

Prevalence of Menstrual Disorders and Their Association with Physical Activity in Adolescent Girls of Aligarh City

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ABSTRACT

Not much is known about the association between menstrual disorders and physical activities in adolescent girls. This study was conducted to assess the prevalence of menstrual disorders and their association with physical activity among adolescent girls in Aligarh city. This cross-sectional descriptive study was carried out among 320 adolescent school going girls aged 14 -17 years over a period of 10 months. A predesigned pretested structured questionnaire cum interview schedule was used to collect data regarding age at menarche, menstrual cycle interval, menstrual flow length and period pain. Physical activity was assessed by the Physical activity questionnaire scale (PAQ-A). Chi-square and Pearson's correlation test was applied using IBM SPSS version 21.0. Mean age at menarche was calculated as 12.60 ± 0.99 which ranges from 11 to 16 years. The overall prevalence of menstrual disorders was reported by 76.9%. The most common menstrual disorder was PMS (71.3%). Dysmenorrhoea was 46.3%, amenorrhoea (21.3%), oligomenorrhoea (12.8%), polymenorrhoea (22.2%), menorrhagia (15.9%) and hypomenorrhoea (15%). The majority of adolescent attained menarche at an appropriate age. Dysmenorrhoea and PMS are highly prevalent among girls in Aligarh. Strong inverse correlation ($R = -0.342$, $p > 0.01$) was found between physical activity and menstrual disorders. Dysmenorrhoea and PMS had highly inverse correlation ($p > 0.01$) while amenorrhoea and menorrhagia had mild inverse correlation ($p > 0.05$). PMS was the commonest menstrual disorder that interfered with the daily routine of the school girls. Hence, physical activity must be considered as a significant and important risk factor while identifying different types of menstrual disorder. There is an urgent need for menstrual health education so that the disorders underlined can be detected at the initial stage and can be treated in a better way.

Keywords: menstrual disorders, physical activity, adolescent girls, dysmenorrhoea, premenstrual syndrome

INTRODUCTION

Menstruation is a periodic and cyclical shedding of progestational endometrium accompanied by loss of blood and which involves many hormonal changes. It is a normal physiological process that begins during adolescence and may be associated with the various

symptoms occurring before or during the menstrual flow. ^[1] This monthly experience by females adds a powerful tool to the assessment of normal development and the exclusion of pathological conditions among them, and it is one of the determinants of a woman's reproductive health. ^[2]

Normal menstrual cycle in females represents the complex interplay of hormones such as estrogen and progesterone. Regular menstrual cycle occurs every 28-35 days \pm 2-3 days in which the menstrual flow lasts for 3-5 days with an average loss of 30-80 ml of blood. [1]

The onset of menstruation is governed by a girl's general health condition, genetic, socioeconomic and nutritional factors, and is coordinated by the actions of the hypothalamic-pituitary-ovarian axis. [3] It generally occurs approximately 2-3 years after the initiation of puberty, between the ages of 11 and 14 years in 95% of girls depending on race, ethnicity, socioeconomic and nutritional status. [4-5]

Disorders in cycles or its irregularities are a major gynaecological problem among female adults especially adolescent [6-7] and a major source of anxiety to them and their family. Studies have shown that a large proportion of the female population of reproductive age suffers from menstruation-related health issues. [8-10] Abnormal menstrual cycle is any deviation from the normal cycle. Menstrual disorders prevailing in adolescent girls, including dysmenorrhea, amenorrhea, menorrhagia, hypomenorrhea, Polymenorrhea, oligomenorrhea, and premenstrual syndrome. Dysmenorrhoea is defined as painful periods that may include severe menstrual cramps. [11] Amenorrhea as absent menstrual periods for 3 months continuously, oligomenorrhea is infrequent menstrual periods which occur more than 35 days apart and polymenorrhea is frequent menstrual periods occurring less than 21 days apart. Menorrhagia defines as bleeding that exceeds 8 days in duration on a regular basis. Hypomenorrhea: a condition in which uterine bleeding may be slight in volume, short in duration (<2 days), or both. [12] Premenstrual syndrome (PMS) represents a set of symptoms which include physical, psychological and behavioural changes

characterized by mood swings, headache, bloating, stress, anxiety, and backache.

Menstrual disorders can be affected by a number of factors, including age, ethnicity, family history, smoking and physical activity. [13] It is important to understand the effects of physical activity on reproductive hormones and ovulation, which can subsequently influence fertility outcomes. There is evidence suggesting that high-intensity activity is associated with menstrual dysfunction and subfertility among high-performance females. [14] Previous studies have found that high-intensity activity is associated with amenorrhea, oligomenorrhea, likely through disturbances of the hypothalamic pituitary-adrenal axis. [14-15] During the past 28 to 35 years the researches evaluating the relationship between physical activity and menstrual disorders have significantly increased in number and it has been observed that performing aerobic physical activities once or twice a week for 1 to 6 month can be of great effect on menstrual disorders symptoms reduction. [16] Therefore, the present study was aiming to assess the association between physical activity and menstrual disorders. The study results will be helpful to explore this association, and for creating strategies for improving the lifestyle of the adolescents.

MATERIALS AND METHODS

A school-based cross-sectional descriptive study was carried out among 320 adolescent girls of aged 14 – 17 years in Aligarh city over a period of 10 months from July'17 to April'18. Aligarh city is a part of the northern India and district of Uttar Pradesh. Uttar Pradesh is the most populous state in India with a population of 199,812,341. Aligarh city constitutes of 3,650 sq.km area with a population of around 36.7 lakhs among these around 9.2 lakhs are total adolescents and among them 4.2 lakhs are girls. [17] Aligarh population is of mixed nature with people of different religion, caste and socioeconomic level.

The study locale was divided into four zones on the basis of urban morphology i.e., upper Kot area, Achaltal area, civil lines area and peripheral ring area. This division of Aligarh city into specific zones on the geographical layout was to ensure that the study to be representative of the whole city. From each zone, one senior secondary school was selected randomly.

While calculating the sample size, the total sample size was calculated to be 320 by using the Cochran's sample size formula $Z^2 P (1- P)/d^2$. The prevalence of menstrual disorder was considered as 76.6% among adolescent girls (Pilot study) in Aligarh, therefore by taking this prevalence of menstrual disorders and considering the attrition of the subjects at any stage of the study due to unavoidable reasons 10%, possible error was also taken. Before commencing the data collection, necessary approval for conducting the study from Institutional Ethical Committee, Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University, Aligarh has been obtained. After identifying the schools, school authorities were approached for seeking necessary permission to conduct the study. Based on the signed consent and active cooperation of the school authorities; four schools, one from each region, were selected to include the population of students from all income groups and all religions. The inclusion criteria of the subjects were as follows: (1) Those who are willing to participate and cooperate in the study. (2) School girls from 14-17 years of age. (3) Should achieve their menarche. (4) Those don't have any chronic illness. (5) Subjects residing in Aligarh for the past 5 years. Exclusion criteria were: (1) Under 14 years of age or above 17 years of age. (2) Still not achieved their menarche. (3) Migrants or girls from other states and districts

Stratified Random Sampling was taken into consideration for selecting a total of 320 students from these selected four schools and signed informed consent from

the subjects were acquired. The numbers of subjects from four classes (class IXth to XIIth) were selected as per the list of students provided by class teachers. Twenty subjects (girls) from every class (9th, 10th, 11th and 12th) of age group (14 - 17 yr.) from each school were randomly selected. Similarly, for selecting the sections for a particular class, randomization was being followed. An element of randomness was introduced into this kind of sampling by using random numbers to pick up the first unit. Thus, through systematic sampling, only the first unit was randomly selected and the remaining units of the sample were selected at the 5th interval.

A pre-tested and self-structured questionnaire cum interview (Cronbach's alpha = 0.865) was used to collect data regarding menstrual disorders. Both quantitative and qualitative data obtained through this questionnaire. Physical activity questionnaire scale (PAQ-A) developed by Kowalski, Crocker and Donen (2004) was used to assess their physical activity level from the last 7 days (in the last week). [18] This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others. Respondents rate how much of the time they spend on a 5-points Likert Scale. Items were summed for subscale scores, and subscales were summed for the total PAQ - A response score. Higher scores indicated a higher physical activity. Both questionnaires were in the English language. The questionnaire was distributed to the subjects and any difficulty or clarifications related to the questionnaire were attended by the researcher. In the present study, all the above-mentioned definitions were applicable if the symptoms were present for at least the last 3 menstrual periods.

Statistical analysis

Data analysis was done using SPSS version 21.0. Prevalence of each menstrual disorder was calculated and expressed in percentages. Association among physical

activity and menstrual disorders was assessed using Pearson's coefficient.

RESULTS

A total of 320 adolescent girls with a mean age at menarche were 12.60±0.99 which ranges from 11 to 16 years. The prevalence of menstrual disorders was obtained through menstrual questionnaire and the data revealed that 76.9% amongst

320 selected adolescent girls were suffering from one or more type of disorders.

Our results depicted in Figure 1 that 46.3% of the girls experienced dysmenorrhea, 21.3% had amenorrhea, 13% had oligomenorrhea, 22% had polymenorrhea, 16% had menorrhagia and 15% had hypomenorrhea during the past 3 months. The most common disorder with which the majority of girls suffering from was PMS (71.3%).

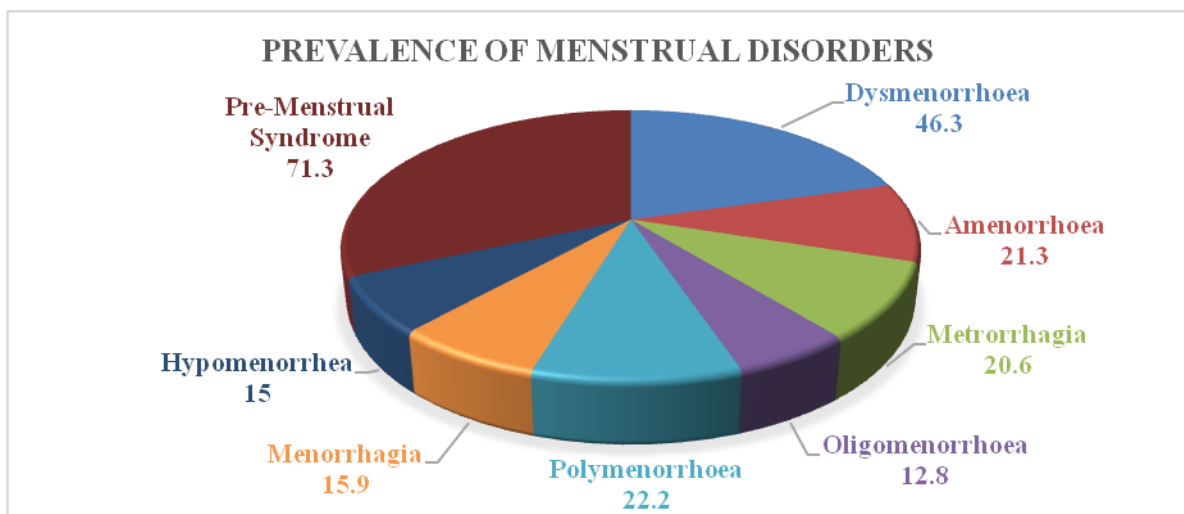


Figure 1: Prevalence of different types of menstrual disorders

Grouping of the total subjects for physical activity in two groups according to the prevalence of menstrual disorders was done to assess the association. It was noted from Table 1, that in low scores category (1-2.3) majority of girls (89%) had disorders while only 10.9% of girls among the category had no disorder. In moderate score category (2.4-3.7), 59.2% of girls had disorders while 40.8% had no disorders. Whereas in the High score category, the majority (66.7%) had no disorders and only 33.3% had menstrual disorders. The association between menstrual disorders and physical activity was strongly significant ($\chi^2=40.819, p< 0.001$).

Table 1: Association between physical activity and menstrual disorders

Menstrual Disorders	PHYSICAL ACTIVITY SCORES				Fisher's Exact test
	Low 1 – 2.3	Moderate 2.4 – 3.7	High 3.8 – 5	TOTAL	
Disorder	171(89.1)	74(59.2)	1(33.3)	246(76.9)	40.819*** p<0.001
No disorder	21(10.9)	51(40.8)	2(66.7)	74(23.1)	
TOTAL	192(100)	125(100)	3(100)	320(100)	

(***p<0.001; Figures in parenthesis indicate percentages)

Further, the descriptive analysis indicates that most of the girls belong to low score category in physical activity had dysmenorrhea, amenorrhea, oligomenorrhea, menorrhagia, hypomenorrhea and PMS (55.2%, 26.0%, 15.6%, 18.8%, 16.7% and 82.8% respectively) as shown in Table 2.

Though there is a significant association with dysmenorrhea, Amenorrhoea and PMS (P<0.05) but no significant association demonstrated with oligomenorrhea, menorrhagia, Polymenorrhea and hypomenorrhea (P> 0.05).

Table 2: Association between physical activity and different types of menstrual disorders

Menstrual Disorders	Physical activity scores			TOTAL	Fisher's Exact test
	Low	Moderate	High		
	1 – 2.3	2.4 – 3.7	3.8 – 5		
Dysmenorrhoea	106(55.2)	41(32.8)	1(33.3)	148(46.2)	15.681**** 0.000
Amenorrhoea	50(26.0)	18(14.4)	0(0)	68(21.2)	6.476* 0.029
Oligomenorrhoea	30(15.6)	11(8.8)	0(0)	41(12.8)	3.207 NS 0.169
Menorrhagia	36(18.8)	15(12.0)	0(0)	51(15.9)	2.660NS 0.209
Polymenorrhoea	49(25.5)	21(16.8)	1(33.3)	71(22.2)	3.969NS 0.112
Hypomenorrhea	32 (16.7)	16(12.8)	0(0)	48(15.0)	0.965 NS 0.646
PMS	159(82.8)	69(55.2)	0(0)	228(71.2)	34.286**** 0.000

(* p<0.05, ****p<0.001, NS= not significant; Multiple responses; Figures in parenthesis indicate percentages)

Pearson's correlation coefficient was found to be R= - 0.342, P > 0.01 which implies that there was a highly strong inverse correlation between menstrual disorders and physical activity as shown in Table 3. Further, it was also found that among all the types of menstrual disorders, dysmenorrhea, oligomenorrhea and PMS had strongly inverse correlation with physical activity (R = - 0.176, - 0.157 and - 0.321 respectively, p > 0.01). While amenorrhea and menorrhagia had a mild inverse correlation with physical activity (R = -0.115 and - 0.110 respectively, p> 0.05).

Table 3: Correlation between the prevalence of menstrual disorders and physical activity

Pearson Correlation		Sig. (2-tailed)
Menstrual disorders	-.342**	.000
Dysmenorrhoea	-.176*	.002
Amenorrhoea	-.115*	.040
Oligomenorrhoea	-.157**	.005
Polymenorrhoea	-.039	.488
Menorrhagia	-.110*	.048
Hypomenorrhea	-.083	.141
PMS	-.321**	.000

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

The present study was conducted first time in Aligarh city on the association of physical activity and menstrual disorders in adolescent girls. Very little information is available regarding the impact of physical

activity on all types of menstrual disorders in the northern part of our nation. In our study, all the subjects achieved their menarche between 11 – 16 years with a mean age at menarche 12.60 ± 0.99. This age is similar to the age of menarche reported by most of the Indian studies. [19-22] However, some Indian studies have reported a mean of 11.82 ± 1.42 years in Allahabad [23] 11.75±0.57 years in Jaipur [24] and 14.33 ± 0.00 years in Chhattisgarh. [25] Globally, there is a vast difference in the age of menarche. It was found to be 12.3 years in Malaysia, [26] 12.49 years in Egypt, [27] 13.2 years in Lebanese girls [10] and 14.7±1.6 years in Ethiopia, [28] 11.7 years in Pakistan, [29] 12.36 ± 00 years in China, [30] 12.8in USA. [31] This shows that the mean age of menarche varies from population to population.

Findings showed that the prevalence of menstrual disorders was 76.9%. The prevalence of menstrual disorders has been recorded as high as 85.0 - 93.4 % in India. [32- 35]

Further it was found that the high percentage of adolescent girls suffered from PMS (71.3%) which was considerably higher than rates from studies conducted on adolescent girls in Lucknow city (65%), [36] West Bengal (61.5%), [37] Ujjain (39.6%) [38]

and Gujarat (18.4 %).^[39] It was also higher than rates reported in some of the studies globally, such as in Thailand (29.8%)^[40] and China (21.1%).^[41] About 75% to 90 % of the women experiences this syndrome before their menstrual period.^[42-43] This syndrome usually starts 6 to 12 days before menstruation and it lasts 2 to 4 days after menstrual bleeding.^[44-45] Dysmenorrhea is one of the most prevalent menstrual problems during adolescence^[9-10, 46] and can even cause women to become bed-ridden.^[47] The result showed that 46.3% of adolescents had dysmenorrhea which is lower than rates from Andhra Pradesh (65%), Maharashtra (72%), Gwalior (79.67%) Lucknow (74.3%) and Delhi (62 %).^[48-52]

Our finding on the prevalence of Amenorrhoea was 21.3% which was higher than reported in Karnataka (12%).^[53] Thirteen per cent of selected girls had oligomenorrhea. Another study in India by Vanitha et al., (2017) reported similar results.^[54] Polymenorrhea was found in less than 10% of girls in recent studies which is contrary to our findings.^[54-56] Menorrhagia was observed in 16 % of the girls which is again comparable to a study done in south India.^[57] Fifteen percent of selected sampled reported hypomenorrhea. Few studies reported that hypomenorrhea prevail in small proportion of the adolescents.^[58-59]

Most importantly, the present study revealed highly strong inverse correlation between physical activity and menstrual disorders including dysmenorrhea, oligomenorrhea and PMS which means that low physical activity leads to a higher prevalence of menstrual disorders. Similar findings were found in a study of Hyderabad.^[60] Teixeira AL et al.,^[61] and Seedhom AE et al.,^[62] also found a 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.^[26] Similar findings were reported by Latthe et al., (2014) that there was a positive correlation between decreased the

risk of dysmenorrhea and followed regular exercises & healthy physical activities for adolescent girls.^[63] A significant association was observed with lack of physical exercise and premenstrual syndrome and dysmenorrhea in the present study.^[64-65] In several studies, premenstrual symptoms were significant with lack of physical exercise, but not dysmenorrhea.^[46,66-67] No study was found having any association with oligomenorrhea and physical activity. Some studies reported a positive association between physical activities/exercise with amenorrhea and menorrhagia which is in contrast to our study.^[14, 68]

CONCLUSION

This study concluded that physical activity is an essential indicator of menstrual disorders in an adolescent. This school-based investigation on adolescent girls of Aligarh indicates that physical activity must be considered as a significant and important risk factor while identifying the menstrual disorder and its types. And hence, there is an urgent need for menstrual health education so that the disorders underlined can be detected at the primary stage and treated in a better way. Further researches should be focused on the adaptive practices inherent by young girls to avoid consequences of menstrual disorders.

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