in uterine contractions during menstruation, triggering the occurrence of menstrual pain or primary dysmenorrhea (Pratiwi dan Rodiani, 2015).

Correlation analysis of protein intake with primary dysmenorrhea showed no correlation ($p = 0.260$), which is also in line with Adilah's research (2023). However, in this study, the majority of respondents with insufficient protein intake experienced primary dysmenorrhea, which is in line with the theory that low protein intake causes primary dysmenorrhea. Protein plays a role in iron transport for red blood cell synthesis, so low protein consumption can reduce Hb levels, which cause anemia (Erningtyas et al., 2023). This anemia causes a decrease in oxygen levels circulated throughout the body, including the uterus, so that ischemia occurs and dysmenorrhea or menstrual pain appears (Kusumawardani dan Cholifah, 2018).

Correlation between nutritional status with primary dysmenorrhea

Based on this study, in preclinical students of the Faculty of Medicine, University of Jember, there was no correlation between nutritional status (BMI) and primary dysmenorrhea (p = 0.703). This is not in accordance with the research of Nissa et al. (2016), which states that there is a relationship between BMI and primary dysmenorrhea in medical students. In the study of Nissa et al. (2016), the subject was a first-year medical student. This could be a factor that caused this study not to find a correlation because this study took 4 levels with an age range of 18–22 years (Nissa et al., 2016). The data also showed that the number of respondents who had abnormal BMI and experienced dysmenorrhea was very small compared to normal BMI respondents who experienced dysmenorrhea. Pre-college students of the Faculty of Medicine, University of Jember, also have an average normal nutritional status of 21.6 (63.3%).

Nutritional status with a BMI greater than normal or overweight has excess prostaglandin levels and causes ischemia in the uterus, causing menstrual pain (Rafique dan Al-Sheikh, 2018). Nutritional status with a BMI less than normal or underweight may have less fat, which can interfere with the ovulation cycle and excessive prostaglandin release, causing uterine contractions and menstrual pain or primary dysmenorrhea (Wu et al., 2022).

The results of the analysis showed no correlation between macronutrient intake and nutritional status in primary dysmenorrhea, possibly due to other factors. One of the factors is stress in female students who are not assessed, which can be one of the causes of primary dysmenorrhea. The onset of stress in college students is inevitable, even though this study was conducted during the vacation period. The cause of stress is not only academic life but can be caused by other factors. Some of the stressors for college students include changes in their living environment, difficulty managing themselves, and financial management issues. In addition, it is reported that stress is also caused by parental and university expectations that put pressure on failure, which impacts students' confidence and dignity (Suhandiah et al., 2021). One of the subjects in this study is a final-semester preclinical student who is also prone to stress when completing a final project or thesis. Stress can cause pressure on the hip and lower back muscles and reduce pain resistance.

Therefore, the severity of dysmenorrhea increases and is directly proportional to the high degree of stress (Sulistiani et al., 2023).

Correlation between age of menarche with primary dysmenorrhea

The age at first menstruation is called menarche age. In this study, the correlation analysis of menarche age with primary dysmenorrhea resulted in a significance of 0.003 ($p<0.05$) which means that a correlation was found which is in line with Qomarasari's research (2021). This is also indicated by data on the age of menarche in preclinical students, the majority of whom experienced menstruation at the age of ≤ 12 years, totaling 46 people (58.2%). According to Qomarasari's research (2021), the earlier the age of menarche will cause the reproductive organs to be unprepared and the narrow size of the cervical canal to cause dysmenorrhea (Qomarasari, 2021).

CONCLUSION AND SUGGESTION

There is a correlation between menarche age and primary dysmenorrhea in preclinical students of the Faculty of Medicine, University of Jember, Indonesia. Fat, protein, and carbohydrate intake were not found to be correlated with primary dysmenorrhea and there was no correlation between nutritional status and primary dysmenorrhea. Preclinical students of the Faculty of Medicine are advised to pay attention to the amount of carbohydrate, protein and fat intake consumed to match the nutritional needs. For future researchers, they can conduct research with other methods to assess nutritional intake and food recall when the respondent finishes menstruating.

DECLARATION

Conflict of Interest

Author declare there is no conflict of interest in this researchAuthors' ContributionAll author contribute from concept in writing draf article.

Ethical Approval

The research was declared by The Ethics Committee of The Faculty of Medicine, Jember University No. 5123-/UN25.1.10.2/KE/2023.

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Data Availability
The data supporting this research are available from the authors on reasonable

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