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The Relationship between Nutritional Status, Junk Food Consumption, and Exercise Habits of Adolescent Girls in Jakarta with the Incidence of Primary Dysmenorrhea

Hubungan antara Status Gizi, Konsumsi Junk Food*, dan Kebiasaan Olahraga Remaja Perempuan di Jakarta dengan Kejadian Dismenorea Primer*

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ABSTRACT

Background: Every one in six people in the world is an adolescent, and as many as 85% of adolescents live in developed countries, which often experience menstrual disorders such as primary dysmenorrhea. Primary dysmenorrhea is menstrual pain in the absence of pathological conditions in the pelvis that often occurs at a young/adolescent age triggered by various factors such as nutritional status, diet, exercise habits, and stress.
Objectives: To analyze the association between nutritional status (BMI-for-age), junk food consumption, and exercise habits of adolescent girls in Jakarta with the incidence of primary dysmenorrhea.
Methods: This study used a cross-sectional design, the population of this study was all grade 11 students in Jakarta (East Jakarta, South Jakarta, West Jakarta, Central Jakarta, North Jakarta). The method of obtaining samples used was purposive sampling. The instrument used was a questionnaire regarding nutritional status, exercise habits and junk food consumption patterns assessed using the Food Frequency Questionnaire (FFQ) through Google Forms.
Results: The results showed a significant relationship between nutritional status (p = 0.022), junk food consumption (p = 0.000), and exercise habits (p = 0.000) with the incidence of primary dysmenorrhea.
Conclusions: There was a correlation between nutritional status, junk food consumption, and exercise habits on the incidence of primary dysmenorrhea in adolescent girls in Jakarta. Further research is needed on the relationship between nutritional status, junk food consumption and exercise habits with the incidence of primary dysmenorrhea in other age groups, and with different methods to expand knowledge related to factors that cause primary dysmenorrhea.

INTRODUCTION

One in every six people on the planet is a teenager, with industrialized nations accounting for 85% of the total[1], who commonly face menstruation difficulties such as primary dysmenorrhea. Primary dysmenorrhea is discomfort experienced during menstruation that is not caused by any pathological diseases in the pelvis and is caused by myometrial contractions, resulting in ischemia owing to the presence of prostaglandins from the endometrial secretory phase[2]. Primary dysmenorrhea is characterized by pain signs such as cramps and occurs in the lower center region of the uterus[2]. Primary dysmenorrhea is frequently associated with symptoms such as nausea, vomiting, diarrhea, and headache, even when no abnormalities are found after a gynecological examination[2]. The pain is generally felt starting before menstruation begins and increases on the first and second days[2]. Dysmenorrhea appears to be connected with late or early menstruation, extended and heavier-than-usual menstruation, low body weight and BMI, insufficient exercise, genetic susceptibility, active or passive smoking, poor socioeconomic level, nutrition, stress, and mental illnesses[3].

Around 90% of teenage girls worldwide suffer menstrual issues, and more than 50% of menstruating women experience primary dysmenorrhea, with 10-20% experiencing severe symptoms. In Indonesia, the frequency of dysmenorrhea is 64.25%, with 54.89% being primary dysmenorrhea and 9.36% being secondary dysmenorrhea. Primary dysmenorrhea affects 60-75% of youths, with three-quarters experiencing mild to severe discomfort and the remaining quarter experiencing severe pain[4]. In an epidemiological research done in a teenage population, 12% of individuals suffering dysmenorrhea symptoms described the pain as severe, 37% as moderate, and 49% as light[5]. Primary

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dysmenorrhea affects 87.5% of women in Jakarta, with 20.48% experiencing light discomfort, 64.76% experiencing moderate pain, and 14.76% experiencing severe pain[6].

According to prior studies, the incidence of dysmenorrhea is highest among teenagers between 14 and 16 years. According to researchers, this might be due to the stress that teens endure at that age. It might be argued that 14 years of age is still too young to start high school, and this condition can place pressure on pupils who are having problems adjusting to school activities. Meanwhile, teens aged 16 are more psychologically matured, making them more likely to encounter a variety of difficulties both within and outside of school that might create stress[7].

Nutritional status is a description of a person's bodily state as a result of food consumption and the usage of nutritional supplements. Nutritional status is divided into four categories: poor, poor, good, and better[8]. Nutritional status may also be defined as a physical description of a person that represents the balance of energy absorbed and released by the body[9].

Primary dysmenorrhea is associated with being overweight. In addition, persons who are underweight suffer from primary dysmenorrhea. A research was done at a school, and preliminary data supplied by the school's class teacher revealed that about half of the students frequently complained of menstruation discomfort[10]. The correlation between body mass index (BMI) and dysmenorrhea, as illustrated by a U-shaped curve in a longitudinal study, indicated that women who were slender and obese had a greater risk of developing dysmenorrhea compared to those who had a normal nutritional status. As a result, it is critical for women to be able to maintain a healthy weight throughout time in order to have pain-free menstruation[11].

Sport is described as a planned and consistent sequence of physical motions designed to preserve mobility and increase movement capability[12]. Sport is also defined as a requirement for everyone in their everyday lives in order to preserve their physical condition and health. Exercise can also promote health and help to avoid sickness[13]. Sports activities carried out with regular and continuous intensity are considered good exercise[14].

Women who exercise had a decreased incidence of dysmenorrhea, according to studies[15]. Women who exercise at least once a week can minimize the severity of lower abdominal pain and discomfort[15]. Endorphins released in the circulation during exercise are thought to contribute to this. It appears that there is a common idea that exercise helps alleviate the symptoms of dysmenorrhea[15].

Junk food is characterized as unhealthy or nutritionally deficient food. Fast food restaurants such as McDonald's and KFC are also referred to as junk food. Junk food, in general, comprises essentially little protein, vitamins, or minerals and is heavy in calories from sugar or fat. The term 0 calory refers to the very minimum of nutrition in junk food. Food that has become a lifestyle activity as a result of globalization and industrialization does not have high nutritional value for health. As a result, the phrase junk food is the ideal option[16]. People who live in urban areas, such as Jakarta, are generally more exposed to fast food restaurants than those who live in rural areas and suburbs[17]. People in cities are more prone to eat fast food than those in the suburbs[18]. The study discovered that exposure to broadcast media influences public fast food consumption in urban regions[18]. More importantly, most advertising, including for fast food, tends to be concentrated on television stations operating in Jakarta[19]. Furthermore, easier access to fast food outlets in urban areas may make metropolitan residents more comfortable consuming fast food advertised on television, despite being told that fast food is generally unhealthy, consistent with the positive relationship between density of fast food outlets and fast food consumption[17,20].

Junk food is a common factor in dysmenorrhea[21]. According to the survey, the percentage of junk food consumption habits among Medical Faculty students at one of Indonesia's institutions reached 85.6%[22]. Excessive consumption of junk food causes an increase in the prostaglandin cascade, resulting in hypertonus and excessive vasoconstriction in the myometrium, causing ischemia and pain[23].

Primary dysmenorrhea is menstrual discomfort without any pathological diseases in the pelvis that commonly occurs in young women/adolescents due to a variety of variables such as nutritional status, frequency of junk food consumption, exercise routines, and so on. The growth of the problem of primary dysmenorrhea, which is frequently encountered by teenage females, together with low exercise habits, improper eating patterns, and inadequate nutritional status necessitates more study to examine the association between these variables. As a result, the purpose of this study is to investigate the association between nutritional quality based on body mass index according to age (BMI-for-age), junk food intake, and sports behaviors of teenage girls in Jakarta and the prevalence of primary dysmenorrhea. It is believed that this study would aid in offering recommendations for diet maintenance, nutritional status monitoring, and being more attentive in exercising to prevent primary dysmenorrhea.

METHODS

This was a cross-sectional study using a correlational analytic design to determine the association between nutritional status based on Body Mass Index for age (BMI-for-age), junk food intake, and exercise habits and the occurrence of primary dysmenorrhea. This study was conducted at several schools in five Jakarta municipalities. The study was conducted from July until September 2022. The research population consisted of all female 11th grade SMA/K students in Jakarta. According to sample calculation using the Lameshow formula, the minimum sample size necessary was 96 persons[24]. Subsequently, using a purposive sampling strategy, 10% was added to prevent dropout, resulting in 106 samples. The predetermined inclusion criteria for participants were as follows: they must be female, currently menstruating, actively involved as grade 11 students in high school in Jakarta, have a regular menstrual cycle, and have no prior history of reproductive disease. On the other hand, refusal to participate in the study and

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possession of an irregular menstrual cycle or a history of reproductive disease were considered exclusion criteria.

The study instrument was an online questionnaire created with Google Forms that asked about the respondent's identify (name/initials, school name, class, and school location), menstruation cycles, weight, height, frequency of consuming junk food, and exercise habits. Respondent identification was required to confirm that all respondents were grade 11 high school students and that respondents could represent the five Jakarta municipalities. The respondent independently measured his or her body weight and height. To eliminate bias in weight and height data, respondents were asked to view three videos: one on how to fill out a questionnaire, one on how to appropriately measure body weight, and one on how to correctly measure height. In addition, respondents were required to produce proof in the form of videos/photos while doing weight and height measurements. Menstrual pattern data was acquired using five items in the questionnaire that might determine if the respondent had a regular menstrual cycle or not, whether the respondent had menstrual pain or not, and whether the menstrual pain was classed as primary or secondary dysmenorrhea. This information was required since the current study solely looked at menstruation discomfort, which was classed as primary dysmenorrhea. Data on exercise habits were acquired from four items in the questionnaire, which might determine if the respondent exercises frequently or not, as well as how many days per week the respondent exercises[25], what factors encourage respondents to exercise[26], and what factors prevent respondents from exercising[27]. There is an infographic in the questionnaire that describes the distinctions between sport and physical activity so that respondents are informed before filling out this area and can complete the questionnaire correctly.

Data on the frequency of consuming junk food was obtained through FFQ (Food Frequency Questionnaire), where the frequency was divided into 7 days/week, 5-6 days/week, 3-4 days/week, 1-2 days/week [28], and never. The junk food group was divided into 6 groups, namely preservative/canned foods (packaged noodles/instant noodles, instant meatballs, sardines, corned beef, canned fruit, instant seblak, canned vegetables, popcorn, packaged foods), processed meat foods (meatballs, sausages, nuggets, burgers, fried chicken, steak, hot dogs, beef jerky, meat-based sauces, ham), frozen sweet foods (ice cream, frozen cake), cheesy foods (pizza, pasta), foods/drinks that contain a lot of sugar (martabak, candy, boba drinks, coffee, powdered/sweet drinks, sweet bottled drinks, soda, bottled fruit juice, energy drinks, sports drinks, Thai tea, and other contemporary drinks, sweet cereal, chocolate, cookies/biscuits , cakes, donuts, pastries, etc.), and fried foods (chips, stick noodles, crispy intestines, seblak crackers, baked macaroni, crispy chicken skin, egg martabak, fried foods, french fries, aromatic bananas, fried meatballs/basreng , sempolan)[29]. Aside from that, respondents were asked about the benefits and drawbacks of eating junk food[30]. In this situation, validity verification was performed by comparing the r count and r table. The sample size in this example was 101, thus r table = 0.195. We achieved r count > r table after processing the data using SPSS 26.0, indicating that all of the question items were genuine[31]. The reliability test process is considered reliable if the Cronbach's Alpha value is > 0.6, namely 0.701 > 0.6 so the question is considered reliable[32].

Data was collected by distributing a poster giving the criteria for needed responders. There was a QR code linked to the Google Forms link for the research questionnaire, a QR code linked to the Google Drive link (which included a video guide on how to fill out the questionnaire, a video on how to measure the right weight, and a video on how to measure the right height), and a QR code linked to a Google Forms link that respondents must fill out as proof that they had read the attached ethical letter and agreed to participate in this research. Posters were distributed online through various social media platforms until the requisite number of responses were reached. If there were any issues or questions when filling out the questionnaire, respondents could contact the researcher by WhatsApp, which was listed on the poster. The Health Research Ethics Commission granted permission for this study with letter number 107/PE/KE/FKK-UMJ/VI/2022, Muhammadiyah University Jakarta. Meanwhile, univariate and bivariate data analysis was performed. In this study, the goal of univariate analysis was to generate frequency distributions and percentages of the independent variables, nutritional status (BMI-for-age), frequency of junk food consumption, and exercise habits, as well as the dependent variable, the incidence of primary dysmenorrhea[33]. The bivariate analysis used was the Chi-square test, to see whether one variable was related to other variables. In this study, Chi-square was used to analyze the relationship between primary dysmenorrhea and nutritional status (BMI-for-age), frequency of consuming junk food, and exercise habits. The analysis method used was Pearson Chi-square with a significance level of 5% (0.05), a confidence level of 95%, and a critical limit of 0.10[31]. Data analysis was carried out using SPSS 26.0.

RESULTS AND DISCUSSION

The respondents in this study were 16-year-old or grade 11 girls in Jakarta who were already menstruation and attending high school or vocational school. There were 24 students from East Jakarta (23.8%), 24 students from West Jakarta (23.8%), 21 students from Central Jakarta (20.8%), 21 students from South Jakarta (20.8%), and 11 students from North Jakarta (10.9%).

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Table 1. Frequency distribution of primary dysmenorrhea, nutritional status, frequency of intake of each junk food class, and frequency of exercise habits

Variable	Category	n	%
Primary Dysmenorrhea Incidence			
Existent		74	73.3
Inexistent		27	26.7
Nutritional Status (BMI-for-age)			
Underweight	3 SD s.d. < -2 SD	5	5
Normal	-2 SD s.d. +1 SD	76	75.2
Overweight	+1 SD s.d. +2 SD	18	17.8
Obese	>+2 SD	2	2
Junk Food Consumption Frequency			
Preserved/Canned Foods			
Very often consumed	7 days/week	1	1
Usually consumed	5-6 days/week	3	3
Occasionally consumed	3-4 days/week	24	23.8
Rarely consumed	1-2 days/week	43	42.6
Never consumed		30	29.7
Processed Meat Foods			
Very often consumed	7 days/week	0	0
Usually consumed	5-6 days/week	5	5
Occasionally consumed	3-4 days/week	30	29.7
Rarely consumed	1-2 days/week	45	44.6
Never consumed		21	20.8
Frozen Sweet Foods			
Very often consumed	7 days/week	0	0
Usually consumed	5-6 days/week	5	5
Occasionally consumed	3-4 days/week	21	20.8
Rarely consumed	1-2 days/week	44	43.6
Never consumed		31	30.7
Cheesy Foods			
Very often consumed	7 days/week	0	0
Usually consumed	5-6 days/week	1	1
Occasionally consumed	3-4 days/week	18	17.8
Rarely consumed	1-2 days/week	51	50.5
Never consumed		31	30.7
High Sugar Foods/Drinks			
Very often consumed	7 days/week	6	5.9
Usually consumed	5-6 days/week	23	22.8
Occasionally consumed	3-4 days/week	28	27.7
Rarely consumed	1-2 days/week	24	23.8
Never consumed		20	19.8
Fried Foods			
Very often consumed	7 days/week	8	7.9
Usually consumed	5-6 days/week	20	19.8
Occasionally consumed	3-4 days/week	27	26.7
Rarely consumed	1-2 days/week	22	21.8
Never consumed		24	23.8
Frequency of Exercise Habits			
Never		49	48.5
Rarely	1 day/week	12	11.9
Quite often	2-3 days/week	29	28.7
Often	4-7 days/week	11	10.9

BMI-for- age (body mass index according to age)

Table 1 demonstrates that the majority of individuals, 74 (73.3%), had primary dysmenorrhea. Meanwhile, 27 (26.7%) of the individuals did not have primary dysmenorrhea. The participants in this study were all 16 years old. Teenagers are still emotionally unstable at that age; therefore, primary dysmenorrhea develops more frequently. Constitutional factors are tightly tied to psychological factors, and these factors might impair pain resistance[34]. According to one book, primary dysmenorrhea is common, affecting up to 50% of women and causing severe discomfort in 15% of them. Primary dysmenorrhea is most common throughout

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adolescence, about 2-3 years following the first menstruation[35].

Women who are teens aged 12-24 years will face many stress triggers from various areas such as schooling, family, and the economy, which might impact the occurrence of dysmenorrhea. Adolescent females, in general, are unable to solve their own difficulties and prefer to ignore them, resulting in stress that might promote dysmenorrhea[36]. Dysmenorrhea can have a negative influence on teenage females by disrupting learning activities, failing to pay attention to instructor explanations, and frequently napping in class during learning activities. Both academic and non-academic achievements are impacted. During menstruation, many teens grumble and are even unwilling to attend school. The more severe the discomfort, the more disturbed learning activities will be[37].

According to Table 1, 75.2% of participants had a normal nutritional status, whereas just 2% were obese. Physical activity, body image, knowledge factors, inherited variables, lifestyle, and environmental factors can all have an impact on teenage girls' nutritional status[38]. One of the organ functions influenced by nutritional status is the reproductive system. To maintain healthy nutritional status, young women must consume a well-balanced nutritional diet. The synthesis of menstrual hormones such as FSH (Follicle Stimulating Hormone), LH (Luteinizing Hormone), estrogen, and progesterone may all be altered by a healthy diet. The hormones FSH, LH, and estrogen all impact the menstrual cycle at the same time, whereas progesterone regulates the uterus and can reduce contractions throughout the cycle[39].

Table 1 shows that the class of junk food most frequently consumed was fried food (7.9%), and the class of junk food most usually consumed was food/drinks containing a lot of sugar. As many as 29.7% of respondents said they occasionally ate processed meat, while 50.5% said they rarely ate cheesy foods. The two categories of junk food that were rarely consumed were cheesy foods and frozen sweet foods.

According to Table 1, 48.5% of research individuals never exercised in a week, whereas 10.9% exercised frequently. According to a study, the proportion of teens with irregular exercise habits is greater than the proportion of teenagers with regular exercise habits[40]. Teenagers often engage in mild physical activities such as sitting and casual strolling and seldom engage in sports since not every teenager in sports topics engages in sports and other heavy physical activities. Aside from that, the availability of automobiles and technological developments have made labor lighter and less physically demanding. As a result, teens seldom engage in physical activity[41].

Exercise can improve blood circulation by increasing blood flow to the reproductive organs. Regular activity, such as brisk walking, jogging, running, swimming, cycling, or aerobic exercise, can enhance overall health and maintain a regular menstrual cycle. Some women find comfort via exercise, which not only reduces stress but also promotes the creation of endorphins in the brain, the body's natural painkillers. There are no limits on activity during menstruation; however, aerobic exercise can assist create natural chemicals that can alleviate menstrual discomfort[42].

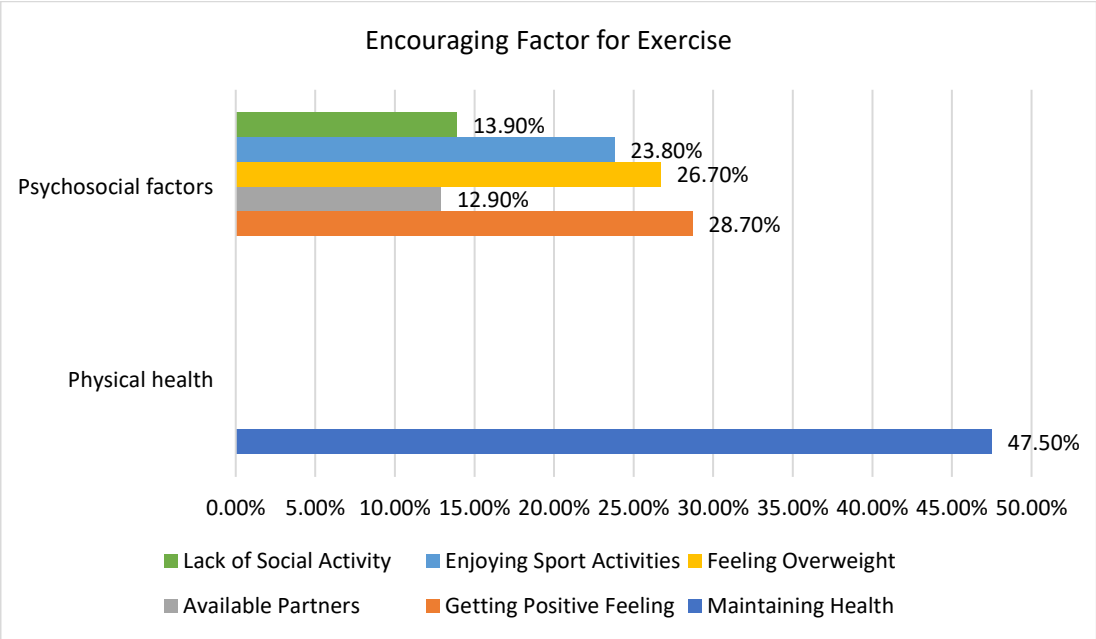

Figure 1. Exercise Encouraging Factor Diagram

The factors that encourage respondents to exercise are depicted in Figure 1. The motivation most commonly chosen by respondents were exercise to keep their health. Maintaining health in this context means keeping your present body weight, decreasing extra weight, keeping your body form, and so on. Psychosocial variables such as happy feelings after exercise, being overweight, and enjoying the physical activity itself can all inspire people to exercise. Apart from these three reasons, a lack of social activities can also be a reason why someone spends their time with sports, and many

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individuals exercise because friends invite or join them to exercise[26].

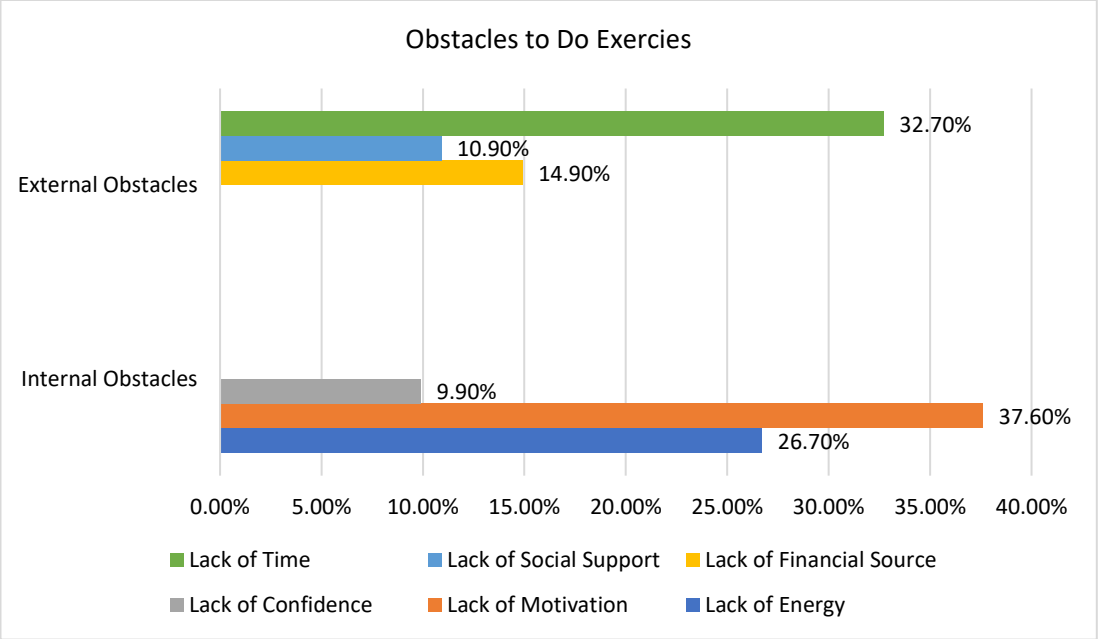

Figure 2. Diagram of Exercises Obstacles Factors

Figure 2 shows the factors that hinder respondents from exercising. The most stated reasons were a lack of motivation and a lack of time. A lack of motivation can be demonstrated by someone believing that many other leisure activities that can be done with friends are more interesting than sports, or that sports have no good influence on oneself. Lack of time is another factor that prevents people from exercising, particularly if they are unable to manage their time. In addition, a lack of energy might prohibit someone from exercising. Feeling too fatigued or unable to exercise, and sometimes simply thinking about the exercise activity itself causes fatigue, thus a person decides not to exercise. Then, a lack of resources, such as a lack of sports equipment at home or the absence of a gym or fitness facility in the region where they live, can also prohibit someone from exercising. It has been shown that a lack of social support and self-confidence might also deter people from exercising. A lack of social support occurs when family or friends do not support sports, or when parents stress academic achievement above sports, and a lack of self-confidence occurs when someone is concerned about their performance and aptitude in sports[27].

Table 2. Average value (mean) frequency of consumption of junk food

Category	Score	n	%
Very often consumed	7 days/week	0	0
Usually consumed	5-6 days/week	1	1
Occasionally consumed	3-4 days/week	35	34,7
Rarely consumed	1-2 days/week	40	39,6
Never consumed		25	24,8

According to Table 2, 39.6% of participants rarely consumed junk food, 1% usually consumed junk food, and none regularly consumed junk food in the previous month. Teenagers are readily influenced by contemporary developments, such as fashion and societal trends, particularly in the realm of modern eating. Teenagers tend to eat their favorite meals, which are usually junk foods. Junk food is particularly popular due to its short processing time, ease of availability, and low and reasonable costs. Many teens prefer fast food to other foods[21].

Excessive junk food consumption can trigger the prostaglandin cascade, leading in hypertonus and vasoconstriction in the myometrium, resulting in ischemia and discomfort; this is the most common cause of pelvic pain. Young age (30 years), body mass index over the usual limit, duration of menstrual cycle, age at first menstruation, family history of dysmenorrhea, stress, and eating behaviors are all risk factors for dysmenorrhea. Consuming junk food is an eating pattern that frequently causes dysmenorrhea[43].

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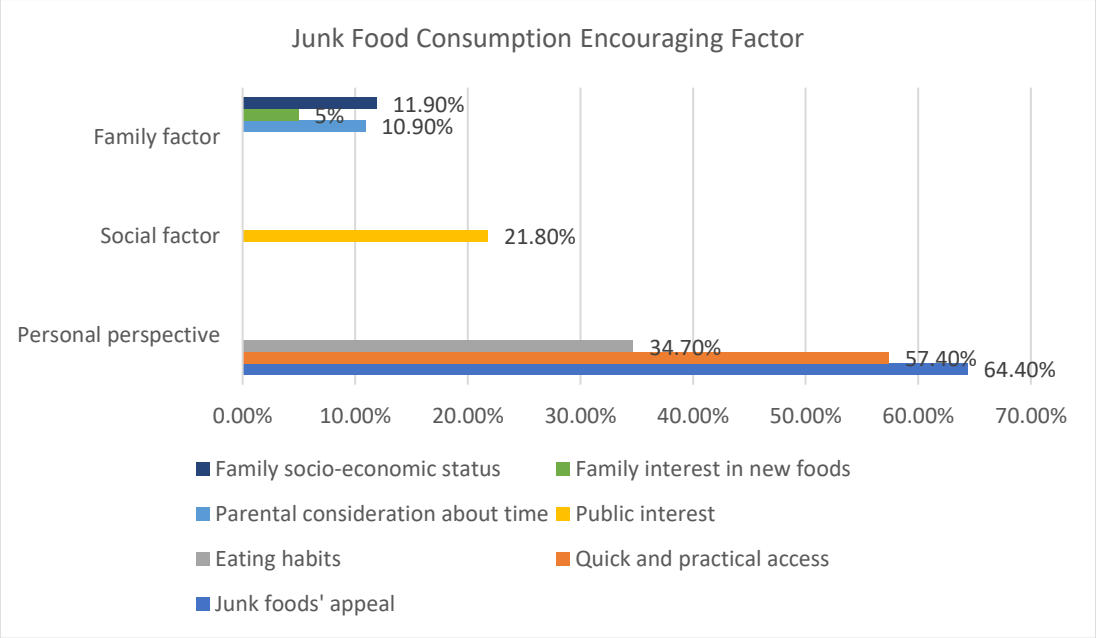

Figure 3. Diagram of Encouraging Factors to Eat Junk Food

Figure 3 depicts the qualities that motivate respondents' consumption of junk food. It can be shown that the appeal of the junk food itself, for example, was the component that most encourages someone to consume junk food. Then, because it is easy and convenient to obtain, many individuals consume junk food. Then, there were some who consumed junk food because they were accustomed to doing so on a daily basis, either because it has become a habit or because they are addicted to junk food. These three driving reasons were personal views, which implies that they are generated by each individual. Then, there were sociological factors, such as popular interest in junk food. The presence of junk food commercials everywhere, the growing number of fast-food restaurants, and being surrounded by family/friends who enjoy junk food can all boost the public's desire to consume junk food. According to respondents' responses, the factor that influenced junk food consumption the least is family-related factors[30].

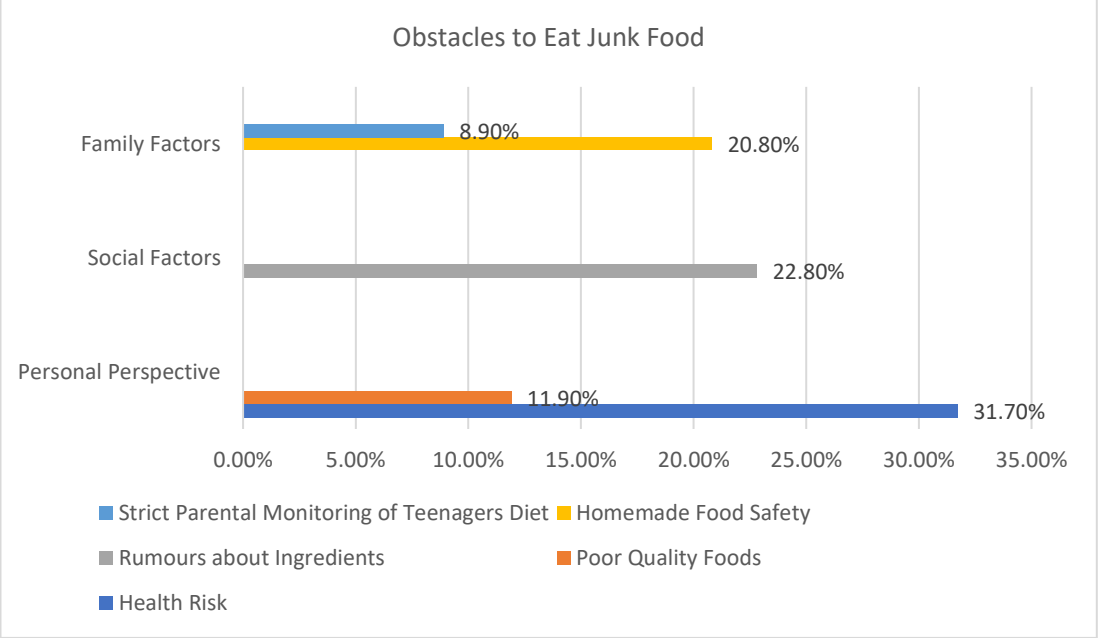

Figure 4. Diagram of Obstacle Factors to Eat Junk Foods

Figure 4 depicts the characteristics that discourage respondents from eating junk food. The majority of respondents cited health risks as a reason to avoid junk food. Heart difficulties, infertility, high blood cholesterol levels, obesity, and other risks. Aside from health concerns, speculations regarding the ingredients used in junk food were the second most common cause. Many people have begun to be educated about balanced

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nutritional intake patterns, so many people have begun to realize that junk food intake needs to be limited, and teenagers' relatively high use of social media exposes them to negative news that occurs as a result of unrestricted junk food intake. The safety of food prepared at home was another factor that keeps respondents from eating junk food. The safety in question is that responders were aware of the fundamental components used and how the meal was prepared. The other two characteristics were poor food quality and strict parental monitoring of what they eat[30].

Table 3. Bivariate analysis of the relationship between nutritional status (BMI-for-age) and the incidence of primary dysmenorrhea

Incidence of Primary Dysmenorrhea	Nutritional Status								*p-value*
	Underweight -3SD < -2SD		Normal -2SD sd +1SD		Overweight +1SD sd +2SD		Obese > +2SD		
	n	%	n	%	n	%	n	%	
Existent	4	80	50	65,8	18	100	2	100	
Inexistent	1	20	26	34,2	0	-	0	-	0,022
Total	5	100	76	100	18	100	2	100	

As shown in Table 3, the Chi-Square test results showed a p-value of 0.022 or (p<0.05). This demonstrates a connection between female teenagers' nutritional status and the prevalence of primary dysmenorrhea in Jakarta. These findings are consistent with prior research that discovered a link between nutritional status and the occurrence of dysmenorrhea in teenage females in SMAN 1 Bangkinang City in 2018[44]. An abnormal nutritional status can impede development, organ function, and reproductive function. This influences menstrual diseases such as dysmenorrhea, although it can improve if dietary intake is improved. According to one study, teenage females with bad nutritional status are 10,500 times more likely than adolescent girls with good nutritional status to suffer dysmenorrhea[45].

According to the findings of this study, up to 80% of underweight teenage females had primary dysmenorrhea. This can be caused by inadequate diet, which causes the gonadotropin hormone in the body to drop. Because of the reduction in gonadotropin hormones, LH and FSH output falls as well. In this circumstance, estrogen levels will fall, impacting menstruation. When there is an imbalance in estrogen production, prostaglandins are created. When the amount of prostaglandins increases, it produces vasospasm (narrowing of the blood vessels) in the uterine arterioles, resulting in ischemia (loss of blood flow) and cramping in the lower abdomen, which causes discomfort[46].

This study also found that all teenagers who were overweight or obese suffer from primary dysmenorrhea. This occurred because being overweight can raise prostaglandin levels in the body, causing discomfort during menstruation. Then, being overweight causes adipose tissue to restrict blood flow to the blood vessels, disturbing the blood flow that should be smooth during menstruation and resulting in dysmenorrhea[47]. Meanwhile, some adolescents with normal nutritional status had primary dysmenorrhea, while others did not. Many additional factors, such as age of menarche, duration of menstruation, family history, and exercise habits, can all contribute to the prevalence of primary dysmenorrhea[48].

Table 4. Bivariate analysis of junk food consumption and the incidence of primary dysmenorrhea

Incidence of Primary Dysmenorrhea	Junk Food Consumption								*p-value*
	Usually Consumed 5-6 days/week		Occasionally Consumed 3-4 days/week		Rarely Consumed 1-2 days/week		Never Consumed		
	n	%	n	%	n	%	n	%	
Existent	1	100	33	94,3	35	87,5	5	20	
Inexistent	-	-	2	5,7	5	12,5	20	80	0,000
Total	1	100	35	100	40	100	25	100	

The Chi-Square test findings in Table 4 had a p-value of 0.000 or (p<0.05). This demonstrates that there was a relationship between junk food consumption among female teenagers in Jakarta and the occurrence of primary dysmenorrhea. This is consistent with studies that show a relationship between junk food consumption and the occurrence of primary dysmenorrhea[49]. Similar things were found in research which showed that consumption of junk food was associated with the incidence of primary dysmenorrhea[50].

Trans fatty acids, which are a source of free radicals, are also found in junk food. One of the effects of free radicals is cell membrane damage. Phospholipids are one of several components that make up cell membranes. Phospholipids serve as sources of arachidonic acid, which is then converted into prostaglandins by all cells in the body[51]. Prostaglandins help the uterus contract and evacuate the uterine lining throughout the menstrual cycle. As a result, women who have menstrual discomfort or dysmenorrhea are suffering from an excess of prostaglandins, resulting in dysmenorrhea[21]. As a result, in this research, people who never ate junk food did not get primary dysmenorrhea.

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Table 5. Bivariate analysis of the relationship between exercise habits and the incidence of primary dysmenorrhea

Primary Dysmenorrhea Incidence	Exercise Habits								*p-value*
	Never		Rarely 1 day/week		Quite Often 2-3 days/week		Often 4-7 days/week		
	n	%	n	%	n	%	n	%	
Existent	47	95,9	8	66,7	15	51,7	4	36,4	
Inexistent	2	4,1	4	33,3	14	48,3	7	63,6	0,000
Total	49	100	12	100	29	100	11	100	

The Chi-Square test findings in Table 5 had a p-value of 0.000 or (p<0.05). This demonstrates a correlation between adolescent girls' sporting activities and the prevalence of primary dysmenorrhea in Jakarta. These findings are corroborated by a research that found a link between sports and the occurrence of dysmenorrhea in female students at AKPER level 1, Ngawi Regency Government[52]. A different investigation discovered a link between exercise behaviors and the occurrence of primary dysmenorrhea in teenage girls[48].

Primary dysmenorrhea can be exacerbated by a lack of activity during menstruation and a lack of exercise, which can result in reduced blood and oxygen circulation. This scenario can have an influence on blood flow and oxygen circulation in the uterus, as well as cause discomfort[35]. This may be seen in the findings of this study, which found that the majority of participants who never or seldom exercised had primary dysmenorrhea. Subjects who exercised often, on the other hand, did not have primary dysmenorrhea.

Exercise can help reduce menstruation pain because it increases the chemicals endorphins and serotonin, which have a positive influence on the body by creating a sense of comfort, relaxation, and can help lessen pain. Aerobic exercise is strongly suggested for reducing discomfort and avoiding primary dysmenorrhea. Because the primary purpose of aerobic exercise is to improve the activity of the heart and lungs, blood and oxygen circulation in the body will improve to the greatest extent possible. When oxygen levels are ideal, the hormone prostaglandin is repressed, and endorphin hormones rise, relieving pain[53].

The weakness of this study is that it was conducted during the Covid-19 pandemic, when most schools were still implementing distance or hybrid learning, making it extremely difficult to obtain permission from the school to conduct offline and face-to-face research, especially because a sample size was required. The main event. As a result, directions on how to fill out the questionnaire can only be provided through recorded videos, and the time spent filling it out is not tracked. Then, the tools used to measure weight and height were not consistent because respondents performed it individually using measuring instruments they owned at home, which meant that the accuracy of each measuring instrument varied. The benefit of this study is that the time spent filling out the questionnaire was more efficient, making it simpler for researchers to input data from the findings of the online questionnaire. Then, in this study, researchers sought to discover not only the relationship between the incidence of primary dysmenorrhea and the frequency of junk food consumption and/or exercise habits, but also the respondents' incentives and/or barriers to consuming junk food and/or exercise, so that the data could be used as information if this research is developed in the future.

CONCLUSIONS

After conducting research on the relationship between nutritional status based on body mass index according to age (BMI-for-age), exercise habits, and junk food consumption patterns in adolescent girls in Jakarta, it was determined that there was a relationship between these three variables and the incidence of primary dysmenorrhea. More research is needed on the relationship between nutritional status, junk food consumption, and exercise habits and the incidence of primary dysmenorrhea in other age groups, and with different methods to expand knowledge about the factors that cause primary dysmenorrhea, and can also be used as a comparison to find out which factors have the greatest impact on the occurrence of primary dysmenorrhea.

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