

DIETARY AND LIFESTYLE PATTERNS IN ADOLESCENT GIRLS AND YOUNG WOMEN WITH MENSTRUAL IRREGULARITIES IN NORTH INDIA

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ABSTRACT

Background: A normal menstrual cycle is an important health indicator for girls and women in the reproductive age group. However, the prevalence of menstrual problems is increasing because of hormonal imbalances occurring due to unhealthy dietary habits, lack of exercise, and increased levels of stress. High intake of foods rich in fat, sugar, and salt also leads to metabolic disturbances within the body. **Aim:** To study how the dietary behavior and lifestyle patterns in terms of exercise and sleep affect menstruation in adolescent girls and young adults in North India. **Methodology:** We conducted a survey in schools and colleges in Chandigarh among girls and young women in the age group of 14 to 24 years using close-ended questions. Menstrual patterns and the effects of diet, exercise, and sleep on menstruation were studied. Two formats were used – printed forms that were distributed to the students in schools and online forms distributed to college students through Google Forms. **Observations and Results:** In all we received 679 valid responses – 120 from adolescents (age groups 14-18 Years) and 559 from young adults (ages 20-24 years). BMI was calculated as weight/height² in kg/m². It ranged from 18.1 to 29.3 kg/m². Overall, the prevalence of overweight (BMI ≥ 23 Kg/m²) was observed in 31.1% (n=212) of students. Menstrual irregularity was observed among 19.1% (n=130) students. There was a significant correlation between menstrual irregularities and lack of regular exercise. **Conclusion:** There is a high prevalence of menstrual irregularities among adolescents and young women in North India. This significantly correlates with a lack of regular exercise. School health programs promoting regular physical activity, healthy dietary habits, and raising awareness about menstrual health can help in addressing this issue.

KEYWORDS: Menstrual irregularity, adolescents, PCOS, physical activity, lifestyle.

INTRODUCTION

A normal menstrual cycle is an important health indicator of girls and women in the reproductive age group since it is regulated by normal physiological and biochemical processes within the body. The onset of menstrual periods, menarche, generally varies from 10 years to 16 years of age, although for most girls, periods usually begin around the age of 12 to 13 years.^[1,2] A normal menstrual cycle averages 28 days although the length can vary from 21 to 40 days. A period lasts for about 5 days on an average but can last between 3 and 7 days, with a blood loss averaging around 30 to 72ml.^[1,3] Flow may be labeled as excessive if it lasts more than 7 days, and is associated with frequent and excessive soakage of menstrual hygiene products, or passage of blood clots larger than about 2.5 cm.^[1]

Scientific literature shows that changing dietary habits, physical exercise, and sleep patterns are associated with menstrual problems among adolescents and young women.^[4] High consumption of fatty and salty foods or foods rich in carbohydrates and refined sugar has been associated with metabolic changes in the body resulting in hormonal disturbances, development of ovulatory dysfunction resulting in the formation of follicular cysts in ovaries, and irregularity of the menstrual cycle. This may also be associated with the manifestation of other symptoms of polycystic ovary syndrome (PCOS) such as increased growth of male pattern facial hair, acne, and darkening of skin in areas of skin folds such as armpits, groin, and neck.^[5,6]

Further, lack of physical activity and increased stress levels have been associated with worsening hormonal disturbances.^[7,8]

Hypothesis

We hypothesized that students who consume high fat, salt, and sugar (HFSS) foods, do not engage in regular physical activity, and have inadequate sleep, are likely to have a higher prevalence of menstrual disturbances.

Aims and Objectives

The **aim** of the project was to study how the dietary and lifestyle patterns in terms of exercise and sleep affect menstruation in young girls in Chandigarh.

The objectives were

1. To study the correlation between high intake of HFSS foods, “junk foods” or “fast foods” and menstrual irregularities.
2. To study how low levels of exercise or physical activity affect menstruation in comparison to adequate exercise.
3. To study how stress reflected by reduced sleep affects menstruation.

METHODOLOGY

We conducted a survey in schools and colleges in Chandigarh in the month of October 2019.

Subjects for study: This survey was conducted among adolescent school-going girls and young college-going women in the age group between 14 years to 24 years.

Inclusion criteria: All girls in classes IX to XII in the schools participating in the study who were willing to fill out these questionnaires were included in the study. All college students aged up to 24 years of age who submitted the filled proforma online were included.

Exclusion criteria: Girls who had started menstruating less than two years back from the date of conducting the study were excluded because of a greater possibility of menstrual irregularity due to an immature hypothalamic-pituitary axis.^[9]

Preparation of questionnaire

The questionnaire was prepared after extensive reading about menstruation and the effect of diet and lifestyle on menstruation. The questions were discussed and debated under the guidance of our mentor. The final form of the questionnaire was proofread and filled by 20 girls from

our class to check for validity and the required editing was done.

Methodology: Two formats were used. We approached the heads of three schools, explained the project, and took permission to distribute the questionnaires in the specified classes. We collected the filled questionnaires and later entered the data in Microsoft Excel. We uploaded the questionnaire on Google Forms and sent the link to college-going students with a request to fill in the proforma along with an explanatory note regarding the reason behind the study. All observations were then taken on an excel spreadsheet.

The data from both sources was then clubbed for preparing observations and results.

OBSERVATIONS AND RESULTS

We received 702 responses, 23 of which had to be disregarded because of incomplete or invalid responses. The results were collated from 679 responses – 120 responses from adolescents and 559 responses from young women up to 24 years of age. BMI was calculated as $\text{weight}/\text{height}^2$ in kg/m^2 . To define overweight and obesity in girls up to 18 years of age, we used BMI cutoffs of 23 and 27, respectively. This was as per the revised growth charts for height, weight, and BMI for 5- to 18-year-old Indian children and adolescents prepared by the Indian Academy of Pediatrics.^[10] For young women > 18 years of age, we used adult BMI cut off 23 Kg/m^2 for overweight and 25 kg/m^2 for obesity as per the Modified criteria of BMI classification for Asian Indians.^[11]

Using these cut-offs, 15% (n=18) of adolescents were found to be overweight, while 5.8% (n=7) were found to be obese. In comparison, among the college students (age 18 - 29 years), 25.8% (n=144) were found to be overweight while 7.7% (n=43) were found to be obese. Overall, the prevalence of overweight students in this cohort ($\text{BMI} \geq 23$) was 31.1% (n=212). The average age at menarche was 12.87 years. All the students had attained menarche more than two years before we conducted the study. Table 1 shows the frequency of various menstrual disturbances among students.

Table 1: Frequency of menstrual disturbances among students.

Menstrual disturbance	Frequency(%age)
Prolonged bleeding (lasting >7 days)	18 (2.6%)
Heavy bleeding (Soaking 4 or more sanitary napkins per day along with staining)	45 (6.6%)
Irregular cycles (skipping cycles, menstruation often delayed by more than 45 days)	130 (19.1%)
Dysmenorrhea (pain during periods)	378 (55.7%)

Most of the students with irregular menstrual cycles (58.9%, n=76) were overweight or obese with a $\text{BMI} \geq 23 \text{ kg}/\text{m}^2$. In comparison, among 549 students with regular menstrual cycles, 12.9% (n=71) were found to

have a $\text{BMI} \geq 23\text{kg}/\text{m}^2$. However, analysis of significance using a one-way ANOVA test showed that this difference was not significant; P-value = 0.412.

We also asked about the other problems that can be associated with irregular menstruation. Table 2 summarizes the frequency of occurrence of problems like excessive facial hair (hirsutism), acne, and darkening of the skin in skin folds and creases in areas such as

armpits, groin, and neck (acanthosis nigricans) in students with or without irregular menstruation. These problems were significantly more common in students suffering from irregular menstruation, P-value=0.015

Table 2: Frequency of occurrence of excessive facial hair, acne, and acanthosis nigricans in students with irregular menstruation in comparison to those with regular menstruation.

	Irregular menstruation (n=130)	Regular menstruation (n=549)
Excessive facial hair	60% (n=78)	30.9% (n=170)
Acne	30% (n=39)	20.7% (n=114)
Acanthosis nigricans	51.5% (n=67)	39.1% (n=215)

Further, 24.6% (n=32) of students with irregular menstruation gave a history of treatment for polycystic ovarian syndrome (PCOS). Significantly, a greater number of students (48.5%, n=63) with irregular periods gave a family history of diabetes in first or second-degree relative, compared with those with regular menstruation (44.4%, n=244), P-value=0.021.

Table 3 shows the relation between irregular menstruation and physical exercise. It can be seen from this table that the number of students who had irregular menstruation decreased as the frequency of exercise increased. This correlation was also significant; P-value=0.026

Table 3: Relation between irregular menstruation and physical exercise.

Frequency of exercise per week	Number of students	Percentage of students with irregular menstruation
Hardly ever/ Never	329	21.6% (n=71)
1 – 3 times /week	172	20.9% (n=36)
4 – 6 times /week or daily	178	12.9% (n=23)

Another factor that seemed to be associated with irregular cycles was reduced sleep. We found that 284 students (41.8%) who responded that they slept for less than seven hours a day were more prone to irregular menstruation 20.8% (n=59) compared to those students (n=395) who slept for more than seven hours daily, 18% (n=71) although this correlation was not significant P-value=0.052.

Further, we compared the consumption of fresh fruits, vegetables, and salads; intake of bakery products and sweets, frequency of exercise, overweight, and irregularity of periods among those who ate HFSS foods such as noodles, burgers, pasta, and pizza ≤ 2 times per week (n=513) compared to those who consumed these “junk foods” ≥ 3 times per week (n=166). Table 4 shows this comparison. We found that P-values for these comparisons were not significant.

Table 4: Comparison regarding dietary pattern, exercise, overweight and menstrual irregularity among those who consume ‘junk food’ ≥ 3 times per week versus those who consume it ≤ 2 times per week.

	Consume ‘junk food’ ≥ 3 times per week (n=166)	Consume ‘junk food’ ≤ 2 times per week (n=513)	P-value
Bakery products and Sweets ≥ 3 times per week	82 (49.4%)	120 (23.4%)	0.332
Consumption of fresh fruits, vegetables, and salads per day (≥ 5 servings per day)	45 (27.1%)	315 (61.4%)	0.131
Regular exercise ≥ 4 times per week	33 (19.9%)	145 (28.3%)	0.291
Overweight (BMI ≥ 23)	57 (34.3%)	155 (30.2%)	0.232
Irregular periods	34 (20.5%)	96 (18.7%)	0.41

DISCUSSION

Menarche is a significant landmark in the lives of adolescent girls. It heralds a period of physical and mental adjustments which need active coping mechanisms. Further, problems like the irregularity of cycles, heavy menstrual flow, and painful periods often compound the problems of absenteeism from school and

decreased efficiency due to a general feeling of ill-health.^[12]

This project was undertaken to study the prevalence of these disorders of menstruation and to see the correlation of irregular menstruation with the lifestyle and dietary habits of adolescents and young women.

In this study, 2.6% of students responded that they had prolonged bleeding during their cycles, 6.6% responded that it was often heavy with staining of clothes despite using adequate protection, 55.7% said that their periods were painful but only 9% (n=60) said that they occasionally missed school because of issues related to periods. These figures are comparable to those observed by Omidvar et al in a study on menstruation among adolescent girls living in an urban area of South India.^[2] Absenteeism from school, because of period problems, appeared less in our study compared to the rate of 40% reported by Vashisht et al.^[12] Apparently, this was because our data was from an urban area and from students studying in institutions with good infrastructure and adequate toilet facilities. Also, our study included a higher proportion of young women who may be more experienced in managing their periods.

We found that irregular menstruation was a frequent problem among students (19.1%). Further, it was significantly associated with other problems like excessive facial hair, acne, and acanthosis nigricans. These results are comparable to the prevalence rates of 17.74% quoted by Sharma et al and are higher than the rates observed among adolescents in many other countries.^[13] Dietary and lifestyle factors as well as genetic predisposition due to a higher rate of diabetes in the family (48.5%) may be responsible for the higher prevalence rates.

Overweight, frequent intake of high fat, salt, and sugar (HFSS) containing foods, and inadequate sleep have been linked to irregularity of periods and PCOS.^[14,15] Although the prevalence rates of irregular menstruation in our study was higher among those students who took inadequate sleep, were overweight, or frequently consumed HFSS food, the difference was not statistically significant. However, we found a significant correlation between irregular menstruation and lack of regular exercise. This observation has been confirmed in other studies as well.^[16]

Limitations of the study

This was an observational study using survey data from school and college students. Therefore, the element of social desirability bias cannot be ruled out. Further, our sample consisted of a mixed population of adolescents and young women, whose perceptions about period problems may not be similar, resulting in inconsistency in responses.

Further Action Taken

Our results motivated us to address this issue of high prevalence of menstrual problems. We worked on a project to digitalize the school health cards so that the health providers and parents could look at a consolidated year wise report of the student's health and compare the growth pattern over the years to make meaningful conclusions and take the recommended action. Our project was selected among the top innovative projects

from all over the nation by the Atal Innovative Mission under the "SheCodes" program.^[17] Further, we designed brochures to spread awareness regarding menstrual health and distributed the same in schools and colleges.

CONCLUSION

There is a high prevalence of menstrual irregularities and overweight among adolescents and young women especially in urban population in India. Therefore, there is a need to raise awareness among students regarding the necessity of following a healthy diet and lifestyle. School health programs can help students to develop healthy eating habits and regular exercise patterns in their formative years. The support of parents is also crucial in this endeavor.

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REFERENCES

1. National Health service. Periods. Retrieved on 15.10.2019 from: <https://www.nhs.uk/conditions/periods/fertility-in-the-menstrual-cycle/#:~:text=The%20length%20of%20the%20menstrual,to%2040%20days%2C%20are%20normal>
2. Omidvar, S., Amiri, F. N., Bakhtiari, A., & Begum, K. A study on menstruation of Indian adolescent girls in an urban area of South India. *Journal of family medicine and primary care*, 2018; 7(4): 698–702. https://doi.org/10.4103/jfmpc.jfmpc_258_17.
3. Anna Targonskaya. How much blood do you lose during your period? Retrieved from: <https://flo.health/menstrual-cycle/health/period/how-much-blood-you-lose>
4. Negi, P., Mishra, A., & Lakhera, P. Menstrual abnormalities and their association with lifestyle pattern in adolescent girls of Garhwal, India. *Journal of family medicine and primary care*, 2018; 7(4): 804–808. https://doi.org/10.4103/jfmpc.jfmpc_159_17.
5. Hajivandi, L., Noroozi, M., Mostafavi, F., & Ekramzadeh, M. Food habits in overweight and obese adolescent girls with Polycystic ovary syndrome (PCOS): a qualitative study in Iran. *BMC pediatrics*, 2020; 20(1): 277. <https://doi.org/10.1186/s12887-020-02173-y>.
6. Mayo Clinic. Polycystic Ovary Syndrome. Retrieved on 15.10.2019 from: [https://www.mayoclinic.org/diseases-conditions/pcos/symptoms-causes/syc-20353439#:~:text=Polycystic%20ovary%20syndrome%20\(PCOS\)%20is, fail%20to%20regularly%20release%20eggs](https://www.mayoclinic.org/diseases-conditions/pcos/symptoms-causes/syc-20353439#:~:text=Polycystic%20ovary%20syndrome%20(PCOS)%20is, fail%20to%20regularly%20release%20eggs).

7. Basu, B. R., Chowdhury, O., & Saha, S. K. Possible Link Between Stress-related Factors and Altered Body Composition in Women with Polycystic Ovarian Syndrome. *Journal of human reproductive sciences*, 2018; 11(1): 10–18. https://doi.org/10.4103/jhrs.JHRS_78_17.
8. Woodward, A., Klonizakis, M., & Broom, D. Exercise and Polycystic Ovary Syndrome. *Advances in experimental medicine and biology*, 2020; 1228: 123–136. https://doi.org/10.1007/978-981-15-1792-1_8.
9. Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. Committee Opinion No. 651. American College of Obstetricians and Gynecologists. *Obstet Gynecol*, 2015; 126: e143–6.
10. Indian Academy of Pediatrics Growth Charts Committee, Khadilkar V, Yadav S, Agrawal KK, Tamboli S, Banerjee M, Cherian A, Goyal JP, Khadilkar A, Kumaravel V, Mohan V, Narayanappa D, Ray I, Yewale V. Revised IAP growth charts for height, weight and body mass index for 5- to 18-year-old Indian children. *Indian Pediatr*, 2015 Jan; 52(1): 47-55. doi: 10.1007/s13312-015-0566-5. PMID: 25638185.
11. World Health Organization. Geneva: WHO. The Asia Pacific Perspective- Redefining Obesity and Its Treatment, 2000.
12. Vashisht, A., Pathak, R., Agarwalla, R., Patavegar, B. N., & Panda, M. School absenteeism during menstruation amongst adolescent girls in Delhi, India. *Journal of family & community medicine*, 2018; 25(3): 163–168. https://doi.org/10.4103/jfcm.JFCM_161_17.
13. Sharma, M., Khapre, M., Saxena, V., & Kaushal, P. Polycystic ovary syndrome among Indian adolescent girls - A systematic review and metanalysis. *Nepal journal of epidemiology*, 2021; 11(3): 1063–1075. <https://doi.org/10.3126/nje.v11i3.38460>.
14. Bahman, M., Hajimehdipoor, H., Afrakhteh, M., Bioos, S., Hashem-Dabaghian, F., & Tansaz, M. The Importance of Sleep Hygiene in Polycystic Ovary Syndrome from the View of Iranian Traditional Medicine and Modern Medicine. *International journal of preventive medicine*, 2018; 9: 87. https://doi.org/10.4103/ijpvm.IJPVM_352_16
15. Mustaqeem, M., Sadullah, S., Waqar, W., Farooq, M. Z., Khan, A., & Fraz, T. R. Obesity with irregular menstrual cycle in young girls. *Mymensingh Medical Journal: MMJ*, 2015; 24(1): 161–167.
16. Woodward, A., Klonizakis, M., & Broom, D. Exercise and Polycystic Ovary Syndrome. *Advances in experimental medicine and biology*, 2020; 1228: 123–136. https://doi.org/10.1007/978-981-15-1792-1_8.
17. Presha Goel, Preesha Katial, Pavit Behniwal, Meenakshi Jindal. A smart way to secure health for school children. Atal Innovation Mission. The Ingenious Tinkerers. Top innovations of ATL Marathon, 2019-20; 96-97. Available at: <https://aim.gov.in/pdf/ingenious-tinkerers.pdf>