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PRIMARY DYSMENORRHEA LEVEL BASED ON FOOD CONSUMPTION AND DIETARY HABITS IN FEMALE STUDENTS AT YWKA HIGH SCHOOL BANDUNG

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Abstract

Primary dysmenorrhea refers to menstrual pain that occurs before or during menstruation without any abnormalities in the reproductive organs and is most commonly experienced by adolescent girls aged 15-25 years. Globally, the prevalence reaches up to 90%, while in Indonesia it is 54.89%. Factors associated with primary dysmenorrhea include age under 30 years, early menarche, BMI under 18 kg/m², family history, and nutritional status. Objective: To examine the difference in primary dysmenorrhea level based on food consumption and dietary habit among female students at YWKA High School Bandung. Methods: This study used a quantitative design with a retrospective case-control approach. The population consisted of 96 female students from grades X and XI, with 58 students in the case group and 38 in the control group, selected using a total sampling technique. Data were collected using the SQ-FFQ and AFHC questionnaires, and analyzed using multivariate logistic regression. Results: there was an association of primary dysmenorrhea with food consumption of magnesium (OR: 2.670; 95%CI: 1.057-6.741; p-value: 0.038), family history (OR: 0.336; 95%CI: 0.133-0.853; p-value: 0.022), and dietary habit (OR: 3.432; 95%CI: 1.348-8.743; p-value: 0.01). Meanwhile, BMI (OR: 1.58; 95%CI: 0.59-4.231; p-value: 0.362) was a confounding variable. Conclusion: These findings emphasize the importance of education on balanced nutrition as part of promotive efforts to enhance reproductive health and reduce the incidence of primary dysmenorrhea among adolescent girls.

Keywords : Primary Dysmenorrhea, Dietary Habit, Food Consumption, Reproductive Health, Adolescent Girls

Introduction

Primary dysmenorrhea is a condition characterized by menstrual pain that occurs just before or during menstruation in individuals with normal ovulatory cycles and no underlying pathological abnormalities [1]. This condition is most commonly experienced by adolescent females aged 15–25 years [2]. According to the World Health Organization (WHO), the global prevalence of primary dysmenorrhea reaches 90%, with approximately 10–16% of cases classified as severe. In Indonesia, the prevalence is 54.89% [3], while in West Java, it reaches 54.9% [4]. Data from community health centers in Bandung City indicate a prevalence of 73% among adolescent girls [5], making this region one of those with the highest incidence rates.

Various factors are known to contribute to the occurrence of primary dysmenorrhea, including age below 30 years, early menarche (<12 years), nutritional status, smoking, menstrual duration, stress, family history, psychological factors, physical activity, allergies, anemia, and hormonal factors

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[6–8]. In addition to biological and psychological factors, food consumption patterns and dietary habits also play an important role. Adolescents often exhibit unhealthy eating behaviors, such as skipping meals, consuming nutrient-poor foods, and eating irregularly. These habits contribute to an increased risk of various health problems, including primary dysmenorrhea [9].

Previous studies have shown a significant association between diet and primary dysmenorrhea. Aktaş et al, (2025) found a relationship between food consumption and the incidence of primary dysmenorrhea. Poor dietary habits, such as low intake of fruits and vegetables and frequent consumption of coffee and fast food, are known to increase prostaglandin levels in the body, which can trigger uterine contractions and worsen menstrual pain [11,12]. This highlights the importance of providing appropriate nutrition education for adolescent girls to reduce the risk of dysmenorrhea [13]. Primary dysmenorrhea has a negative impact on adolescents' quality of life, including school absenteeism, reduced concentration, learning difficulties, and decline in academic performance [14,15]. A study conducted in Palestine reported that 26% of adolescent girls missed school during menstruation, 36% had difficulty concentrating, and 39% were unable to study or complete school assignments [16]. If left untreated, this condition may progress into chronic long-term pain [17].

Based on preliminary observations at YWKA High School Bandung, it was found that approximately 60% of female students experienced primary dysmenorrhea. In addition to the fact that the majority of students in this school are female, there has been no previous study specifically examining the relationship between food consumption and dietary habits with primary dysmenorrhea in this setting. Therefore, this research is important to identify modifiable risk factors and serve as a basis for interventions aimed at improving the reproductive health of adolescent girls.

Method

This study was a quantitative research with a retrospective case-control approach, conducted at YWKA High School Bandung from October 2024 to April 2025. The study population consisted of 96 female students from grades X and XI, comprising 58 participants in the case group and 38 participants in the control group. The sampling technique used in this study was total sampling. The research employed several instruments, including a primary dysmenorrhea level questionnaire using the Numeric Rating Scale (NRS) to determine the intensity of menstrual pain, a food consumption questionnaire using the Semi Quantitative Food Frequency Questionnaire (SQFFQ), and a dietary habit questionnaire using the Adolescent Food Habits Checklist (AFHC) developed by Johnson et al. (2002) and Amelia (2009). The latter instrument was modified by the researcher and had been tested for validity and reliability. Data analysis was performed using the Chi-Square test and Logistic Regression test. This research was reviewed by the Ethics Committee of Universitas Negeri Malang and was declared ethically appropriate with approval number 13.01.07/UN32.14.2.8/LT/2025.

Result

The dependent variable in this study was the group experiencing primary dysmenorrhea and the group not experiencing primary dysmenorrhea, while the independent variables were age at menarche, family history of dysmenorrhea, BMI, iron supplementation consumption, food consumption of carbohydrates, protein, fat, iron, magnesium, and calcium, as well as dietary habits.

Table 1 Characteristics of the Primary Dysmenorrhea Group

Variable	f	%
Group		
1. Primary dysmenorrhea	58	60,4
2. Non-primary dysmenorrhea	38	39,4
Total	96	100
Age of Menarche		
1. Abnormal	24	41,4
2. Normal	34	58,6
Total	58	100
Family History of Dysmenorrhea		
1. Yes	36	62,1
2. No	22	37,9
Total	58	100
BMI		
1. Abnormal	25	43,1
2. Normal	33	56,9
Total	58	100
Iron Supplementation Consumption		
1. Yes	13	22,4
2. No	45	77,6
Total	58	100
Consumption of Carbohydrate Foods		
1. Inadequate	40	69
2. Adequate	18	31
Total	58	100
Consumption of Protein Foods		
1. Inadequate	50	86,2
2. Adequate	8	13,8
Total	58	100
Consumption of Fat Foods		
1. Inadequate	47	81
2. Adequate	11	19
Total	58	100
Consumption of Iron Foods		
1. Inadequate	26	44,8
2. Adequate	32	55,2
Total	58	100
Consumption of Magnesium Foods		
1. Inadequate	36	62,1
2. Adequate	22	37,9
Total	58	100
Consumption of Calcium Foods		
1. Inadequate	48	82,8
2. Adequate	10	17,2
Total	58	100
Dietary Habit		
1. Poor	40	69
2. Good	18	31

Variable	f	%
Total	58	100

In the initial stage of data processing, descriptive analysis was conducted to describe the frequency of each variable, as presented in Table 4.1. The results of the analysis show the characteristics of the group of students with primary dysmenorrhea. Out of the total respondents, 58 students experienced primary dysmenorrhea, with 41.4% of them having an early age at menarche (<12 years). The majority of students (62.1%) had a family history of dysmenorrhea. Most students had a normal BMI (56.9%) and did not regularly consume iron supplementation (77.6%).

Regarding food consumption, most students had inadequate nutritional intake, particularly for carbohydrate (69%), protein (82.2%), fat (81%), magnesium (60.3%), and calcium (82.8%) intake, although the majority (55.2%) had adequate iron nutritional intake. In addition, 69% of students had poor dietary habits. The characteristics of the non-primary dysmenorrhea group are presented in Table 4.2 as follows

Table 2 Characteristics of the Non-Primary Dysmenorrhea Group

Variable	f	%
Group		
1. Primary dysmenorrhea	58	60,4
2. Non-primary dysmenorrhea	38	39,4
Total	96	100
Age of Menarche		
1. Abnormal	11	28,9
2. Normal	27	71,1
Total	38	100
Family History of Dysmenorrhea		
1. Yes	13	26,5
2. No	25	53,2
Total	38	100
BMI		
1. Abnormal	10	26,3
2. Normal	28	73,7
Total	38	100
Iron Supplementation Consumption		
1. Yes	13	34,2
2. No	25	65,8
Total	38	100
Consumption of Carbohydrate Foods		
1. Inadequate	26	68,4
2. Adequate	12	31,6
Total	38	100
Consumption of Protein Foods		
1. Inadequate	32	84,2
2. Adequate	6	15,8
Total	38	100
Consumption of Fat Foods		
1. Inadequate	30	78,9
2. Adequate	8	21,1
Total	38	100
Consumption of Iron Foods		
1. Inadequate	11	28,9
2. Adequate	27	71,1
Total	38	100
Consumption of Magnesium Foods		

Variable	f	%
1. Inadequate	13	34,2
2. Adequate	25	65,8
Total	38	100
Consumption of Calcium Foods		
1. Inadequate	29	76,3
2. Adequate	9	23,7
Total	38	100
Dietary Habit		
1. Poor	14	36,8
2. Good	24	63,2
Total	38	100

The results of the analysis in Table 4.2 describe the characteristics of the non-primary dysmenorrhea group. A total of 71.1% of the students in this group had a normal age at menarche. Most students (53.2%) did not have a family history of dysmenorrhea. The majority of students had a normal BMI (73.7%) and did not regularly consume iron supplementation (77.6%). Regarding food consumption, most students had inadequate nutritional intake, particularly for carbohydrate (68.4%), protein (84.2%), fat (78.9%), and calcium (76.3%) intake, although the majority had adequate iron nutritional intake (71.1%) and magnesium (65.8%). In addition, 63.2% of students had good dietary habits. The analysis was then continued with bivariate analysis, as presented in Table 3.

Tabel 3 Differences in Food Consumption and Dietary Habits Between Primary Dysmenorrhea and Non-Primary Dysmenorrhea Groups

Variable	Primary Dysmenorrhea	Non-Primary Dysmenorrhea	N	p-value
	f (%)	f (%)	f (%)	
Age of Menarche				
1. Abnormal	24 (68,6)	11 (31,4)	35 (100)	0,307
2. Normal	34 (55,7)	27 (44,4)	61 (100)	*Baseline*
Family History of Dysmenorrhea				
1. Yes	36 (73,5)	13 (26,5)	49 (100)	0,014
2. No	22 (46,8)	25 (53,2)	47 (100)	*Baseline*
BMI				
1. Abnormal	25 (71,4)	10 (28,6)	35 (100)	0,146
2. Normal	33 (54,1)	28 (45,9)	61 (100)	*Baseline*
Iron Supplementation Consumption				
1. Yes	45 (64,3)	25 (35,7)	70 (100)	0,300
2. No	13 (50)	13 (50)	26 (100)	*Baseline*
Consumption of Carbohydrate Foods				
1. Inadequate	40 (40,6)	26 (39,4)	66 (100)	1,000
2. Adequate	18 (60)	12 (40)	30 (100)	*Baseline*
Consumption of Protein Foods				
1. Inadequate	50 (61)	32 (39)	82 (100)	1,000
2. Adequate	8 (57,1)	6 (42,9)	14 (100)	*Baseline*
Consumption of Fat Foods				
1. Inadequate	47 (61)	30 (39)	77 (100)	1,000
2. Adequate	11 (57,9)	8 (42,1)	19 (100)	*Baseline*
Consumption of Iron Foods				
1. Inadequate	26 (70,3)	11 (29,7)	37 (100)	0,177
2. Adequate	32 (54,2)	27 (45,8)	59 (100)	*Baseline*
Consumption of Magnesium Foods				
1. Inadequate	36 (73,5)	13 (26,5)	49 (100)	0,014
2. Adequate	22 (46,8)	25 (53,2)	47 (100)	*Baseline*
Consumption of Calcium Foods				0,608

Variable	Primary Dysmenorrhea	Non-Primary Dysmenorrhea	N	p-value
1. Inadequate	48 (62,3)	29 (37,7)	77 (100)	*Baseline*
2. Adequate	10 (52,6)	9 (47,4)	19 (100)	
Dietary Habit				
1. Poor	40 (74,1)	14 (25,90)	54 (100)	0,004
2. Good	18 (42,9)	24 (57,1)	42 (100)	*Baseline*

The results of the analysis in Table 4.3 show the variables that met the criteria for inclusion in the multivariate test. These variables had a p-value < 0.25, namely family history of dysmenorrhea, BMI, dietary habit, food consumption of iron and magnesium. Meanwhile, the variables that were not included in the multivariate test because they had a p-value > 0.25 included age at menarche, iron supplementation consumption, and food consumption of carbohydrates, protein, fat, and calcium.

Table 4 Final Model of the Relationship Between Family History, Magnesium, and Dietary Habits with Primary Dysmenorrhea, with BMI as a Confounding Variable

Variable	p-value	OR	95% CI
Family History of Dysmenorrhea			
1. Yes	0,022	0,336	0,133 – 0,853
2. No	*Baseline*		
Consumption of Magnesium Foods			
1. Inadequate	0,038	2,670	1,057 – 6,741
2. Adequate	*Baseline*		
Dietary Habit			
1. Poor	0,010	3,432	1,348 – 8,743
2. Good	*Baseline*		
BMI			
1. Abnormal	0,362	1,580	0,590 – 4,231
2. Normal	*Baseline*		

Table 4 presents the final results of the relationship between several independent variables and the occurrence of primary dysmenorrhea. Among the four variables analyzed, three showed a statistically significant relationship (p-value ≤ 0.05), namely family history of dysmenorrhea, magnesium intake, and dietary habits. Meanwhile, the Body Mass Index (BMI) variable acted as a confounding variable in this model.

The analysis results indicate that students with a family history of dysmenorrhea were 0.336 times more likely to experience primary dysmenorrhea compared to those without such a history, when controlled for BMI. In other words, adolescents without a family history of dysmenorrhea were associated with a 66.4% lower risk of experiencing dysmenorrhea (1 – 0.336 = 0.664). The findings also revealed that students with insufficient magnesium intake were 2.67 times more likely to experience primary dysmenorrhea compared to those with adequate magnesium intake, when controlled for BMI. In addition, students with poor dietary habits were 3.432 times more likely to experience primary dysmenorrhea compared to those with good dietary habits, also when controlled for BMI.

Discussion

a. Differences in Dietary Habits Between Primary Dysmenorrhea and Non-Primary Dysmenorrhea Groups at YWKA High School Bandung in 2025

Dietary habit refers to the daily behaviors of selecting, preparing, and consuming food by individuals or groups [19]. The macronutrient and micronutrient content of consumed foods can influence the occurrence of primary dysmenorrhea [20]. This study showed that most students with primary dysmenorrhea had poor dietary habits. Based on the analysis results, there was a significant relationship between dietary habits and the incidence of primary dysmenorrhea among students at YWKA High School Bandung. These findings are consistent with the study conducted by Taqiyah et al. [21] in Makassar, which also found a relationship between dietary habits and primary dysmenorrhea.

However, the study conducted by Huda et al. [22] did not support this finding, reporting no significant relationship between dietary habits and primary dysmenorrhea. This discrepancy may be due to differences in individual sensitivity to certain foods and variations in metabolism that can influence the effect of dietary patterns on dysmenorrhea [22,23]. This study also revealed differences in dietary habits between students who experienced primary dysmenorrhea and those who did not. This may occur because most students tend to choose foods without considering their health impacts, resulting in poor dietary habits [24].

Poor dietary habits are characterized by high consumption of fast food, high-sugar foods, and saturated fats, which can worsen the symptoms of primary dysmenorrhea. Fast food contains high levels of calories, fat, and sugar but is low in fiber. The fatty acid content in fast food can increase the production of prostaglandins, compounds that cause excessive uterine contractions and menstrual pain [25]. If unhealthy food intake continues, prostaglandin production may increase, thereby exacerbating primary dysmenorrhea [26]. This finding aligns with the results of this study, in which logistic regression analysis showed that dietary habits had an OR of 3.432, meaning that students with poor dietary habits were three times more likely to experience primary dysmenorrhea compared to those with good dietary habits.

Several other studies also indicate that excessive consumption of caffeine and cold beverages can increase the risk of primary dysmenorrhea because caffeine can cause vasoconstriction and reduce blood flow to the uterus [27]. Adolescents with severe menstrual pain tend to follow a Western diet, which is high in meat, fish, and fast food, while those with milder pain are more likely to adopt a lacto-ovo-vegetarian diet, with higher intake of vegetables, fruits, and dairy products [28]. The results of this study also revealed that most students preferred fast food over fruits and vegetables. This tendency may be due to the students' urban living environment, where food accessibility is easier, leading them to consume more practical and ready-to-eat meals. Additionally, urban adolescents often follow modern food trends popularized through social media, such as boba drinks, which can have negative health effects when consumed excessively [29].

Dietary habits are influenced by social factors, such as the environment and peer groups. Eating behaviors formed during childhood within the family often persist into adulthood. Furthermore, peers may influence students to adopt their friends' eating habits [30,31]. Another factor contributing to primary dysmenorrhea is the habit of skipping meals, particularly breakfast, which is common among adolescents [32]. This finding aligns with a study conducted in Japan, which found that the habit of skipping meals can disrupt hormonal and metabolic balance, affecting the menstrual cycle and primary dysmenorrhea symptoms through disturbances in the circadian rhythm and hypothalamic-pituitary-ovarian axis [33]. Female adolescents who regularly eat breakfast experience lower pain intensity compared to those who skip it [34].

The results of this study also identified Body Mass Index (BMI) as a factor that may moderate the relationship between dietary habits and primary dysmenorrhea. Students with abnormal BMI were

more prone to severe dysmenorrhea, possibly due to hormonal imbalances resulting from insufficient or excessive nutrient intake [35]. Low caloric intake, reduced body fat, and abnormal BMI can disrupt pulsatile gonadotropin secretion in the pituitary gland, leading to an increased incidence of primary dysmenorrhea. This finding is consistent with Ramadhania et al [36], who reported a relationship between BMI and dietary habits. Therefore, BMI can serve as a moderating variable that should be analyzed using stratification or included in a multivariate model.

The practical implications of this study are highly relevant in the context of school health promotion. Schools should consider improving canteen food availability by providing more healthy menu options and reducing the sale of deep-fried foods prepared with excessive oil. This approach functions not only as a preventive strategy but also as a means to foster healthy eating culture among adolescents. Nutrition education emphasizing the importance of healthy food choices to reduce the risk of primary dysmenorrhea should also be implemented through health seminars or structured, continuous educational programs.

However, the cost of inviting healthcare professionals or organizing seminars can be a barrier. Additionally, healthy menus are often perceived as less appealing by students; therefore, canteen managers and students should be involved for instance, through menu voting to make healthy foods more attractive. The main limitation of this study lies in the use of the AFHC questionnaire, which relies on participants' recall of the past week, posing a potential recall bias, especially among those with low nutritional awareness. Future research could use daily food records or 24-hour dietary recalls validated with objective measurements, such as energy intake assessment. Moreover, since the case-control design cannot establish causality between dietary patterns and primary dysmenorrhea, further research using a longitudinal design is recommended, including mediating variables such as prostaglandin levels, hormones, and stress.

b. Differences in Magnesium Food Consumption Between the Primary Dysmenorrhea and Non-Primary Dysmenorrhea Groups at YWKA High School Bandung 2025

Magnesium is an essential micronutrient, especially for adolescents who are still undergoing growth and development [37]. This mineral plays a role in neurotransmitter function, which influences mood and behavior [38]. For adolescent girls, magnesium can help relieve menstrual pain due to its role in maintaining muscle and nervous system function. Magnesium helps transmit signals between nerve cells and controls the contraction of smooth muscles, including the uterine muscles. When magnesium levels are low, uterine muscle contractions increase, triggering menstrual pain [39].

This study showed that most students with primary dysmenorrhea had inadequate magnesium intake based on the Recommended Dietary Allowance (RDA). The analysis results revealed a significant relationship between magnesium food consumption and the incidence of primary dysmenorrhea among students at YWKA High School Bandung. This finding is consistent with research conducted in Depok, which also found a similar association between magnesium intake and primary dysmenorrhea among 103 adolescent girls [40]. However, research by Davidson et al. [41] did not support this result, indicating no relationship between magnesium food consumption and primary dysmenorrhea. This discrepancy may occur because adolescents have varying sensitivities to certain foods and differences in metabolism that can affect magnesium absorption [42].

Another study conducted in Jakarta also showed differences in magnesium intake between adolescents who experienced primary dysmenorrhea and those who did not. The average daily magnesium intake among adolescent girls was 130.1 mg/day, far below the recommended daily intake of 230 mg/day [43]. Low magnesium intake increases the risk of primary dysmenorrhea due to the influence of estradiol and progesterone hormones that can trigger uterine contractions [44]. This study found that students with inadequate magnesium intake were 2.67 times more likely to experience primary dysmenorrhea compared to those with adequate intake.

Body magnesium levels are influenced by hormonal changes during the menstrual cycle. Before menstruation, low magnesium levels cause increased uterine contractions due to a decrease in progesterone. After ovulation, magnesium levels rise again along with the increase in progesterone [45]. Estrogen also regulates the balance of magnesium and calcium through parathyroid hormones. Therefore, adequate magnesium intake helps maintain hormonal balance and body metabolism [46]. Magnesium also helps reduce calcium levels in smooth muscle cells, relaxing the muscles, preventing cramps, and reducing primary dysmenorrhea pain [47,48].

The majority of students had low magnesium intake due to several contributing factors, such as cultural influences, where healthy foods are often considered less appealing and not trendy. Viral food trends also shift eating preferences toward low micronutrient foods, such as those low in magnesium. School canteens also tend to sell more fast food and packaged snacks rather than fruits and vegetables. In addition, families with limited economic resources tend to prioritize filling and affordable foods, such as rice, instant noodles, and fried foods, which are low in magnesium [49]. Urban environments and suburban areas also make it difficult to find fresh and healthy food ingredients at affordable prices [50].

Nutritional status, represented by Body Mass Index (BMI), also plays a role in strengthening the relationship between magnesium intake and primary dysmenorrhea. Previous studies have shown that adolescents with abnormal BMI tend to have a higher risk of magnesium deficiency and experience more severe menstrual pain [51]. BMI can exacerbate the effects of magnesium deficiency, as supported by research from Naseeb et al [52], which showed a relationship between BMI and magnesium intake. The finding of a relationship between magnesium intake and primary dysmenorrhea has important implications in the school setting. A lack of understanding about the role of magnesium in reproductive health could serve as an early indicator to identify at-risk students. Therefore, nutrition education involving schools and health workers, such as seminars conducted by public health centers is necessary to help students understand the menstrual cycle and the benefits of magnesium.

Monitoring and evaluation, such as recording cases of dysmenorrhea and magnesium deficiency, are also important. From an intervention standpoint, school canteens should provide magnesium-rich foods such as green vegetables and nuts. These findings can also be used by local health centers to create promotion and prevention policies, for instance through nutrition counseling, adolescent health clinics, or supplement distribution. Comprehensive monitoring of nutritional intake is required to ensure the effectiveness of intervention programs. However, the main challenges lie in cost, availability of measuring tools, professional manpower, and school canteen readiness. Dependence on short-term program funding also threatens sustainability. A potential solution is to start with a pilot program lasting 1–2 months with support from the local health center, then expand it if proven effective. Collaboration between schools, the Health Office, and the Education Office is essential.

This study has several limitations, such as the use of the SQ-FFQ method for dietary assessment, which poses a risk of recall bias, particularly because the reporting period covered one month. In addition, the case-control design limits the ability to determine causal relationships between magnesium intake and the incidence of primary dysmenorrhea. Therefore, further studies using longitudinal or prospective cohort designs are recommended to evaluate changes in magnesium intake over time and its effect on dysmenorrhea symptoms. The use of the SQ-FFQ instrument should still be maintained but simplified by grouping relevant food items more specifically to focus on foods related to the nutrients of interest. Furthermore, multivariate analysis considering other factors such as stress, hormonal status, and sleep patterns can provide a more comprehensive understanding.

c. Differences in Family History of Dysmenorrhea Between the Primary Dysmenorrhea and Non-Primary Dysmenorrhea Groups at YWKA High School Bandung 2025

Family history contributes to an increased risk of primary dysmenorrhea because inherited genetic factors can influence women's physiological response to menstrual pain [53]. The results of this study showed a significant relationship between family history of dysmenorrhea and the occurrence of primary dysmenorrhea among students at YWKA High School Bandung. Most respondents who experienced primary dysmenorrhea reported having mothers or sisters with similar histories. This finding is consistent with studies conducted in various countries, such as in Palembang Septiyani & Simamora [54] and Ethiopia [55], which reported that having a family history of dysmenorrhea could increase the risk up to 4.64 times. However, the findings of Kasma et al. [56] were not consistent with this study, showing no significant relationship between family history and primary dysmenorrhea.

Genetic factors from parents can affect an individual's sensitivity to pain. One example is the chromosome 1p13.2, which is associated with the body's response to prostaglandins and hormonal regulation. Additionally, a mother's behavior in responding to pain may be imitated by her daughter, leading to similar perceptions of menstrual pain [57,58]. The risk of dysmenorrhea is also higher when the mother or sister experiences the same condition [59]. This study supports that notion, as most students with primary dysmenorrhea also had family members with dysmenorrhea. Genetic factors influence variations in the intensity of menstrual pain, as observed in twin studies. Twin research has shown an estimated heritability of 0.67, reinforcing the notion that genetics play a dominant role in primary dysmenorrhea [60].

However, it is important to note that this relationship is not solely caused by genetic factors. Parenting patterns, lifestyle, and pain management behaviors within the family also shape individual pain perception and experience. Adolescents who grow up in families that normalize or ignore menstrual pain may adopt similar attitudes [61]. Therefore, when examining family history as a risk factor, aspects of social modeling and early habituation should also be considered. Positive coping strategies, maternal education, good role modeling, and stable emotional support can significantly reduce the intensity and impact of menstrual pain [62,63]. Furthermore, the relationship between family history and primary dysmenorrhea can be influenced by other variables, such as Body Mass Index (BMI). Abnormal BMI—whether overweight or underweight—can disrupt reproductive hormonal balance. High BMI is associated with increased estrogen levels, while low BMI can reduce estrogen production due to low body fat [10,64]. This finding aligns with Hu et al. [65] who reported a relationship between family history, BMI, and primary dysmenorrhea. This may occur because dietary patterns within families are often inherited, suggesting that a family history of dysmenorrhea could also be linked to similar nutritional habits and statuses [65]. This indicates that BMI may act as a moderating variable that should be analyzed using stratified or multivariate models.

These findings indicate that family history is related to primary dysmenorrhea, making it important to recognize this risk early. A lack of knowledge regarding healthy dietary habits may serve as an early indicator of students at risk for primary dysmenorrhea. Therefore, nutrition education involving schools and health professionals such as seminars on reproductive health and genetically influenced primary dysmenorrhea should be implemented. Such education can help students and parents understand the risks and learn how to reduce symptoms through balanced nutrition.

From a nutritional intervention perspective, this study highlights the need for school-based nutrition counseling programs. These programs aim to increase students' awareness of primary dysmenorrhea risk, the importance of adequate nutrient intake, and healthy lifestyle practices to prevent reproductive health issues. With proper education, students are expected to be more attentive to their reproductive health both now and in the future. However, limited school funding and resources may hinder the sustainability of such programs, making long-term collaborations with local

health centers, the Health Office, or the Education Office essential. Schools can integrate these initiatives into annual school health programs or extracurricular activities, or establish simple monitoring systems such as menstrual tracking cards or nutrition diaries.

Although this study demonstrates a relationship between family history and the incidence of primary dysmenorrhea, it is important to note that family history data were obtained through self-reported responses, which are susceptible to recall bias or misinformation. Not all students may know the exact menstrual history of their mothers or sisters, raising concerns about data validity. Future studies are recommended to use longitudinal or cohort designs to examine long-term associations between family history and dysmenorrhea symptom progression. Validation of family history data should involve direct information from family members (e.g., mothers) and include additional variables such as emotional status, stress levels, and adolescent coping strategies.

Conclusion

Based on the results of the study on the differences in food consumption and dietary habits between students with primary dysmenorrhea and those without primary dysmenorrhea at YWKA High School Bandung, it can be concluded that most of the respondents were adolescent girls who experienced normal age at menarche, had a family history of dysmenorrhea, and had a normal BMI. Most of the students did not regularly consume iron supplementation. Furthermore, the majority of students had an inadequate intake of carbohydrates, protein, fat, iron, magnesium, and calcium. In addition, many students exhibited poor dietary habits. The analysis showed significant differences in dietary habits, magnesium intake, and family history of dysmenorrhea between the primary dysmenorrhea and non-primary dysmenorrhea groups at YWKA High School Bandung. Future research may be conducted using a cohort study design to allow researchers to observe the development of dysmenorrhea and magnesium intake more comprehensively. Moreover, future studies should involve a larger population, so the findings can be generalized to a broader population of adolescent girls.

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