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Original Research Article

Impact of dietary and lifestyle choices on menstrual patterns in medical students

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ABSTRACT

Background: The aim of the study was to evaluate average age of menarche, the pattern and types of menstrual disorders and their relation with BMI, dietary habits, physical exercise and stress.

Methods: A cross sectional prospective study was conducted on female medical students during the academic year 2018-2019 at Mallareddy medical college for women, Suraram, Hyderabad, India. The various life style factors including BMI, junk food consumption and physical exercise were factored. Prevalence of each different menstrual abnormality were identified and analyzed by Chi-square test and p value <0.005 was considered as statistically significant.

Results: Study included 255 medical students who had attained menarche without known medical problems. Mean age of menarche was 12.81years. The most frequent menstrual disorders were premenstrual syndrome 192 (75 %), dysmenorrhoea 146 (57 %), and irregular cycle 97(38%). Statistically significant association of Body mass index (BMI) related to premenstrual syndrome (PMS) and dysmenorrhoea was reported (both p<0.05). Similarly, statistically significant association of lack of physical activity had greater risk of premenstrual syndrome and dysmenorrhoea (both p<0.0001). Unhealthy dietary patterns had statistically significant higher risk for dysmenorrhoea (p<0.0001).

Conclusions: In conclusion premenstrual symptoms, dysmenorrhoea and menstrual irregularities were more prevalent. Majority of symptoms were stress, pain abdomen, irritability, mood swings. Comprehensive education programs on lifestyle modifications like regular physical activities, promoting healthy eating habits should be emphasised to prevent menstrual abnormalities of young students as early as at school level.

Keywords: BMI, Dysmenorrhoea, Menstrual disorders, PMS

INTRODUCTION

Menstruation is a fundamental physiological phenomenon of normal sexual and reproductive function. Evidence from previous literatures indicates that after menarche third year onwards the episode of interval between bleeding periods is in the range of 21-34 days, with a flow lasting from 3 to 7 days and a mean menstrual blood loss around 35 ml (range 5-80ml).

However, in the abnormal menstrual patterns it might vary in interval, duration of flow and/or quantity of blood flow with different conditions named from amenorrhea, oligomenorrhea, heavy menstrual bleeding, frequent menstrual cycles, irregular cycle, pain and premenstrual symptoms.

These above stated menstrual irregularities encompasses a wide variety of cyclic, recurrent, physical, emotional

and behavioural symptoms occurring during late luteal phase of menstrual cycle and subsiding with the beginning of menses.^{1,2} Pain perceived before or during menstruation is common symptom known as dysmenorrhoea in women of especially reproductive age usually begins during adolescence with normal pelvic anatomy.³ Various studies conducted in students including medical students show that they are at high risk for developing menstrual irregularities probably due to stressful lifestyle, long hours of work, insufficient sleep, irregular food and exercise habits.

Menstrual problems frequently affect the quality of life of young adult women and may indirectly affect on quality of life of family members, social life and economy as well.⁴ Many studies have showed relation between menstrual disorders and life style factors.^{5,6,7}

However, early identification and sorting of aetiologies in relation to abnormal menstruation in women's health is mostly neglected by primary health care.⁸ So, early interventions at etiological level like disorders of body mass index (BMI), dietary habits, physical exercise and psychological stress may prevent menstrual disorders. Therefore, to understand menstrual patterns in young medical students conducted a cross-sectional study to evaluate average age of menarche, the pattern and types of menstrual disorders and their relation with BMI, dietary habits, physical exercise and stress.

METHODS

A cross sectional prospective study was conducted on female medical students during the academic year 2018-2019 at Mallareddy medical college for women, Suraram, Hyderabad, India. Students willing to participate in the proposed study were explained about the purpose of the study and were given information on the questionnaire after obtaining consent. The questionnaires were self-explanatory, and students were asked to fill self, from all those who agreed to participate. Students with medical problems associated menstrual abnormalities excluded from this study. Any difficulties in understanding the questionnaire were clarified. Informed consent was obtained from all the participants. The study protocol was evaluated and approved by the Institute Ethics Committee (IEC). Demographic profile information about all the study participants regarding age, social status, religion, dietary habits, and physical exercise were also collected from all the students.

The anthropometric measurements of weight and height are measured and recorded at the study entry and body mass index was calculated. The questionnaires provided to students were included to record details of menstrual history including age at menarche, average length of menstrual cycle, duration of menstrual flow, history of passage of clots during menses, presence of dysmenorrhoea or any preceding symptoms like headache, mood swings and irritability suggesting

premenstrual symptoms. Severity of dysmenorrhoea was measured using the pain related scale Visual Analogue Scale (VAS). The questionnaire also evaluated history about the menstrual abnormalities that had severe episodes which warranted to skip the classes and also recorded needing of medication or medical attention if any.

Data related to lifestyle factors were assessed for correlation with menstrual problems experienced by the female medical students. The various life style factors including BMI, junk food consumption and physical exercise were factored. Prevalence of each different menstrual abnormality were identified and analyzed by Chi-square test. Statistical significance was considered if the differences between each menstrual abnormality was tested and p value <0.005 was considered as statistically significant.

RESULTS

Study included 255 medical students who had attained menarche with mean age being 20.73 years and mean BMI of 22.77. The characteristics of the students were shown in Table 1.

Table 1: Characteristics of medical students.

Characteristics	No. of students (n=255)	%
Age (years)		
17-20	101	40
21-23	154	60
BMI		
16-17.9	29	11
18-24.9	165	65
25-30	61	24
Diet pattern		
Home food/hostel food	140	55
Frequent junk food intake		
2-3 days/week	90	35
4-5 days/week	25	10
Physical activity		
2-3 days/ week	72	28
4-5days/week	31	12

Mean age of attainment of menarche was 12.81 years. Menstrual pattern and types of menstrual characteristics of the participants were provided in Table 2. Study reported maximum number of participants' attained menarche at the age of 11-13 years (70%). It was observed that 158 (62%) girls had a regular menstrual cycle history. Menstrual irregularities were reported by 97 (38%) girls. Excessive menstrual flow was reported by 35 (14%) girls. The Majority of the students had duration of the menstrual flow 3-7 days (85%). The most frequent menstrual disorders in the students were premenstrual syndrome 192 (75 %), dysmenorrhoea 146 (57 %), and irregular cycle 97 (38%) (Table 2).

Table 2: Menstrual pattern in medical students.

Parameter	No. of students (n=255)	%
Age of menarche (years)		
9-11	32	12
11-13	178	70
13-15	45	18
Cycle length		
21-35	167	66
<21	36	14
>35	52	20
Cycle regularity		
Regular	158	62
Irregular	97	38
Duration of flow		
<2 days	14	5
3-5days	158	62
5-7days	58	23
≥8days	25	10
Amount of blood loss		
Heavy	35	14
Moderate	206	81
Scanty	14	5
Dysmenorrhoea		
No	109	43
Yes	146	57
Grade-1	84	57
Grade-2	52	36
Grade-3	10	7
Premenstrual syndrome (PMS)	192	75

The results also indicate that students had more than one symptom related to premenstrual syndrome.

Table 3: Prevalence of premenstrual symptoms among medical students.

Premenstrual symptoms	No. of students (n=192)	%
Stress	183	95
Abdominal pain	146	76
Irritability	124	64
Lack of concentration	122	63
Headache	102	53
Backache	97	50
Mood swings	86	45
Decreased physical activity and restrain from work	62	32
Breast tenderness	32	16
Nausea, vomiting	20	10
Bowel disturbances	19	10

Women with premenstrual syndrome had higher prevalence of family history of premenstrual syndrome in

their sibling's (sisters) and mothers. Majority of the students had stress 183 (95%) followed by abdominal pain 146 (76%) during menstruation, followed by irritability (64%) and lack of concentration (63%) mood swings 86 (45%) during menstruation observed (Table 3). Decreased physical activity and restrain from work during menstruation was reported by 62 (32%) students. Irregular bowel habits were noticed to an extent of 19 (10%) students (Table 3).

Statistically significant association of BMI related to premenstrual syndrome and dysmenorrhoea was reported (both $p < 0.05$) (Table 4).

Table 4: Association between BMI, premenstrual syndrome and dysmenorrhoea.

Parameter	BMI (16-17.9) n=29		BMI (18-24.9) n=165		BMI (25-30) n=61		P-value
	Yes	No	Yes	No	Yes	No	
Students with PMS (n=192)	21	8	133	32	38	23	0.017
Students with dysmenorrhoea (n=146)	19	10	102	63	25	36	0.012

Similarly, statistically significant association of lack of physical activity had greater risk of premenstrual syndrome and dysmenorrhoea (both $p < 0.0001$) (Table 5).

Table 5: Association of PMS and dysmenorrhoea with physical activity.

Parameter	Regular physical exercise (n=103)		Without physical activity (n=152)		p-value
	Yes	No	Yes	No	
Students with premenstrual syndrome (n=192)	65	38	127	25	<0.0001
Students with dysmenorrhoea (n=146)	41	62	105	47	<0.0001

Hence, strong association was noted between lack of physical exercise and premenstrual syndrome and dysmenorrhoea.

In addition, the association with unhealthy dietary patterns had statistically significant higher risk for dysmenorrhoea ($p < 0.0001$) (Table 6).

However, the association with unhealthy dietary patterns did not have significant impact on premenstrual syndrome (Table 6).

Table 6: Association of PMS and dysmenorrhoea with diet pattern.

Parameter	Frequent junk food (n=115)		Home/hostel food (n=140)		P-value
	Yes	No	Yes	No	
Students with premenstrual syndrome (n=192)	89	26	103	37	0.482
Students with dysmenorrhoea (n=146)	81	34	65	75	<0.0001

DISCUSSION

In developing countries women in reproductive age are significantly affected by menstrual disorders and women are less concern over their menstrual disorders as they are not of threatening conditions. Even though, change in the menstrual patterns in regularity, frequency, cycle length, duration, premenstrual symptoms and dysmenorrhoea in the reproductive age group may affect day to day life in terms of physical, physiological health and psychological well-being.⁹

The mean age of attainment of menarche in the present study was 12.81±1.22 years, different studies have shown similar age of attaining menarche: 12.6±1.32 year (Nirmala J L et al), 12.5±1.52 years (Singh A et al), 12.67±1.10 years (Sthrotiya C et al), 12.4±1.3 years (Rigon. F et al), 12.6 ±1.0 years (Begum J et al).¹⁰⁻¹⁴ Few studies have identified the various factors such as socioeconomic status, nutritional and health status, heredity, environmental conditions, body stature, family size, level of education and psychological well-being have influence on age at onset of menarche.^{15,16}

In this present study, it was observed 62% of participants had regular cycles, whereas 38% had irregular cycles. While in Mohite and Mohite study and Sujatha et al study reported irregular cycles 26.1% and 12% respectively.^{8,15} In present study 81% of the students had normal amount of menstrual flow, while 5 % had scanty flow and 14 % had heavy blood loss similar to reported in Sujatha et al study with normal flow in 78%, scanty flow in 14% and heavy flow in 8% of students.¹⁵ Above mentioned studies were showing minor differences mainly due to

environmental, nutritional and lifestyle factors. In present study, moderate flow was reported with regular cycles, whereas heavy flow was mainly reported who had irregular cycles, these results coincides with Sujatha et al study.

Premenstrual syndrome is a multifactorial syndrome, characterized by manifestation of psychological, physical and behavioral symptoms. The typical symptoms include irritability, lack of concentration, mood swings, depression, stress, anxiety, abdominal bloating, breast tenderness and fatigue.¹⁷ In this study 75% had premenstrual symptoms, majority of them had usual stress (95%), abdominal pain (76%), irritability (64%) and lack of concentration (63%), mood swings (45%) during menstruation. Decreased physical activity and restrain from work during menstruation was reported by 32% of students. Irregular bowel habits were noticed to an extent of 10%. Singh A et al, reported premenstrual symptoms in ~61% of students. Kavitha C. study reported 63% Wasnik VR et al reported ~18% of students had premenstrual syndrome.^{11,17,18} Variations in prevalence rate of premenstrual symptoms may be due to variations in sample size, methodology, regional variation, study participants selection criteria etc.

Dysmenorrhoea is an important sign of functional disturbance in the hypothalamic-pituitary-ovarian axis. Recently, it has become an important public health problem among the female population. It is characterized by localized pain in the abdominal inferior quadrants. Dysmenorrhoea is classified into 3 grades (Grade- 1, not requiring analgesic; Grade-2, painful, requiring analgesic; Grade-3, painful, not relieved by analgesic).¹⁹ In present study the prevalence of dysmenorrhoea was 57%, which was comparable to the studies that were reported by Montero P in Moroccan girls, Nair P et al in rural area of East Delhi and Sheila W et al in Madras were 57%, 63.75% and 61%, respectively. Agarwal and Agarwal 23 reported high prevalence of dysmenorrhoea (71.96%) among adolescent girls of Gwalior.²⁰⁻²³

Table 7 Provides information regarding severity of dysmenorrhoea. Sujatha et al 15 and Nirmala J L et al were showing severe pain in 6.5% and 5% of participants respectively similar to present study (7%).¹⁰ Satish kumar et al study and Nisreen et al had severe dysmenorrhoea in 66% and 61% respectively in contrast to present study.^{24,25}

Table 7: Comparison of severity of dysmenorrhoea in different studies.

Dysmenorrhoea severity	Present study N=146	Sujatha et al ¹⁵ N=122	Nirmala et al ¹⁰ N=152	Nisreen A et al ²⁵ N=154	Satish Kumar PK et al ²⁴ N=78
Grade-1	57%	55.7%	61%	18.8%	17.8%
Grade-2	36%	37.7%	34	19.5%	15.6%
Grade-3	7%	6.5%	5%	61.6%	66.6%

Dysmenorrhoea, premenstrual syndrome and heavy flow were the main reasons for absence from class or college. Most of the students experienced menstrual disorders more commonly around the time of academic assessments confirming the stress induced abnormalities. Previous studies have shown a high prevalence of premenstrual syndrome, dysmenorrhoea and menstrual irregularities among female medical students and are most common causes for college absenteeism, limitation of daily, social and academic activities.²⁶⁻²⁸ Table 8 was providing information about menstrual irregularities and

their association with BMI, consumption of junk food and physical exercise in different studies. In present study increase in BMI was significantly associated with premenstrual syndrome and dysmenorrhoea. But, in Rupavani et al, Anandha lakshmi et al, and Sujata et al studies increase in BMI was not significantly associated with dysmenorrhoea.^{15,29,30} Participants those who were consuming junk food on regular basis showed a significant association with dysmenorrhoea and not with premenstrual syndrome in contrast to Rupavani et al, Anandha Lakshmi et al and Sujatha et al studies.³⁰

Table 8: Correlation of PMS and dysmenorrhoea with lifestyle and diet pattern comparison with other studies.

Parameters	BMI		Junk food		Physical exercise	
	Premenstrual syndrome	Dysmenorrhoea	Premenstrual syndrome	Dysmenorrhoea	Premenstrual syndrome	Dysmenorrhoea
Present study	Significant	Significant	Not significant	Significant	Significant	Significant
Rupavani et al ²⁹	Significant	Not significant	Significant	Not significant	Significant	Not significant
Lakshmi et al ³⁰	Significant	Not significant	Significant	Not significant	Significant	Not significant
Sujatha et al ¹⁵	Significant	Not significant	Significant	Not significant	Significant	Not significant

Whereas, Nirmala et al reported a significant association between dysmenorrhoea and premenstrual syndrome with frequent consumption of junk food. Fujiwara et al found an association between fast food consumption and dysmenorrhoea. Significant association was observed with lack of physical exercise and premenstrual syndrome and dysmenorrhoea in present study.^{10,31} While in Rupavani et al, Anandha lakshmi et al and Sujatha et al studies, premenstrual symptoms were significant with lack of physical exercise, but not dysmenorrhoea.^{15,29,30}

The limitation of present study is that data was collected from the single centre especially from one medical college participating students, and this may not represent to the general population of women. In addition, the data was recorded from the past memory at the time of filling the questionnaire, which might have a chance of recall bias.

CONCLUSION

In conclusion premenstrual symptoms, dysmenorrhoea and menstrual irregularities were more prevalent among young females. Majority of symptoms were stress, pain abdomen, irritability, backache, nausea and vomiting. Those who have experienced severe dysmenorrhoea, premenstrual symptoms, and menstrual irregularities showed limitation of working ability and college absenteeism. In this present study menstrual disorders were significantly associated with increase in BMI, consumption of junk food and lack of physical exercise. Early identification and interventions can resolve the menstrual disorders. Comprehensive education programs on lifestyle modifications like regular physical activities,

promoting healthy eating habits should be emphasised to prevent menstrual abnormalities of young students as early as at school level. Therefore, further studies are required with a multicentre large sample size setting.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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