

# Study of Menstrual Abnormalities and its Association with Demographic Factors among Female Medical Students

VAIBHAV KANTI<sup>1</sup>, VANDANA VERMA<sup>2</sup>, NARESH PAL SINGH<sup>3</sup>

## ABSTRACT

**Introduction:** The regularity of menstrual cycle depends on many factors like genetic makeup, hormonal balance, weight and height, chronic medical illness and psychological problems. Life of medical students is very stressful, their food habits and sedentary lifestyle make them more prone for many menstrual abnormalities.

**Aim:** This study was conducted to find out the menstrual abnormalities and its association with different biological variables like BMI, food habits and physical activity.

**Materials and Methods:** This was a cross-sectional study conducted at U.P.U.M.S. Saifai, Etawah between July-August 2019 on 150 Female medical students. All the willing female medical students were asked to fill preformed self-structured questionnaire (weight, height, menstrual pattern and abnormalities, food habits, addiction, physical activity, relevant medical and surgical history) and association was sought between menstrual abnormalities and different demographic factors by using Pearson chi-square test.

**Results:** The mean age of students were 21.9 years. Mean age at menarche was 13.4 years. A total of 2.7% students ate junk food daily; 18% (27) girls had irregular cycles out of which only five girls had taken treatment for this. Amount of blood loss during menstruation was found to be increased in 5.8% girls that consumed junk food ( $p=0.13$ ). There was no significant correlation found between pattern of menstrual cycle and BMI, physical activity, addiction. Dysmenorrhea and PMS was less in the girls that were on restricted diet for weight reduction (46.1% and 61.5%, respectively) but this difference was not statistically significant. There was significant association between dysmenorrhea and regular consumption of junk food. Dysmenorrhea and PMS was also less in the girls that exercised regularly (45.2% and 69% respectively) ( $p=0.4$ ). PMS was significantly associated with addiction to tea or coffee ( $p=0.04$ ).

**Conclusion:** In this study dysmenorrhea and PMS was the most common menstrual abnormalities. Medication was being taken mostly for dysmenorrhea. Most of the parameters did not show a significant association so a larger study or multicentric study is required.

**Keywords:** Dysmenorrhea, Menarche, Pre-menstrual syndrome

## INTRODUCTION

Approximately, 75% females are affected with some or other menstrual disorders worldwide [1,2]. Regularity and rhythm of menstrual cycle depends on the changes in the levels of different hormones in each cycle [3]. The most common menstrual abnormalities are irregular menstrual cycle, dysmenorrhea and premenstrual syndrome [4]. These menstrual abnormalities can result in loss of self-confidence leading to less achievements in life. Dysmenorrhea is the most common menstrual problem and its prevalence is 60 to 93% [5]. It is one of the common menstrual disorders which leads to absenteeism from work and school; it is also associated with reduction in income and poor quality of life [4-6]. Genetics and psychological well being affect the age of menarche. The regularity of menstrual cycle depends on many factors like genetic makeup, hormonal balance, weight and height, chronic medical illness and psychological problems [7,8].

Life of medical students is very stressful, their food habits and sedentary life style makes them prone to many menstrual abnormalities due to the change in hypothalamo-pituitary ovarian axis [9]. Many disorders can be detected and treated at an early stage to improve the quality of life. Various studies are done on this topic in India and outside but in most of them association of menstrual disorders with demographic factors have not been found out and in some studies association was seen between menstrual disorders and only BMI, Food habit and physical activity [5]. Since they found some association, this study was formulated to find out the menstrual

pattern and frequency of different menstrual disorders in medical students and its association with different biological variables like BMI, food habits, physical activity and addiction and dieting.

## MATERIALS AND METHODS

This was a cross-sectional study conducted by the Department of Obstetrics and Gynecology and Social and Preventive medicine at U.P.U.M.S. Saifai, Etawah, between July-August 2019, in 150 female medical students selected by random sampling. Sample size was 150 students, keeping in mind the limited resources because a maximum of 150 female medical students were found at the study center that included all the consenting semester students.

Informed consent was obtained from students after discussing the purpose and methodology of the study. Ethical clearance for the study was taken from the Institute's Ethics Committee (letter no. 34/2019-20).

**Inclusion criteria:** All the female medical students who had given the consent for study were included. After explaining the terminologies used in questionnaire they were asked to fill the preformed, pretested questionnaire based on Menstrual symptom questionnaire and menstrual bleeding questionnaire [10,11] and questionnaires were modified according to need and only those questions were removed which was not relevant to the study and further content validity was checked by two experts of Obstetrics and Gynaecology. Questionnaire was first given to pilot group and the queries were rectified; like definitions of dysmenorrhea and PMS

were added, irregularity and regular exercise term were defined before giving the questionnaire to students for main study.

**Exclusion criteria:** The students who did not given the consent for study were not included in the study. If consenting students had any difficulty in filling the questionnaire, they were helped out by investigators at the same time.

#### Some terminologies used in this study are described below:

**Regular menstrual cycle:** Occurs every 24-38 days $\pm$ 2-3 days in which the menstrual flow lasts for 4-8 days with an average loss of 5-80 mL of blood per cycle [12].

**Irregular menstrual cycle:** Defined as when there is variation of >20 days in between 2 cycles (if distance between 2 last menstrual period more than 48 days, if the previous cycles were of 28 days) [12].

**Heavy blood loss:** For >80 mL blood loss in one cycle. It is assessed in our study by number of completely soaked pads. If the number of completely soaked regular sized pads were more than five in a day it was assessed as excessive blood loss [5].

According to body mass index students were classified in three categories: Underweight (BMI <18.5 kg/m<sup>2</sup>), normal (BMI=18.5 to 24.9 kg/m<sup>2</sup>) and overweight and obese ( $\geq$ 25.0 kg/m<sup>2</sup>) students [1].

**Regular exercise:** If the students were doing brisk walking, jogging, aerobic exercise, dancing, swimming for minimum 30 minutes for  $\geq$ 5 days in a week or equivalent exercise for 150 minutes per week. (moderate exercise for 150 min per week is minimum required for fitness of adults as per American heart association) [13].

**Dysmenorrhea:** Lower abdominal pain radiating to back and thighs, perceived before or during menstruation and this pain may be of varying severity [14,15].

**Pre-menstrual syndrome:** Includes a wide variety of cyclic, recurrent, physical, emotional and behavioural symptoms which occur during late luteal phase of menstrual cycle and subside with the beginning of menses. These symptoms include some physical and neurological symptoms like weight gain, headache, fatigue, nervousness, irritability and mood swings [14].

## STATISTICAL ANALYSIS

Statistical analysis of data was done by using Statistical Package for the Social Sciences (SPSS) software version 21.0 Chicago and data was analysed by Pearson chi-square test. The p-value of <0.05 was considered significant.

## RESULTS

Data of 150 students were analysed. Mean age of students were 21.9 years. Maximum number of students was in the age group of 21-23 years age group (52%). Most of the students (68%) were in normal BMI category; 76% were vegetarian [Table/Fig-1].

| Age groups (Years)   | Number of subjects | Percentage |
|----------------------|--------------------|------------|
| 18-20                | 39                 | 26         |
| 21-23                | 78                 | 52         |
| >23                  | 33                 | 22         |
| <b>BMI</b>           |                    |            |
| Underweight          | 24                 | 16         |
| Normal               | 102                | 68         |
| Overweight and obese | 24                 | 16         |

[Table/Fig-1]: Demographic characteristics of participants.

Out of 150 students, 80% students were in the habit of eating junk foods but most of them took junk foods occasionally (60.7%); 17.3% girls were addicted to tea, coffee and chocolates; only 28% girls were on regular exercise [Table/Fig-2].

In all the girls, age at menarche was between 10-15 years except one student for whom it was <10 years. Mean age at menarche was

| Characters                                     | Number of subjects | Percentage |
|--|--------------------|------------|
| <b>Dietary habit</b>                           |                    |            |
| Vegetarian                                     | 114                | 76         |
| Non vegetarian                                 | 36                 | 24         |
| <b>Habit of junk food consumption</b>          | 120                | 80         |
| <b>Frequency of junk food consumption</b>      |                    |            |
| Occasional                                     | 91                 | 60.7       |
| >3 days/week                                   | 25                 | 16.7       |
| Everyday                                       | 4                  | 2.7        |
| <b>History of dieting for weight reduction</b> | 13                 | 8.7        |
| <b>Addiction to tea, coffee, chocolate</b>     | 26                 | 17.3       |
| <b>Regular exercise</b>                        | 42                 | 28         |

[Table/Fig-2]: Lifestyle characteristics of participants.

(Junk food included Pizza, burgers, cakes, pastries, excessive oily foods etc..)

13.4 years. In most of the students (82%), the cycle was regular and cycle length was of 28-35 day in all girls that had regular cycles and duration of flow was 2-7 days in all 150 girls. Total 18% (27) girls had irregular cycles out of which only five girls had taken treatment for this.

Increased blood loss in menses was present in 4.7% students out of which two students had taken treatment. Dysmenorrhea was present in 56% students whereas PMS is present in 73.3% students. 17.8% (15) students were using medication for dysmenorrhea. Total 7.1% students remained absent from class for one or two days during menses due to dysmenorrhea [Table/Fig-3,4].

| Lifestyle characteristics    | No. of students | Percentage |
|------------------------------|-----------------|------------|
| <b>Age of menarche</b>       |                 |            |
| <10 y                        | 1               | 0.7        |
| 10-15 y                      | 149             | 99.3       |
| >15 y                        | 0               |            |
| <b>Pattern of cycle</b>      |                 |            |
| Regular cycle                | 123             | 82         |
| Irregular cycle              | 27              | 18         |
| <b>Amount of flow</b>        |                 |            |
| Normal                       | 139             | 92.7       |
| Increased                    | 7               | 4.7        |
| Decreased                    | 4               | 2.7        |
| <b>Dysmenorrhea</b>          | 84              | 56         |
| <b>Premenstrual syndrome</b> | 110             | 73.3       |

[Table/Fig-3]: Menstrual pattern and abnormalities in medical students.

| Parameters assessed                          | Number of students       | Percentage |      |
|--|--------------------------|------------|------|
| Any treatment taken for menstrual disorders  | Excessive blood loss (7) | 2          | 28.5 |
|  | Irregular menses (27)    | 5          | 18.5 |
|  | Dysmenorrhea (84)        | 15         | 17.8 |
| Absences from class/work due to dysmenorrhea | 6                        | 7.1        |      |

[Table/Fig-4]: Effect on lifestyle due to menstrual disorder.

In this study, the underweight students having irregularity in cycle were more as compared to the normal BMI students (33.3% and 16.7%, respectively) but the difference was not significant whereas the amount of blood flow was more in 8.3% of overweight and obese students as compared to 4.9% in normal BMI girls. Amount of blood flow was found to be increased in 5.8% girls that consumed junk foods. In the girls that were addicted to tea, coffee and chocolates 26.9% girls had irregular cycles as compared to 16.2% who were nonaddict whereas flow of menstrual blood was increased in only 3.9% girls (less than nonaddicts).

No statistical correlation was found between regularity of cycle and frequency of exercise. Amount of blood loss was normal in 95% girls

that were on regular exercise as compared to 91.6% of girls who were not doing exercise, but difference in regularity and amount of flow were not statistically significant [Table/Fig-5].

Dysmenorrhea was more common (66.6%) in underweight girls whereas PMS was more common in overweight and obese girls (79.1%) but difference is statistically insignificant. There was significant association between Dysmenorrhea and regular consumption of junk foods (p=0.01) but PMS was insignificantly less in the girls that consumed junk foods. About 57.6% girls addicted to tea coffee and chocolate had dysmenorrhea which is insignificantly more than in nonaddicts (55.6%) whereas 57.6% had PMS compared to 76.6% in nonaddicts (p=0.04). Dysmenorrhea and PMS was less in the girls that were dieting for weight reduction (46.1% and 61.5%, respectively). Dysmenorrhea and PMS was also less in the girls who were doing exercise regularly (45.2% and 69%,

respectively) but the difference was insignificant [Table/Fig-6].

In this study, three students had history of treated tuberculosis and four students were hypothyroid and were taking treatment for the same and none of them were having any menstrual abnormality. The students who had any form of menstrual abnormality and were not investigated and did not take any treatment, counselling was done and relevant investigations were advised after compilation of results of study.

### DISCUSSION

There are many studies on menstrual irregularities in medical students done in India and outside India. Summary of the previous studies are tabulated in [Table/Fig-7] [5,16-18]. In this study, the mean age of menarche was 13.4 years which was almost similar to that found in other studies from India and outside [16-18]. In this study irregular cycle was found in 18% of students which was less

| Lifestyle characteristics |  | Regularity of cycle |                | p-value                | Amount of Flow |               |               | p-value                 |
|---------------------------|--|---------------------|----------------|------------------------|----------------|---------------|---------------|-------------------------|
|                           |  | Regular (123)       | Irregular (27) |                        | Normal (139)   | Decreased (4) | Increased (7) |                         |
| BMI                       |  |                     |                |                        |                |               |               |                         |
| Underweight               |  | 16 (66.6%)          | 8 (33.3%)      | $\chi^2=4.6$<br>p 0.09 | 24 (100%)      | 0 (0%)        | 0 (0%)        | $\chi^2=5.9$<br>p 0.2   |
| Normal                    |  | 86 (84.3%)          | 16 (16.7%)     |                        | 95 (93.1 %)    | 2 (1.9%)      | 5 (4.9 %)     |                         |
| Overweight and obese      |  | 21 (87.3%)          | 3 (12.5%)      |                        | 20 (83.3%)     | 2 (8.3%)      | 2 (8.3%)      |                         |
| Junk food consumption     |  |                     |                | $\chi^2=0.10$<br>p 0.7 |                |               |               | $\chi^2= 4.0$<br>p 0.13 |
| Yes                       |  | 99 (82.5%)          | 21 (17.5%)     |                        | 111 (92.5%)    | 2 (1.6%)      | 7 (5.8%)      |                         |
| No                        |  | 24 (80%)            | 6 (20%)        | 28 (93.3%)             | 2 (6.7%)       | 0             |               |                         |
| Addiction                 |  |                     |                | $\chi^2=1.6$<br>p 0.1  |                |               |               | $\chi^2= 0.92$<br>p 0.6 |
| Yes                       |  | 19 (73.0%)          | 7 (26.9%)      |                        | 25 (96.1%)     | 0 (0%)        | 1 (3.9%)      |                         |
| No                        |  | 104 (83.8%)         | 20 (16.2%)     | 114 (91.1%)            | 4 (3.2%)       | 6 (4.8%)      |               |                         |
| Dieting                   |  |                     |                | $\chi^2=0.06$<br>p 0.7 |                |               |               | $\chi^2 0.65$<br>p 0.7  |
| Yes                       |  | 11 (84.61%)         | 2 (15.3%)      |                        | 12 (92.3%)     | 0 (0%)        | 1 (7.7%)      |                         |
| No                        |  | 112 (81.7%)         | 25 (18.3%)     | 127 (92.7%)            | 4 (2.9%)       | 6 (4.3%)      |               |                         |
| Exercise                  |  |                     |                | $\chi^2=1.4$<br>p 0.2  |                |               |               | $\chi^2 1.5$<br>p 0.4   |
| Yes                       |  | 37 (88%)            | 5 (12%)        |                        | 40 (95.2%)     | 0 (0%)        | 2 (4.7%)      |                         |
| No                        |  | 86 (79.6%)          | 22 (20.4%)     | 99 (91.6%)             | 4 (3.7%)       | 5 (4.6%)      |               |                         |

[Table/Fig-5]: Association between life style and menstrual pattern.

| Lifestyle characters  |  | Dysmenorrhea |             | $\chi^2$ and p-value   | Premenstrual syndrome |             | $\chi^2$ and p-value   |
|-----------------------|--|--------------|-------------|------------------------|-----------------------|-------------|------------------------|
|                       |  | Present (84) | Absent (66) |                        | Present (110)         | Absent (40) |                        |
| BMI                   |  |              |             |                        |                       |             |                        |
| Underweight           |  | 16 (66.6%)   | 8 (33.4 %)  | $\chi^2=1.5$<br>p 0.4  | 18 (75%)              | 6 (25%)     | $\chi^2 0.61$<br>p 0.7 |
| Normal                |  | 56 (54.9%)   | 46 (30.7%)  |                        | 73 (71.5%)            | 29 (28.5%)  |                        |
| Overweight and obese  |  | 12 (50%)     | 12 (50%)    |                        | 19 (79.1 %)           | 5 (20.9%)   |                        |
| Junk food consumption |  |              |             | $\chi^2=5.6$<br>p 0.01 |                       |             | $\chi^2 3.4$<br>p 0.06 |
| Yes                   |  | 73 (48.7%)   | 47 (31.3%)  |                        | 84 (70 %)             | 36 (30%)    |                        |
| No                    |  | 11 (7.3%)    | 19 (12.7%)  | 26 (86.6%)             | 4 (13.4%)             |             |                        |
| Addiction             |  |              |             | $\chi^2=0.03$<br>p 0.8 |                       |             | $\chi^2 3.9$<br>p 0.04 |
| Yes                   |  | 15 (57.6%)   | 11 (42.4%)  |                        | 15 (57.6%)            | 11 (42.4%)  |                        |
| No                    |  | 69 (55.6%)   | 55 (44.4%)  | 95 (76.6%)             | 29 (23.4%)            |             |                        |
| Dieting               |  |              |             | $\chi^2=0.56$<br>p 0.4 |                       |             | $\chi^2 1.0$<br>p 0.31 |
| Yes                   |  | 6 (46.1%)    | 7 (53.9 %)  |                        | 8 (61.5%)             | 5 (38.5%)   |                        |
| No                    |  | 78 (56.9%)   | 59 (43.1%)  | 102 (74.4%)            | 35 (25.6%)            |             |                        |
| Exercise              |  |              |             | $\chi^2=2.7$<br>p 0.09 |                       |             | $\chi^2 0.54$<br>p 0.4 |
| Yes                   |  | 19 (45.2%)   | 23 (54.8 %) |                        | 29 (69%)              | 13 (31%)    |                        |
| No                    |  | 65 (60.1%)   | 43 (39.9%)  | 81 (75%)               | 27 (25%)              |             |                        |

[Table/Fig-6]: Association between lifestyle and menstrual abnormalities.

| Authors                         | Study population/age of participants/mean menarche age  | Statistical association   |
|---------------------------------|---|---|
| Karki PK and Gupta R, 2017 [16] | 171 medical students<br>Mean age of students 19.81±1.05 Year<br>Mean age of menarche-12.95 Year | Irregular cycle- 33.3%<br>PMS- 67.3%<br>Dysmenorrhea- 53.8%.<br>BMI had significant association with irregularity of cycles.  |
| Sujatha V et al., 2015 [17]     | 200 medical and dental students<br>Age group 17-20 Year   | Irregular periods-12%, dysmenorrhea- 61% and PMS- 70%<br>BMI and junk food consumption had significant association with PMS.  |
| Ibrahim NK et al., 2015 [18]    | 435 medical students<br>Mean age -21.4±1.4 Year   | Dysmenorrhea- 60.9%<br>Absenteeism due to dysmenorrhea 28.3%<br>Significant association was found between dysmenorrhea and family history of dysmenorrhea.  |
| Lakkawar NJ et al., 2014 [5]    | 200 medical students<br>Age group 17-22 Year<br>mean age of menarche- 12.6±1.32 Year            | Irregularity of cycles- 29%, Dysmenorrhoea-76%, PMS- 69%<br>Irregular cycles significantly associated with being overweight, consumption of junk food on regular basis, dieting and physical exercise. Significant association was found between physical exercise and menstrual abnormalities. |

[Table/Fig-7]: Comparison of different studies on menstrual cycle abnormalities in medical students [5, 16-18].

than reported in other studies done in India and outside. It may be because in this study, number of students with normal BMI were more than reported in other studies [16-18].

Prevalence of dysmenorrhea was 56% in this study whereas in other studies prevalence was higher [16,18]. In this study, no statistically significant correlation was present in BMI and irregularity of cycle, amount of blood lost in menstrual cycle, dysmenorrhea and PMS whereas in the study conducted by Lakkawar NJ et al., Karki PK and Gupta R showed that irregular cycles were significantly associated with being overweight. It may be because of the larger sample size and more number of overweight patients in their study [5,16].

In this study, no significant association was found between irregular cycle or amount of blood lost in menstrual period and junk food consumption in contrast to it the study conducted by Lakkawar NJ et al., which showed large number of students (86%) consumed junk food on regular basis and there was significant association between irregular cycles, abnormal flow and consumption of junk food [5]. This may be because of small sample size in the index study. In the index study number of students consuming junk food on >3 days in a week was only 16.7%.

Significant association was found in regular consumption of junk food and dysmenorrhea in contrast to Sujatha V et al., that reported no relation in dysmenorrhea and junk food consumption but significant correlation was reported in regular consumption of junk food and PMS in their study [17]. But the reason for this contradiction could not be made out. No statistically significant association was found in BMI, physical exercise, dieting and menstrual abnormalities in this study which may be because of small sample size in the study.

### Limitation(s)

This study has limitations because it was based on the answers given by students by filling the given proforma, no examination or investigation was done in this study. Sample size was small and an external validation is recommended.

### CONCLUSION(S)

In this study, the most common menstrual abnormality that was found was dysmenorrhea and PMS. Dysmenorrhea was most common abnormality for which students were taking medication. Also, most of the parameters did not show a significant association, so a larger study or multicentric study is required to find the association between menstrual abnormalities, BMI and other variables.

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#### PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Obstetrics and Gynaecology, UPUMS, Saifai, Etawah, Uttar Pradesh, India.
2. Assistant Professor, Department of Obstetrics and Gynaecology, UPUMS, Saifai, Etawah, Uttar Pradesh, India.
3. Professor, Department of Preventive and Social Medicine, UPUMS, Saifai, Etawah, Uttar Pradesh, India.

#### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Vandana Verma,  
Flat No. 202, Type 4, Block C, New Campus, UPUMS, Saifai,  
Etawah, Uttar Pradesh, India.  
E-mail: drvandana19@gmail.com

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