

# Menstrual Abnormalities in School Going Girls – Are They Related to Dietary and Exercise Pattern?

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## ABSTRACT

**Context:** Adolescence is the transitional phase of physical and mental development between childhood and adulthood and is characterized by immense hormonal changes. 75% of girls experience some problems associated with menstruation.

**Aim:** We tried to find out the prevalence of menstrual abnormalities in school going girls in Pondicherry and their association with dietary and exercise habits.

**Setting and Design:** A cross-sectional questionnaire based study was conducted in adolescent girls who attained menarche in four secondary schools of Pondicherry, India.

**Material and Methods:** All students who attained menarche and willing to participate in the study were invited to answer the questionnaire, which dealt with anthropometric data, socioeconomic data, menstrual history, and diet and exercise pattern.

**Statistical Analysis:** Chi-square test and Fisher's exact test

was used to compare the dietary and exercise patterns among students having menstrual abnormalities and those who do not have menstrual abnormalities.

**Results:** A total of 853 students participated in the study. Dysmenorrhea and premenstrual symptoms were the most frequent problems encountered. Premenstrual symptoms were significantly more common among girls who were overweight, in girls who were eating junk food regularly, in girls who were eating less food (dieting) in order to lose weight and in those who were not doing regular physical activity. Dysmenorrhea was significantly more common in the girls who were dieting to lose weight. Passage of clots was also significantly high in the girls who were dieting.

**Conclusion:** Lifestyle modifications like regular physical activity, decreasing the intake of junk food and promoting healthy eating habits should be emphasised in school health education programs to improve their menstrual health.

**Keywords:** Menstrual abnormalities, Dieting, Junk food, Exercise

## INTRODUCTION

Adolescence is the transitional phase of physical and mental development between childhood and adulthood and is characterized by immense hormonal changes. The most striking change in adolescent girls is the onset of menstruation. In the Indian context, the age of onset of menstruation or menarche is generally between 11-15 years. Slight variations in the age of menarche may occur according to the nutritional status, hereditary pattern, and climate difference. After menarche, common menstrual abnormalities that the female adolescent may encounter include dysmenorrhea, irregularities in menstrual flow and premenstrual symptoms. 75% of girls experience some problems associated with menstruation [1]. These may lead to problems in academic excellence, achievements in sports as well as loss of self image. Menstrual disorders at the age of 16 are also a good marker of hyperandrogenemia and adverse lipid profile in later life [2]. Goel et al. suggested that change in dietary habit of consuming more high energy junk food and shifting to sedentary lifestyle is likely to be one of the important precursors of overweight and obesity among adolescents [3]. Food high in salt, sugar, fat or calories and low nutrient content is called junk food. Junk foods provide suboptimal nutrition with excessive fat, sugar, or sodium per kcal [4]. Numerous health risks have been associated with adolescent overweight, including hypertension, respiratory disease, several orthopaedic disorders, diabetes mellitus and elevated serum lipid concentrations. But not many studies are done on their relation with menstrual abnormalities. Hence, it is important to evaluate the present situation of eating habits and sedentary lifestyle in adolescent girls and estimate their influence on menstrual

disorders. Our study aims to find out the prevalence of menstrual abnormalities in school going girls in Pondicherry and their association with dietary and exercise habits.

## MATERIAL AND METHODS

A school based cross-sectional study was carried out in secondary school girls of Pondicherry who attained menarche, belonging to 13 – 19 years age, after taking consent from the school authorities and approval from hospital ethical committee. Four secondary schools (2 urban and 2 rural) in Pondicherry were chosen based on stratified random sampling method. Students and the school authorities were explained about the purpose of the study and given information on the questionnaire. All students who attained menarche and who were willing to participate in the study were included in the study. They were invited to answer the questionnaire, which dealt with anthropometric data, socio-economic data, menstrual history, and diet and exercise pattern. The questionnaire was self administered, semi-structured and prepared in local and English languages. Students who did not attain menarche, who are suffering from any chronic health condition and are using any medicines for long duration (more than a month) were excluded from the study.

Anthropometric data included weight and height. Body mass index was calculated as the subject's weight in kilograms divided by square of the height in meters (kg/m<sup>2</sup>). Details on menstrual history included age of menarche, average length of menstrual cycle, duration of menstrual flow, any passage of clots during periods, occurrence of dysmenorrhoea and if present, is it severe enough to skip classes or any need to take medications like analgesics or

antispasmodics and any perception of premenstrual symptoms.

For purpose of this study, authors decided upon the following definitions of menstrual abnormalities. The duration of menstrual cycle is defined as the period between the first day of menstrual flow and the day immediately prior to the next menstrual flow. Irregular menstrual cycles are defined as past history of irregular cycles experienced by the students within 6 months prior to the study. Abnormal duration of flow is defined as menstrual bleeding which lasted for less than 2 days or more than 7 days. Dysmenorrhea is defined as acute spasmodic pain experienced in the lower abdomen which appeared on the first day of menses and rarely lasted for more than 2 days.

Premenstrual symptoms (PMS) are defined as a constellation of physical, emotional, and behavioral symptoms which occurred premenstrually and remitted after the onset of bleeding. Physical symptoms include abdominal pain, headache, nausea, skin disorders, abdominal bloating, breast tenderness, and swelling of extremities. Emotional symptoms include irritability, anger, depression, and tension. Behavioural symptoms include increased or decreased food intake, hypersomnia, lethargy, and marked lack of energy. All these symptoms were enlisted in the questionnaire and students were asked whether they experienced any discomfort before menses which remits after the onset of menses and if so, they were asked to indicate which kind of discomfort they experienced.

Physical activity in terms of number of days of regular physical exercise per week (activities for >20 minutes that make them sweat) was categorised as follows: one day of physical exercise per week (category a); 2–3 days of physical exercise per week (category b); 4–7 days of physical exercise per week (category c) and no regular physical exercise (Category d). Similarly, junk food consumption was studied by assigning categories-eating junk food 1day/ week (category a); eating junk food 2-3 days/ week (category b); eating junk food 4-7 days/ week (category c) and eating junk foods regularly (category d). Fussy behavior at eating food and eating less food in order to lose weight (dieting) were also explored.

## STATISTICAL ANALYSIS

Prevalence of each menstrual abnormality was calculated and expressed as proportions. Chi-square test and Fisher's exact test was used to compare the dietary and exercise patterns among students having menstrual abnormalities and those who do not have menstrual abnormalities. Statistical analysis was done using SPSS V13 Software and p value <0.05 was considered as statistically significant.

## RESULTS

A total of 861 students participated in the study with 100% response rate. Eight students were excluded from the study as seven of them were on Eltroxine for hypothyroidism and one student was taking anti tuberculosis treatment for pulmonary tuberculosis. [Table/Fig-1] shows the baseline demographic and lifestyle characters of the students studied (n=853). 711 (83.4%) students were from urban schools and 142 were from rural schools. [Table/Fig-2] shows the menstrual problems experienced by the study population. Dysmenorrhea (72.8%) and premenstrual symptoms (51.2%) were the most frequent problems encountered.

[Table/Fig-3] shows the association between the menstrual problems and lifestyle factors. Premenstrual symptoms were significantly more common among girls who were overweight, in girls who were eating junk food regularly, who are eating less food (dieting) in order to lose weight and in those who were not doing regular physical activity. Though not statistically significant, dysmenorrhea was more commonly experienced by girls in the underweight and overweight groups. Dysmenorrhea was significantly more common in the girls who were dieting to lose weight (p=0.022). Passage of clots was also significantly high in

the girls who were dieting (p=0.011).

## DISCUSSION

Lot of studies have been done in the past on the prevalence of menstrual problems in adolescent girls, yet much research was not done on their relation with lifestyle factors. In this study we attempted to find a relation between various lifestyle factors like eating junk food, dieting behavior, lack of physical activity with the menstrual problems experienced by the adolescent girls as these are the risk factors which are modifiable and intervention at this stage might result in healthier adults This study is first of its kind in India.

Nutritional deficiency is considered one of the important factors that induce hypothalamic-pituitary-ovarian dysfunction. Recently, adolescents have tended to lose body weight by dietary restriction for cosmetic purpose. Dieting behavior was observed in almost 30% of the girls in our study. We found that girls who were dieting had significantly heavy bleeding, dysmenorrhea and premenstrual symptoms. Dysmenorrhea was also high in the girls who were under weight. Montero et al., studied 1147 urban Spanish adolescents, and found that nearly 40% of the adolescents tried to lose weight. Attempting to lose weight is significantly associated with an increase in irregular menstruation and dysmenorrhea, without a significant relation with body mass index in their study [5]. In a study done by Fujiwara et al., in 18-20 year-old Japanese girls, the intensity of dysmenorrhea was high in those with a history of dieting in adolescence, suggesting that diet in adolescence has long-lasting adverse effects on reproductive function in young women [6]. Balbi C et al., found that lower consumption of fish, eggs, and fruits is associated with dysmenorrhea in adolescent girls [7]. These findings warn us of the possibility that diet limitation in adolescence can become a trigger for the subsequent development of organic gynecologic diseases. Inadequate dietary habits may influence women's quality of life not only in the present but also in the future.

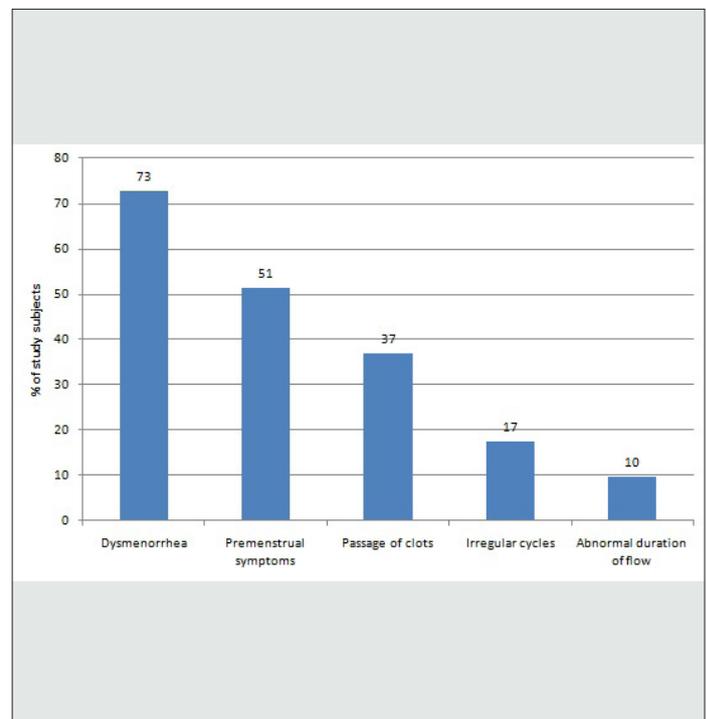
Goel et al., performed a study in adolescent girls in Haryana and found that more than two-third (66.25%) adolescent girls skipped at least one meal a day and the most frequently missed meal was breakfast (41.25%) [3]. The most common effect of skipping meal among adolescent girls was consumption of junk food (60.37%). This results in consuming excess of energy, protein and fat but inadequate micronutrients like iron and beta-carotene. In our study, premenstrual symptoms were significantly high in girls who were regularly eating junk food, similar to the findings of Anandha Lakshmi et al., [8]. Fujiwara et al., found an association between fast food consumption and dysmenorrhea [9]. But in our study, we did not find any significant association between junk food and dysmenorrhea. Junk foods being rich in saturated fatty acids might interfere with the metabolism of progesterone in the luteal phase of menstrual cycle and result in premenstrual symptoms. Junk foods being deficient in micronutrients like vitamin B<sub>6</sub>, calcium, magnesium and potassium, might also be responsible for triggering premenstrual symptoms.

Premenstrual symptoms were also significantly high in girls who did not do regular physical activity in our study. Teixeira AL et al., [10] and Amany Edward Seedhom et al., [11] also found similar association between premenstrual symptoms and physical activity. But, in the study done by Lee et al., no association was found between physical activity and menstrual problems [1]. Lee et al., concentrated on whether the subjects exercised in the seven days prior to the study. But we concentrated on how regular the subject was doing physical exercise. This might be the reason for the association of physical exercise with premenstrual symptoms in our study. Physical activity releases endorphins into the body, which can improve premenstrual symptoms like getting rid of feelings of depression or anxiety.

The drawback in this study was that data was collected in schools, and school-age female adolescents who had left school or dropped out of school at various ages could not be reached. So, the results cannot be generalised to all female adolescents

Character	Number	Percentage (%)
<b>Age in years</b>		
11 – 13	410	48.1
14 - 17	443	51.9
<b>BMI</b>		
Under weight	294	34.5
Normal weight	445	52.2
Over weight and obese	114	13.3
<b>Residence</b>		
Urban	711	83.4
Rural	142	16.6
<b>Dieting habit</b>		
Yes	256	30
No	597	70
<b>Eating junk food</b>		
<3 days / week	566	66.4
3-7 days / week	287	33.6
<b>Physical activity</b>		
<3 days / week	607	71.2
3-7 days /week	246	28.8

**[Table/Fig-1]:** Demographic and lifestyle characteristics of the study participants



**[Table/Fig-2]:** Prevalence of menstrual disorders among the study subjects (n=853)

	Abnormal Duration of Flow (n=107)			Irregular Cycles (n=149)			Passage of Clots (n=315)			Premenstrual Symptoms (n=437)			Dysmenorrhea (n=621)		
	n	%	p value	n	%	p value	n	%	p value	n	%	p value	n	%	p value
<b>BMI</b>															
Underweight	68	23.1		45	15.3		119	40.5		135	45.9		225	76.5	
Normal weight	108	24.3	0.691	79	17.8	0.279	149	33.5	0.092	235	52.8	0.012	309	69.4	0.07
Overweight	31	27.2		25	21.9		47	41.2		67	58.8		87	76.3	
<b>Dieting</b>															
Yes	67	26.2	0.395	48	18.8	0.518	111	43.4	0.011	172	67.2	0.000	200	78.1	0.022
No	140	23.5		101	16.9		204	34.2		265	44.4		421	70.5	
<b>Junk food</b>															
< 3 days/week	140	24.7	0.655	105	18.6	0.242	204	36.0	0.454	270	47.7	0.004	404	71.4	0.187
4 – 7 days/week	67	23.3		44	15.3		111	38.7		167	58.2		217	75.6	
<b>Physical activity</b>															
<3 days/week	156	25.7	0.125	113	18.6	0.165	229	37.7	0.448	297	48.9	0.035	437	72.0	0.405
4 – 7 days/week	51	20.7		36	14.6		86	35		140	56.4		184	74.8	

**[Table/Fig-3]:** Association between menstrual characteristics and diet and physical activity pattern

nationwide. In addition, this being a cross-sectional study, we can suggest associations, but not prove causality.

## CONCLUSION

To conclude, life style modifications like regular physical activity, decreasing the intake of junk food, and promoting healthy eating habits should be emphasised in school health education programs to improve menstrual health. Improvement of menstrual health will not only help in improving the academic performance of the students and their self esteem, but also prevents future problems like Polycystic Ovarian Disease, hyperlipidemia, obesity and infertility.

## REFERENCES

- Lee LK, Chen PCY, Lee KK, Kaur J. Menstruation among adolescent girls in Malaysia: a cross-sectional school survey. *Singapore Med J.* 2006 Oct; 47(10): 869–74.
- Pinola P, Lashen H, Bloigu A, Puukka K, Ulmanen M, Ruokonen A, et al. Menstrual disorders in adolescence: a marker for hyperandrogenaemia and increased metabolic risks in later life? Finnish general population-based birth cohort study. *Hum. Reprod.* 2012 Nov; 27(11): 3279–86.
- Goel S, Kaur T, Gupta M. Increasing Proclivity for Junk Food among Overweight Adolescent Girls in District Kurukshetra, India. *Age (in years).* 16:17.
- Anderson JW, Patterson K. Snack foods: comparing nutrition values of excellent choices and “junk foods.” *J Am Coll Nutr.* 2005 Jun;24(3):155–56; discussion 156–57.
- Montero P, Bernis C, Fernandez V, Castro S. Influence of body mass index and slimming habits on menstrual pain and cycle irregularity. *J Biosoc Sci.* 1996 Jul; 28(3): 315–23.
- Fujiwara T. Diet during adolescence is a trigger for subsequent development of dysmenorrhea in young women. *Int J Food Sci Nutr.* 2007 Sep;58(6):437–44.
- Balbi C, Musone R, Menditto A, Di Prisco L, Cassese E, D’Ajello M, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol.* 2000 Aug; 91(2):143-8.
- Priy ALS, Saraswathi I, Saravanan A, Ramamchandran C. Prevalence of premenstrual syndrome and dysmenorrhoea among female medical students and its association with college absenteeism. 2011 [cited 2013 Aug 13]; Available from: <http://www.biomedscidirect.com/337>.
- Fujiwara T, Sato N, Awaji H, Sakamoto H, Nakata R. Skipping breakfast adversely affects menstrual disorders in young college students. *Int J Food Sci Nutr.* 2009;60 (6):23-31.
- Teixeira AL, Oliveira EC, Dias MR. Relationship between the level of physical activity and premenstrual syndrome incidence. *Rev Bras Ginecol Obstet.* 2013 May;35(5):210-4.
- Seedhom AE, Mohammed ES, Mahfouz EM. Life Style Factors Associated with Premenstrual Syndrome among El-Minia University Students, Egypt. *ISRN Public Health [Internet].* 2013 [cited 2013 Aug 13];2013. Available from: <http://www.hindawi.com/isrn/ph/2013/617123>.

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