



ASSOCIATION OF FRUIT AND VEGETABLE INTAKE AND PHYSICAL ACTIVITY WITH PRIMARY DYSMENORRHEA AMONG CENTRALLY OBESE ADOLESCENTS

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ABSTRACT

Primary dysmenorrhea is a common reproductive health issue among female adolescents and is closely linked to lifestyle factors, including dietary patterns and physical activity, particularly among those with central obesity. This study aims to analyze the relationship between fruit and vegetable consumption, exercise habits, and primary dysmenorrhea among adolescents with central obesity. An analytical observational study with a cross-sectional design was conducted in February 2026 across four public senior high schools in Surakarta. A sample of 128 centrally obese female students was selected using multistage sampling. Data were collected via interviews using a standardized FFQ, a validated 12-item exercise habits questionnaire (Pearson's $r > 0.804$; Cronbach's $\alpha = 0.970$), and a standardized NRS. Data were analyzed using statistical software through univariate and bivariate analyses ($p < 0.05$). The majority of respondents reported irregular fruit and vegetable consumption (56.3%) and irregular exercise habits (55.5%), and most experienced moderate-to-severe dysmenorrhea. Statistically significant relationships were found between fruit and vegetable consumption and dysmenorrhea ($p = 0.004$) and between exercise habits and dysmenorrhea ($p < 0.001$). Irregular consumption and low physical activity were strongly associated with higher pain severity. Fruit and vegetable consumption and exercise habits are significantly associated with the severity of primary dysmenorrhea among adolescents with central obesity. Promoting healthy dietary habits and regular physical activity may mitigate the severity of dysmenorrhea in this population.

Keywords: adolescent; central obesity; fruit consumption; physical exercise; primary dysmenorrhea; vegetable consumption

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INTRODUCTION

Dysmenorrhea is a common reproductive health issue among female adolescents, characterized by menstrual pain in the absence of organic pathology. Globally, the prevalence of dysmenorrhea ranges from 28% to 77.7%, whereas among women of reproductive age, it reaches 45% to 95% (Hidayanti & Adiwiryo, 2021; Y. Puspitasari & Oktarida, 2022). Primary dysmenorrhea is more prevalent among adolescents aged 16–18 years, with a prevalence rate of approximately 60% to 75%. In Surakarta, 91.7% of senior high and vocational school female students were reported to experience primary dysmenorrhea, which adversely affects academic concentration, school absenteeism, and overall academic productivity (Wulandari & Widiyaningsih, 2023).

Nutritional status, particularly central obesity, is a contributing factor in the incidence of primary dysmenorrhea. Central obesity is characterized by the accumulation of abdominal fat, which contributes to metabolic disturbances and hormonal imbalances (Karina et al., 2017). According to the 2018 National Health Research (Riskesdas), the prevalence of central obesity among populations aged ≥ 15 years in Indonesia was 31%, while in Central Java it was 18.4%. This

condition can increase peripheral estrogen production and trigger low-grade chronic inflammation, which disrupts the regulation of reproductive hormones and subsequently elevates the risk of primary dysmenorrhea (Kamal et al., 2025).

Lifestyle factors, such as fruit and vegetable consumption patterns and exercise habits, also play a crucial role in the incidence of dysmenorrhea. Low fruit and vegetable consumption leads to inadequate intake of antioxidants and dietary fiber, thereby increasing oxidative stress and prostaglandin synthesis, which subsequently trigger excessive uterine contractions (Fatahillah & Isnaeni, 2025). Data from the Central Bureau of Statistics (BPS) of Surakarta City indicate that public fruit and vegetable consumption has reached only approximately 43% of the recommended intake of ≥ 400 grams per day (A. I. Puspitasari et al., 2021). Previous studies indicate that low fruit and vegetable consumption is associated with an increased risk of menstrual disturbances and menstrual pain (Syifa & Stefani, 2024).

Physical activity plays a vital role in improving blood circulation and stimulating the release of endorphins, which can alleviate menstrual pain. However, approximately 53.4% of female adolescents in Surakarta have low levels of physical activity. A lack of physical activity not only contributes to central obesity but also exacerbates dysmenorrhea by impairing circulation and heightening inflammation (Saragih et al., 2024). Studies indicate that adolescents with low physical activity levels carry a higher risk of dysmenorrhea compared to those who are physically active (Nadhiroh & Mufarrohah, 2022; Primalova & Stefani, 2024). This study aims to analyze the relationship between fruit and vegetable consumption, exercise habits, and the incidence of primary dysmenorrhea among adolescents with central obesity.

METHOD

This quantitative study employed an analytical observational design with a cross-sectional approach to examine the relationship between fruit and vegetable consumption, exercise habits, and the incidence of primary dysmenorrhea among centrally obese adolescents. The research was conducted in February 2026 at four public senior high schools in Surakarta, namely SMA Negeri 1, 3, 4, and 5. A sample of 128 female students with central obesity was obtained using multistage sampling. Data were collected through interviews using questionnaires. Fruit and vegetable consumption was assessed using a standardized Food Frequency Questionnaire (FFQ), which is a widely accepted and validated tool for dietary assessment. Exercise habits were measured using an exercise habits questionnaire consisting of 12 items, which had been previously tested and demonstrated excellent validity (Pearson's $r > 0.804$, $p < 0.05$) and high reliability (Cronbach's $\alpha = 0.970$). The severity of dysmenorrhea pain was measured using the Numerical Rating Scale (NRS), another standardized, widely recognized, and validated tool for pain assessment. Data were analyzed using statistical software through both univariate and bivariate analyses, with statistical significance set at $p < 0.05$.

RESULT

The characteristics of the respondents are presented in Table 1. Based on the analysis, the frequency distribution and percentages provide a general overview of the respondents, including fruit and vegetable consumption, exercise habits, and the severity of primary dysmenorrhea. These demographic and behavioral characteristics were obtained through questionnaires completed by the respondents.

As shown in Table 1, the majority of respondents exhibited irregular fruit and vegetable consumption (56.3%) and irregular exercise habits (55.5%), indicating suboptimal dietary patterns and physical activity levels. Furthermore, the severity of dysmenorrhea pain was dominated by the severe category (46.9%), followed by moderate (35.2%) and mild (18.0%). This underscores that primary dysmenorrhea constitutes a serious health concern among centrally obese adolescents.

Table 1.
Respondent characteristics (n= 128)

Respondent characteristics	f	%
Fruit and Vegetable Consumption		
Never	18	14,1
Irregular	72	56,3
Regular	38	29,7
Exercise Habits		
Never	22	17,2
Irregular	71	55,5
Regular	35	27,3
Severity of Dysmenorrhea Pain		
Mild	23	18,0
Modered	45	35,2
Severe	60	46,9

Table 2.
Bivariate Analysis Results of Fruit and Vegetable Consumption and Exercise Habits (n= 128)

Variable	Severity of Primary Dysmenorrhea Pain						Total		P Value
	Mild		Modered		Severe				
	f	%	F	%	f	%	f	%	
Fruit and Vegetable Consumption									
Never	2	1,6	7	5,5	9	7,05	18	14,1	0,004
Irregular	8	6,3	22	17,2	42	32,8	72	56,2	
Regular	13	10,1	16	12,5	9	7,05	38	29,7	
Exercise Habits									
Never	3	2,4	6	4,7	13	10,2	22	17,3	< 0,001
Irregular	4	3,1	26	20,3	41	32	71	55,4	
Regular	16	12,5	13	10,2	6	4,7	35	27,3	

According to Table 2, the bivariate Chi-Square analysis showed a statistically significant association between fruit and vegetable consumption and the severity of primary dysmenorrhea pain ($p = 0,004$). Respondents with irregular consumption patterns had the highest proportion of severe pain (32.8%), whereas those with regular consumption tended to experience mild-to-moderate pain. Similarly, exercise habits were significantly associated with the severity of primary dysmenorrhea pain ($p < 0,001$). Respondents who exercised irregularly reported the highest proportion of severe pain (32.0%), while those who exercised regularly experienced predominantly mild pain and had a lower proportion of severe pain.

DISCUSSION

The findings of this study indicate that the majority of respondents exhibited irregular fruit and vegetable consumption and exercise habits. This pattern reflects unhealthy lifestyle habits among adolescents with central obesity and aligns with the high proportion of moderate-to-severe primary dysmenorrhea observed in this population. The analysis demonstrated a statistically significant relationship between fruit and vegetable consumption and the severity of primary dysmenorrhea pain ($p = 0,004$). Respondents with irregular consumption patterns tended to experience more severe pain, whereas regular consumption was associated with milder pain. Physiologically, fruits and vegetables contain essential vitamins and minerals, such as magnesium, alongside antioxidants (vitamins C and E) that play a critical role in suppressing prostaglandin production and reducing uterine contractions (Ningrum et al., 2025). The results of this study are consistent with research by Maisyaroh and Suryani (2024), which reported a significant relationship between fruit and vegetable consumption and the incidence of primary dysmenorrhea among midwifery students at Universitas Aufa Royhan Padangsidiimpuan, with p-values of 0.040 for fruit consumption and 0.032 for vegetable consumption ($p < 0,05$) (Maisyaroh & Suryani, 2024).

A study by Nurhajijah et al. (2025) also found that poor dietary patterns, characterized by low fruit and vegetable consumption, were associated with the incidence of dysmenorrhea among adolescents

($p = 0.001$; $p < 0.05$). That study further explained that adolescent dietary habits, which tend to be high in fast food and low in fruits and vegetables, can elevate the risk of dysmenorrhea due to nutritional imbalances within the body (Nurhajjah et al., 2025). Similarly, research by Fauziyah et al. (2024) conducted on female adolescents at SMK Kesehatan Annisa 3 Citeureup demonstrated a significant relationship between dietary patterns and the incidence of primary dysmenorrhea, with significance values ranging from 0.002 to 0.005 (Fauziyah et al., 2024). These findings reinforce that overall dietary habits, including fruit and vegetable consumption, constitute crucial factors influencing both the incidence and severity of dysmenorrhea.

Exercise habits were also significantly associated with the severity of primary dysmenorrhea pain ($p < 0,001$). Respondents who did not exercise regularly had a higher proportion of severe pain, whereas those who exercised routinely tended to experience milder pain. Physiologically, exercise stimulates the production of endorphins, which act as natural analgesics, improves blood circulation, and aids in hormonal regulation, thereby reducing pain intensity (Hia, 2025). The results of this study align with research by Sunarti and Lestari (2023), which demonstrated an association between exercise activity and the incidence of dysmenorrhea among Diploma-3 midwifery students at STIKes Akbidyo Yogyakarta ($p = 0.004$). That study also noted that exercising three times a week for 20–50 minutes can decrease dysmenorrhea intensity (Sunarti & Lestari, 2023). Furthermore, a study among medical students at Universitas Baiturrahmah conducted by Erlangga and Rahmadhoni (2025) showed a significant relationship between exercise habits and primary dysmenorrhea ($p = 0.000$), indicating that exercise can enhance the production of endorphins and serotonin, which play a role in inhibiting prostaglandin production (Erlangga & Rahmadhoni, 2025).

Another study by Tantri et al. (2025) found a significant relationship between exercise habits and the severity of primary dysmenorrhea ($p = 0.002$) and recommended regular moderate-intensity exercise at least three times per week for 30 minutes, such as brisk walking or jogging (Tantri et al., 2025). Furthermore, research by Salsabila et al. (2025) demonstrated a significant association between exercise habits and the incidence of primary dysmenorrhea among female adolescents at SMA Negeri 9 Mataram ($p\text{-value} = 0.001$). That study explained that a lack of physical activity can lead to stronger uterine contractions due to reduced blood flow, thereby increasing menstrual pain (Salsabila et al., 2025). Based on the comprehensive discussion, it can be concluded that exercise habits play a vital role in reducing the severity of primary dysmenorrhea among adolescents with central obesity.

This study underscores that among adolescents with central obesity, lifestyle factors such as fruit and vegetable consumption patterns and exercise habits play a pivotal role in determining the severity of primary dysmenorrhea pain. However, these findings should be interpreted with caution, as the cross-sectional design cannot establish causal relationships and self-reported questionnaires are susceptible to bias. Overall, promoting increased fruit and vegetable consumption alongside regular physical activity should be emphasized as part of promotive and preventive efforts to mitigate the severity of dysmenorrhea in adolescents with central obesity.

CONCLUSION

This study demonstrates that fruit and vegetable consumption, along with exercise habits, is significantly associated with the severity of primary dysmenorrhea among adolescents with central obesity ($p < 0,05$). Irregular fruit and vegetable consumption and low physical activity levels are associated with higher pain severity.

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