ASSOCIATION OF BODY FAT PERCENTAGE AND PHYSICAL ACTIVITY WITH MENSTRUAL PROBLEMS IN SCHOOL-GOING GIRLS AGED 12-16YRS IN GOREGAON, MUMBAI

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ABSTRACT

BACKGROUND
Menstrual irregularities are prevalent among adolescents and can lead to distressing situations. All over the world, girls experience menstruation-related issues, with dysmenorrhea, premenstrual syndrome (PMS), and irregular cycles being common problems. These conditions can adversely affect daily activities such as academic performance, sports achievements, and self-esteem. Recent shifts in dietary patterns, skipping meals, and lack of physical activity, underscore the need to examine the impact on menstrual health. The aim of the study was to find the association between body fat percentage and physical activity with menstrual problems.
METHOD
A total of 200 school-going girls aged 12-16 years, studying in private schools of Goregaon in Mumbai, India were recruited through a purposive sampling method. Girls with chronic diseases and on hormonal treatment for a long duration were excluded. Girls had a structured interview and completed questionnaires. Tanita, a body composition analyzer was used to record body weight and body fat percentage. The validated questionnaire was used to assess menstrual history and physical activity level. The 24-hour diet recall was used to assess the dietary intake. Descriptive and bivariate analysis was performed.
RESULT
The study found that physical activity levels were associated with the severity of pain ($p=0.043$), with a higher percentage (25.7%) of inactive participants experiencing severe pain among all the categories. Moreover, physical inactivity was significantly more prevalent among obese girls compared to other body fat categories. Overall, 94.5% of participants were experiencing premenstrual syndrome.
CONCLUSION
The key findings reveal that physical inactivity was notably higher among obese and overfat participants, correlating with dysmenorrhea. These results highlight the importance of promoting healthy lifestyle behaviors to potentially alleviate menstrual issues in adolescent girls. Lifestyle modifications like regular physical activity, decreasing the intake of fast food, and promoting healthy eating habits should be emphasized in school health education programs to improve menstrual health.

Keyword: - *Menarche, Menstruation, Dysmenorrhea, Premenstrual Symptoms, Adolescence, Body Fat Percentage, Physical Activity*

1. INTRODUCTION

Menarche, first menstruation is a milestone event of pubertal development in girls, it is a normal physiological phenomenon for females indicating her capability for procreation. Menarche is a late puberty event that is marked by the development of pubic hair and breast expansion. It typically happens two to three years following pubertal beginning. [1] Menstruation, also known as a period, is the regular discharge of blood, secretions and mucosal tissue from the inner lining of the uterus through the vagina. This process typically lasts for a duration of two to eight days and recurs monthly, constituting what is known as the menstrual cycle. The average menstrual cycle (time between the first day of one period and the first day of the next) is 28 days but some females may have longer or shorter cycles. The Indian Human Development Survey revealed a decreasing trend in the age of menarche among Indian women, with a reduction of approximately one month per decade. This indicates a secular decline in the age of menarche among Indian females. [2] Adolescence, a phase characterized by rapid growth and development requiring ample nutrients and energy-rich foods, poses a heightened risk period due to significant physical and psychological changes. Menstrual irregularities are prevalent among adolescents and can lead to distressing situations. Dysmenorrhea, premenstrual syndrome (PMS), and irregular cycles are common problems. These conditions can adversely affect daily activities such as academic performance, sports achievements, and self-esteem. [3]

1.1 Menstrual Problems

Long and irregular menstrual periods are typical in the first or two years following menarche but, by late adolescence, most females settle into a regular pattern of cycles (24–38 day interval). Menstrual problems are common in adolescents, including dysmenorrhea (menstrual pain or period pain), menorrhagia, hypomenorrhea, polymenorrhea, oligomenorrhea, irregular cycle, and other related symptoms. The most prevalent menstrual disorders include dysmenorrhea, premenstrual syndrome (PMS), and irregular cycles. [4]

Primary dysmenorrhea, which occurs without any underlying medical condition, commonly known as menstrual cramps, is a prevalent menstrual disorder characterized by painful menstrual periods. This discomfort typically occurs in the lower abdomen but can also radiate to the lower back and thighs. [5]

The American College of Obstetricians and Gynecologists (ACOG) described PMS as a clinical state marked by recurring physical and emotional symptoms occurring in the five days preceding menstruation in three consecutive menstrual cycles, vanishing within four days of menstruation onset, and not reappearing until at least day 13 of the menstrual cycle, with no association to any organic illness. PMS includes physical symptoms like Breast Tenderness or changes, Abdominal Bloating, Nausea and vomiting, Tiredness, Changes in appetite, Changes in skin (like spots/dryness/pimples), Lethargy, etc. and emotional symptoms like Emotional Symptoms, Mood swings, Feeling irritable, Anger, Depression, Stress and Tension, Feeling down or anxious etc. [6]

Adolescents have a broader range of menstrual periods than adults, where a normal cycle length is described as 21–34 days. Therefore periods less than 21 days and longer than 34 days are considered as irregular periods. [7].

The studies reveal that genetic predisposition, lifestyle factors such as dietary habits, physical activity, sleeping patterns, and environmental exposures significantly influence menstrual abnormalities. However, in developing nations like India, female reproductive health remains a challenging area for research due to a lack of awareness and social stigma. While several significant studies have focused on Polycystic Ovarian Syndrome (PCOS) in different parts of India, other menstrual abnormalities often go unnoticed, and in some regions, no data have been accessed yet. [8]

1.2 Body Fat Percentage and Menstrual Problems

Several established mechanisms elucidate the impact of adipose tissue on ovulation and the menstrual cycle: 1) Adipose tissue facilitates the conversion of androgens into estrogens. 2) Body weight influences estrogen metabolism, with lighter individuals experiencing lesser effects on estrogen metabolism compared to obese individuals who are more susceptible to alterations in estrogen metabolism. 3) Obesity reduces the capacity of attaching estrogen to sex hormone-binding globulin, leading to the inactivation of estrogen and consequently elevating serum free estradiol levels. Furthermore, adipose tissue secretes adipokines, signaling molecules that deviate in production relative to fat mass, which may directly impede ovarian function by modulating the signaling of the hypothalamus-pituitary-ovarian axis, thereby contributing to menstrual irregularities. [9]

Childhood and adolescent obesity have been linked to earlier puberty and menarche, as well as hyperandrogenism leading to menstrual irregularities. This can elevate the risk of premenstrual disorders, dysmenorrhea, and heavy menstrual bleeding in adolescent girls and young adult women. The metabolic and neuroendocrine mechanisms contributing to menstrual irregularities in obese adolescent girls and adult women often resemble those seen in Polycystic Ovary Syndrome (PCOS). A study involving 835 adolescent girls revealed that individuals with higher BMI and percentage body fat were more prone to experiencing irregular menstrual cycles and exhibited higher ovarian volumes compared to those with lower BMI and lower percentage body fat. [10]

1.3 Physical Activity and Menstrual Health

Daily physical activity helps maintain ideal body weight, with a rise in insulin sensitivity, increases BMR and stimulates endorphins which in turn helps in the regularization of the menstrual cycle. The study found that a low level of physical activity has the strongest association with irregular periods. Adolescents who are both obese and sedentary have a higher prevalence of irregular periods than normal-weight women who exercise moderately. [11] Physical activity releases endorphins into the body, which can alleviate premenstrual symptoms such as anxiety and depression. Girls who were not physically active regularly had much higher premenstrual symptoms. In the study, a significant association was found between consumption of junk food, dieting, and physical exercise with an abnormal flow. [12]

Addressing menstrual problems in adolescent girls involves comprehensive support, including education about menstrual health, access to menstrual hygiene products, medical care, and creating an open and supportive environment to foster communication and understanding. By addressing these issues, the negative consequences can be mitigated, and girls can navigate adolescence with better physical and emotional well-being. Lifestyle modifications like regular physical activity, decreasing the intake of fast food, and promoting healthy eating habits should be emphasized in school health education programs to improve menstrual health.

2. METHODOLOGY

This cross-sectional study was conducted among 200 school-going girls aged 12-16 years in private schools in Goregaon, Mumbai. The samples were recruited through a purposive sampling method. The Ethics Committee Approval was obtained from Inter System Biomedical Ethics Committee (ISBEC), before the commencement of the proposed study.

2.1 Inclusion and Exclusion Criteria

Girls aged 12-16 years who were menstruating for more than 2 years, who willingly participated and signed an informed consent form and assent form, were interviewed. The purpose of the study was clearly explained to all the study participants and a written informed consent form and assent form was obtained.
Exclusion criteria were participants with chronic medical conditions like diabetes, heart diseases, asthma, PCOS etc., and major depression; and on hormonal medications for a long duration

2.2 Questionnaire

The questionnaire was administered for the following details:

- Demographic details, anthropometric measurements (Weight and Height) and body fat percentage assessed using a Tanita Body composition analyzer.
- A self-designed questionnaire was used for menstrual history, and a validated APARQ was used for physical activity level.
- Dietary intake including the type of foods & beverages consumed by subjects in the 24 hours (24-hour diet recall) was assessed by personal interview method.

2.3 Data Analysis

Data analysis was performed using IBM SPSS (Statistical Package for Social Sciences) software (version 20). Descriptive statistics such as mean, frequency, percentage, and standard deviation were used to present demographic variables and anthropometric measurements. p-value <0.05 was considered to be statistically significant.

3. RESULT AND DISCUSSION

Table -1 Demographic Characteristics of the Study Participants

Age (in years)	Frequency (n)	Percentage (%)
13	46	23
14	105	52.5
15	47	23.5
16	2	1
Food Preferences	Frequency (n)	Percentage (%)
Vegetarian	61	30.5
Non-vegetarian	139	69.5

Table 1 shows that 52.5% of the participants fall in the age group of 14 years followed by 23.5% and 23% from the age of 15 and 13 years respectively. And 1% of the respondents were 16 years old. 69.5% of the participants were non-vegetarian and 30.5% of the participants were vegetarian.

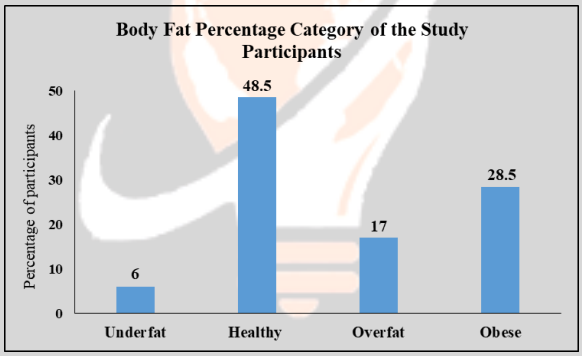

Chart -1 Body Fat Percentage Categories of the Study Participants

Chart 1 shows the body fat percentage categories of the study participants as 6% underfat, 48.5% healthy, 17% overfat and 28.5% obese category. It was observed that 51.5% of the population belonged to the unhealthy category. This could be due to an unhealthy diet and lack of physical activity. The dietary habits, physical activity levels, and sedentary behaviors of adolescents have significant and enduring effects on their physical well-being. These behaviors, whether practiced alone or in combination, can disrupt the balance between energy intake and expenditure, potentially leading to either underweight or overweight conditions. [13]

Table -2 Anthropometric Characteristics of the Study Participants

Parameters	Underfat Mean ± SD (n=12)	Healthy Mean ± SD (n=97)	Overfat Mean ± SD (n=34)	Obese Mean ± SD (n=57)	F value	p-value*
Weight (in kg)	34.25 ± 3.39	44.37 ± 5.51	52.26 ± 6.00	63 ± 9.84	107.11	**0.000**
Height (in cm)	152.75 ± 6.61	157.05 ± 6.09	154.59 ± 5.42	157.74 ± 7.23	3.36	**0.020**
BMI (kg/m2)	14.66 ± 0.65	17.94 ± 1.65	21.83 ± 1.76	25.29 ± 3.39	1.895	**0.000**

Table -2 shows the mean and standard deviation of anthropometric characteristics of the study participants according to the Body Fat Percentage category. There is a statistically significant difference between categories for anthropometric parameters, this may be due to significantly higher consumption of fat (p = 0.041) and low consumption of fiber (p = 0.002) in the overfat and obese category as evidenced by 24-hour dietary recall. Also due to lack of physical activity.

Table -3 Macronutrient Intake according to Body Fat Percentage categories of the study participants

Macronutrients	Underfat Mean ± SD (n=12)	Healthy Mean ± SD (n=97)	Overfat Mean ± SD (n=34)	Obese Mean ± SD (n=57)	F value	p-value*
Energy (in kcal)	1499 ± 403.58	1491 ± 346.66	1325 ± 353.76	1352 ± 379.07	2.913	**0.036**
RDA Energy %	62.46%	62.13%	55.21%	56.33%		
CHO (in g)	201.93 ± 45.47	189.68 ± 45.06	173.04 ± 44.30	179.75 ± 48.36	1.895	0.132
RDA CHO %	155.33%	145.91%	133.11%	138.27%		
Protein (in g)	28.56 ± 6.47	31.53 ± 10.86	29.65 ± 10.74	27.51 ± 9.23	1.944	0.124
RDA Protein %	66.42%	73.33%	68.95%	63.98%		
Fat (in g)	48.97 ± 16.58	50.32 ± 13.72	57.11 ± 10.36	58.91 ± 14.27	2.498	**0.041**
RDA Fat %	122.43%	125.8%	142.78%	147.28%		
Fiber (in g)	16.58 ± 5.58	18.07 ± 5.87	15 ± 5.61	14.84 ± 4.97	5.089	**0.002**
RDA Fiber %	46.06%	50.19%	41.67%	41.22%		

RDA - Recommended Dietary Allowances for Indians (Revised 2024)

Table -3 shows the values of mean and standard deviation of Energy, carbohydrate, Protein, Fat and Fiber among Body Fat Percentage categories. ANOVA test was used to determine the differences in the dietary intake of body fat percentage categories. Findings from the above table show statistically significant differences between body fat percentage categories with Energy, Fat and Fiber. It shows a significantly higher consumption of fat (p-value = 0.041) in the overfat (57.11 ± 10.36) and obese (58.91 ± 14.27) category. On the contrary, there was a significantly higher consumption of Energy and fiber in the Underfat (1499 ± 403.58; 16.58 ± 5.58) and Healthy (1491 ± 346.66; 18.07 ± 5.87) categories (p-value = 0.036 and p-value = 0.002). Overall, there was less intake of calories and protein; and a high intake of carbohydrates and fats, compared to RDA 2024, in all the categories.
During the recall of diet, it was observed that the tendency to skip meals was higher in the overfat and obese category. There are physiological and metabolic mechanisms that could elucidate the association between skipping breakfast and cardio metabolic risk factors. This includes its potential to disrupt energy balance unfavorably, leading to weight gain and alterations in serum lipid levels. Another explanation was that skipping breakfast heightens hunger, prompting excessive food intake throughout the day, and consequently contributing to weight gain. [14]
Research by Mohan et al. (2015) observed a negative correlation between protein intake and body fat percentage among Indian adolescents, suggesting that adequate protein consumption may help mitigate excess adiposity during this critical period of growth and development. [15]

Table -3 Details of the Menstrual History of the study participants according to Body Fat Percentage Category

	Underfat (n=12)	Healthy (n=97)	Overfat (n=34)	Obese (n=57)	Chi-square value	p-value*
Regularity of Periods						

Yes	4 (33.3%)	59 (60.8%)	16 (47.1%)	28 (49.1%)	5.06	0.167
No	8 (66.7%)	38 (39.2%)	18 (52.9%)	29 (50.9%)		
Menstrual Cycle Length (in days)						
<21	4 (33.3%)	17 (17.5%)	8 (23.5%)	15 (26.3%)	6.64	0.675
21-27	2 (16.7%)	31 (32%)	9 (26.5%)	14 (24.6%)		
28-35	2 (16.7%)	27 (27.8%)	8 (23.5%)	10 (17.5%)		
>35	4 (33.3%)	22 (22.7%)	9 (26.5%)	18 (31.6%)		
Duration of Blood Flow (in days)						
≤4	0	26 (26.8%)	8 (23.5%)	10 (17.5%)	5.67	0.461
5-6	9 (75%)	54 (55.7%)	21 (61.8%)	36 (63.2%)		
≥7	3 (25%)	17 (17.5%)	5 (14.7%)	11 (19.3%)		
Menstrual Blood Flow						
Scanty (1-2 pads a day)	6 (50%)	20 (20.6%)	13 (38.2%)	14 (24.6%)	10.30	0.113
Normal flow (3-5 pads a day)	4 (33.3%)	66 (68%)	20 (58.8%)	36 (63.2%)		
Heavy (>5 pads a day)	2 (16.7%)	11 (11.3%)	1 (2.9%)	7 (12.3%)		
Severity of Pain						
Mild	3 (25%)	26 (27.7%)	6 (19.4%)	11 (20.4%)	2.87	0.825
Moderate	5 (41.7%)	49 (52.1%)	19 (61.3%)	30 (55.6%)		
Severe	4 (33.3%)	19 (20.2%)	6 (19.4%)	13 (24.1%)		
Does the Pain during Periods Affect Your Normal Activities?						
Never	3 (25%)	21 (21.9%)	7 (21.9%)	6 (10.9%)	14.59	0.024
Always	3 (25%)	7 (7.3%)	9 (28.1%)	7 (12.7%)		
Sometimes	6 (50%)	68 (70.8%)	16 (50%)	42 (76.4%)		
Do You Have Any Discomfort During Menstruation (PMS)?						
Yes	12 (100%)	91 (93.8%)	32 (94.1%)	54 (94.7%)	0.80	0.849
No	0 (0%)	6 (6.2%)	2 (5.9%)	3 (5.3%)		

Table-3 revealed a statistically significant difference for the Normal Activities affected by menstrual pain. A notable finding was that 28.1% of overfat category participants reported experiencing severe pain "always," whereas 25% of underfat category participants reported the same. Interestingly, 76.4% of obese category participants reported experiencing severe pain "sometimes" followed by 70.8% of healthy category participants.

The analysis revealed that 66.7% of underfat category participants had irregular periods among which 33.3% had a menstrual cycle of <21 days and 33.3% had a menstrual cycle length of >35 days. 52.9% of overfat and 50.9% of obese category participants had irregular periods, among which 26.3% of obese category participants had a menstrual cycle of <21 days and 31.6% had a menstrual cycle length of >35 days. 25% of underfat category participants had a blood flow of ≥7 days followed by the obese category (19.3%), healthy category (17.5%), and overfat category (14.7%). Scanty blood flow was experienced by 50% of the underfat category followed by overfat (38.2%) and obese (24.6%) category participants. Heavy blood flow was experienced by 16.7% of the underfat category followed by obese (12.3%) and healthy (11.3%) category participants.

The analysis also revealed that 33.3% of underfat category participants reported experiencing severe pain, whereas 24.1% of overfat category participants reported the same intensity of pain. Moderate pain was more prevalent among overfat category participants (61.3%) compared to obese category participants (55.6%). Similarly, Patel et al. (2016) identified obesity as a risk factor for dysmenorrhea among women in India, with higher body mass index (BMI) associated with more severe menstrual symptoms. Furthermore, a study by Sharma et al. (2017) observed a higher prevalence of dysmenorrhea among overweight and obese Indian women compared to those with normal BMI, highlighting the potential impact of excess body weight on menstrual health.

Overall, 94.5% of participants were experiencing premenstrual syndrome irrespective of the body fat percentage category. A study conducted in Gwalior city revealed that the average onset age of menarche was 13.5 years with a standard deviation of 0.64 years. Among adolescent girls, prevalent issues included dysmenorrhea (62.75%), premenstrual syndrome (PMS) (40.42%), and irregular menstrual cycles (28.72%). The findings indicated a direct association between these menstrual problems, dietary patterns and physical activity levels. Specifically, dysmenorrhea showed a correlation with the consumption of junk food (66.10%), while PMS was linked with insufficient physical activity (78.94%). [3]

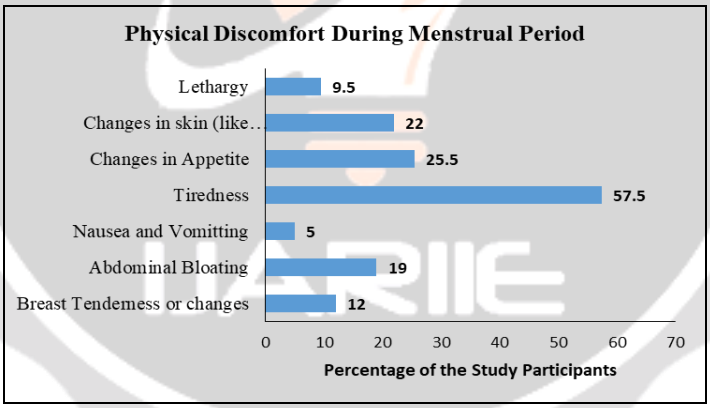

Chart -2 Physical Discomfort (PMS) during Menstrual Period

Chart 2 shows that 57.5% of the study participants reported experiencing tiredness followed by changes in appetite, reported by 25.5%, and changes in skin reported by 22% of participants. Additionally, abdominal bloating was reported by 19% of participants, while breast tenderness or changes were reported by 12%. Lethargy was experienced by 9.5% of participants, and nausea and vomiting were reported by 5%.

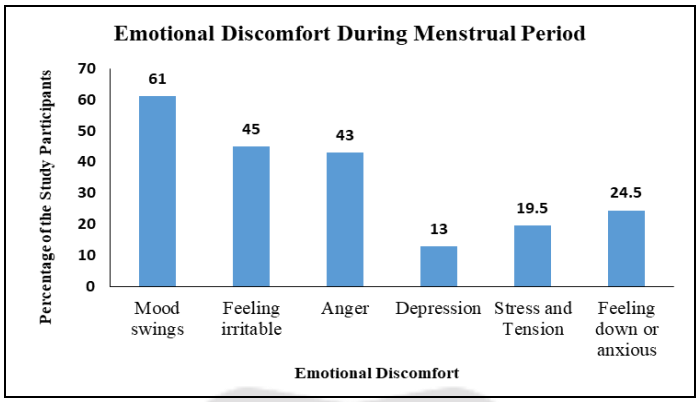

Chart -3 Emotional Discomfort (PMS) during Menstrual Period

Chart 3 shows that 61% of the participants reported experiencing mood swings followed by feeling irritable, reported by 45% of participants, and Anger, reported by 43%. Additionally, 24.5% of participants reported 'Feeling down or anxious', and 'Stress and Tension' were reported by 19.5%. Depression was experienced by 13% of participants.

3.1 Physical Activity Level of the Study Participants

Physical activity of the study participants included organized sports, games, and other activities in the school; and non-organized physical activities before, after and during weekends over the last year.

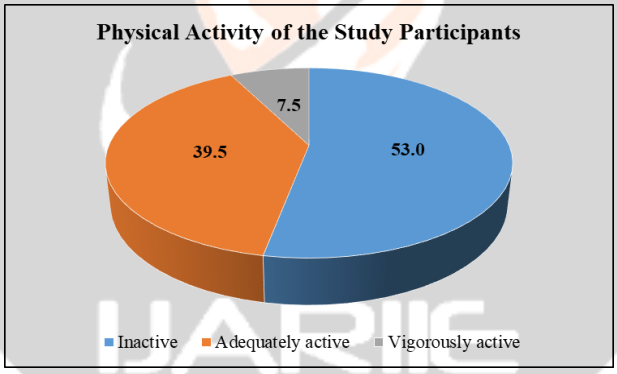

Fig -1 Physical Activity of the Study Participants

Fig -1, shows that 53% of the study participants were inactive, 39.5% of the study participants were adequately active and only 7.5% of the study participants were vigorously active. The majority of vigorously active girls were those who participated in the school's sports team and engaged in games/sports outside of school hours, including weekends. Lack of physical activity may be because there was no regular physical activity class in the school due to space constraints and also stress of the academic responsibilities such as schoolwork, tutoring, homework, and exam preparation. Additionally, some girls mentioned feeling self-conscious about playing in public spaces, lacking suitable play areas, or not having peers to play with.

Although in India, there was limited research on levels of physical activity (PA), existing studies corroborate our findings. For instance, a study conducted in Chennai using the International Physical Activity Questionnaire found that nearly 59% of students were minimally active or inactive. In West Bengal, higher levels of physical activity were observed among younger adolescents. Similarly in Bangalore, physical activity was more prevalent among younger children, with no significant association with socioeconomic status. Female adolescents are particularly susceptible to low PA levels, a trend observed in several studies. Possible factors contributing to this include the school environment, limited access to playgrounds for girls, preference for indoor activities, societal expectations of

girls assuming domestic responsibilities, cultural barriers against female participation in sports, and girls' perception of being less suited for PA compared to males. [12, 16, 17]

Table -4 Comparison of Level of Physical Activity between Body Fat Percentage categories of the study participants

Physical Activity	**Underfat (n=12)**	**Healthy (n=97)**	**Overfat (n=34)**	**Obese (n=57)**	**Chi-square value**	**p-value***
Inactive	7 (58.3%)	43 (44.3%)	19 (55.9%)	37 (64.9%)	17.51	**0.008**
Adequately Active	2 (16.7%)	43 (44.3%)	14 (41.2%)	20 (35.1%)		
Vigorously Active	3 (25%)	11 (11.3%)	1 (2.9%)	0 (0%)		

Table -4 shows a statistically significant difference between categories for physical activity. Physical inactivity was significantly higher in obese category participants compared to overfat, healthy and underfat category (64.9% vs 55.9%, 44.3% and 58.3% respectively) participants.
Accordingly, the Endocrine Society's clinical practical guidelines advocate for schools to provide 60 minutes of moderate to vigorous daily exercise across all grades. Furthermore, our findings indicate that children who do not participate in outdoor games face an elevated risk of being overweight and obese. Encouraging children to engage in outdoor activities not only boosts their physical activity levels but also promotes overall fitness.[24]

Table -5 Association between Physical Activity and Menstrual Problems

	Inactive (n=106)	Adequately Active (n=79)	Vigorously Active (n=15)	Chi-square value	p-value*
Regularity of Periods					
Yes (n=107)	50 (47.2%)	48 (60.8%)	9 (60%)	3.64	0.162
No (n=93)	56 (52.8%)	31 (39.2%)	6 (40%)		
Dysmenorrhea					
Mild (n=46)	26 (25.7%)	13 (17.1%)	7 (50%)	9.85	0.043
Moderate (n=103)	49 (48.5%)	48 (63.2%)	6 (42.9%)		
Severe (n=42)	26 (25.7%)	15 (19.7%)	1 (7.1%)		
Premenstrual Syndrome (PMS)					
Yes (n=189)	100 (94.3%)	76 (96.2%)	13 (86.7%)	2.22	0.330
No (n=11)	6 (5.7%)	3 (3.8%)	2 (13.3%)		

Table -5 shows the percentage of study participants experiencing menstrual problems across different physical activity categories. Statistical analysis revealed no significant difference between physical activity categories for regularity of periods and premenstrual syndrome. However, a notable finding was that a 52.8% of inactive participants reported irregular periods. Interestingly, a higher percentage of adequately active participants (96.2%) experienced premenstrual syndrome compared to inactive participants (94.3%).

The analysis revealed a statistically significant difference among physical activity categories for the severity of pain (dysmenorrhea) ($p=0.043$). In the Inactive category, 48.5% of participants reported moderate pain while 63.2% of adequately active category participants experienced moderate pain. Among vigorously active category participants, 50% reported mild pain. Notably, 25.7% of inactive participants reported experiencing severe pain, followed by 19.7% adequately active participants and only 7.1% vigorously active participants were experiencing severe pain. Similar result was found in a study that most of the girls belonging to the low score category in physical activity had dysmenorrhea (55.2%). It was also found that among all the types of menstrual disorders, dysmenorrhea, oligomenorrhea and PMS had a strongly inverse correlation with physical activity ($R= - 0.176, - 0.157$ and $- 0.321$ respectively, $p < 0.05$). [18]

Based on the results of the study, it showed that there was a significant correlation between less or no physical activity with a higher incidence of dysmenorrhea ($P < 0.0001$). [19] In another study by Shabnam Omidvar et al., 2019, no significant differences were found in the occurrence of dysmenorrhea ($\chi 2 = 2.808$). The frequency of dysmenorrhea among physically active girls was lower compared to those with a sedentary lifestyle (65.3% vs 75%). [20]

The study unveiled a robust negative relationship between physical activity and menstrual disorders such as dysmenorrhea, oligomenorrhea, and PMS. This suggests that lower levels of physical activity are linked to a higher prevalence of menstrual disorders. Teixeira AL et al. and Seedhom AE et al., also found a similar association, indicating a comparable association between premenstrual symptoms and physical activity. Conversely, Lee et al. found no correlation between physical activity and menstrual issues in their study. [21, 22] Likewise, Latthe et al. (2014) reported findings consistent with the studies, showing a positive correlation between reduced risk of dysmenorrhea and engaging in regular exercise and healthy physical activities among adolescent girls. The study also noted a significant connection between lack of physical exercise and premenstrual syndrome and dysmenorrhea. While several studies have demonstrated a significant link between premenstrual symptoms and insufficient physical exercise, the association with dysmenorrhea has not been consistently observed. [23]

4. CONCLUSIONS

The study findings revealed that there were no significant differences in menstrual problems like irregularity, dysmenorrhea and PMS, based on body fat percentage but physical activity levels did show some association. Specifically, physical inactivity was notably higher among obese and overfat participants, correlating with dysmenorrhea. These results highlight the importance of promoting healthy lifestyle behaviors to potentially alleviate menstrual issues in adolescent girls. Lifestyle modifications like regular physical activity, decreasing the intake of fast food, and promoting healthy eating habits should be emphasized in school health education programs to improve menstrual health.

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