

Effect of Diet, Physical Activity, and Psychosocial Factors, on Menstrual Cycle Abnormalities in College Students of Karad, Maharashtra, India

Divya Sachin Gupta¹, Neha Anandrao Jadhav², Suraj Bhimarao Kanase³

^{1,2,3} Department of Physiotherapy, Krishna Institute of Medical Sciences
(Deemed to Be University), Karad, Maharashtra, India.

ABSTRACT

BACKGROUND

Menstruation is a periodic and cyclical shedding of pre-gestational endometrium. Abnormalities of menstruation can be seen as dysmenorrhea, amenorrhea, menorrhagia, premenstrual symptoms (PMS), hypomenorrhea etc. This abnormality can be due to various factors like diet, smoking, physical activity, exercise, stress etc. This study was conducted to study the factors affecting menstrual cycle like diet, physical activity, psychosocial factors and menstrual cycle abnormalities.

METHODS

This was an observational study undertaken on 300 participants aged between 18 - 26 years. A structured questionnaire comprising of components related to type of diet, physical activity, and the alterations in psychosocial factors along with the changes in menstrual cycle was used for this study.

RESULTS

According to the data, it could be seen that there was a significant relation between the diet altered (67 % of 300 participants) and the occurrence of menorrhagia (73 % with altered diet) ($P < 0.0001$) as well as oligomenorrhea (63 % with altered diet) ($P < 0.0001$). It was seen that absence of physical activity or following a sedentary lifestyle (61 % of 300 participants) had a relation with higher occurrence of dysmenorrhea (94 % with limited physical activity) ($P < 0.0001$) and menorrhagia (78 % with limited physical activity). A significant relation was seen between alterations in psychosocial factors (high levels of stress, anxiety, etc) (81 % of 300 participants) and oligomenorrhea (71 % with high levels of psychosocial factors alteration). High levels of stress also had a considerable effect on premenstrual symptoms (93 % with alterations in psychosocial factors).

CONCLUSIONS

Diet, physical activity or exercise and psychosocial factors had an effect on menstrual cycle abnormalities. Proper education about the effects of these factors is needed as these factors could be the underlying cause of abnormalities and hence can prevent future complications as well as improve the quality of life.

KEY WORDS

Menstrual Cycle, Diet, Physical Activity, Psychosocial Factors, Abnormalities

Corresponding Author:

*Dr. Suraj Bhimarao Kanase,
Krishna college of physiotherapy,
Near Dhebewadi road, Malkapur,
Karad, Maharashtra, India.
E-mail: drsurajkanase7@rediffmail.com*

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BACKGROUND

Menstruation and menstrual cycle abnormalities are of critical importance. Several factors such as, high or low body mass index (BMI), smoking, alcohol consumption, drug use, improper eating habits, oral contraceptive use and stress have been associated with occurrence of menstrual cycle dysfunction.¹ Menstrual cycle abnormalities are commonly seen in college students of the age group between 18 - 26 years. It is essential to determine how alteration of certain factors can lead to menstrual cycle abnormalities. The factors focused in this study are diet, physical activity and psychosocial factors. A cumulative and statistical data is needed to establish the co-relation between the effect of above-mentioned factors and menstrual abnormality caused. Menstrual abnormality in girls can be defined by the presence of either one or all of the following points – excessive pain during menstruation, absence of menstrual cycle, short or long cycle length, and / or duration of menses.² Diet, exercise and psychological factors are widely acknowledged to affect the course of pubertal development and regulation of menstrual cycle in girls. Shift in lifestyle and change in the type of food intake, the dietary habits could adversely affect the menstrual cycle. Women usually limit their food intake for weight maintenance. This could lead to improper food selection and poor nutrition intake for the body along with diet-related psychological stress.³ A study showed that intake of junk food can lead to comorbidities like adolescent overweight, hypertension, diabetes etc. due to improper nutrition.⁴ It is important to evaluate eating habits and estimate the influence of the same on menstrual cycle abnormalities. This imbalance between the food intake and energy utilisation causes an impact on the menstrual cycle of girls. A healthy and balanced diet with consumption of fruits, vegetables and sources of vitamins and minerals along with fish and dairy product helps in maintenance of normal menstrual cycle. This can be beneficial in avoiding painful menstruation which could occur due to altered diet or nutrition less food.⁵ The nutritional status of people depends on what they eat.⁶ Following a planned diet can cause minimise the factors causing menstrual disturbances such as obesity, anorexia nervosa etc. Due to inadequate calorie intake as a result of dieting, there is an energy imbalance which can lead to alteration of menstrual cycles and thus lead to various health related issues later in life.⁷ Obesity is a major factor that can lead to insulin resistance, hyperlipidaemia which can contribute to the development of polycystic ovarian disorder, which in turn affects the quality of life.⁸ One of the objectives of this study was to evaluate the effect of exercises on menstrual abnormalities. Furthermore, these abnormalities can also pose as a predisposing factor for occurrence of stroke in either young women or in post-menopausal women.⁹ Due to excessive exercising, weight loss and other medical conditions and at times even stress and anxiety can affect the normal menstrual cycle. In the past two decades, the relation between physical activity and menstrual disorders has been extensively studied. Many studies have shown that strenuous exercise has profound effects on menstrual activity during adolescence.¹⁰ Clinical studies indicate that extreme situations such as eating disorders and strenuous exercise can lead to anovulation and amenorrhea.¹¹ Type of personality has an impact on various diseases and disorders in all the age groups. Personality

changes in young age groups has a direct relation with diseases in old age groups.¹² Psychosocial factors such as anxiety, perceived stress, in the form of academic stress, health related stress, diet-related psychological stress and self-imposed type of stress could have an impact on the menstrual cycle of the college students. Abnormal menstrual cycles can affect women's health and lead to serious conditions in future such as cardiovascular problems, reproductive health problems, anxiety, early menopause etc.¹³ Studies on relation between psychological stress and menstrual abnormalities faced problems of either small sample size or inadequate validated stress questionnaire.¹⁴ High levels of stress can lead to irregular cycles.¹⁵ Studies have shown that variation in menstrual cycle may lead to certain changes in the ovarian function and can affect the reproductive quality of life.¹⁶ It is of critical importance to analyse factors affecting the menstrual cycle as these are capable of disrupting the reproductive health of women.¹⁷ Majority of college students experience menstrual problems and abnormalities which can lead to decrease in quality of life of the students and affect their daily activities, academic performance and have an impact on their social life. An awareness regarding menstrual abnormalities and its root causes needs to be focused on.¹⁸

Currently, the focus is on taking symptomatic measures after the occurrence of menstrual abnormality and not on the underlying cause. Many factors could influence the onset of menstrual abnormalities which could be either internal factors such as anaemia, hormonal imbalance, BMI or external factors such as diet, physical activity, alcohol intake, stress and medications.¹⁹ This study was conducted to determine the underlying cause and establish a correlation between multiple factors and menstrual cycle abnormalities as well as create awareness.

METHODS

This was an observational study carried out in which exposure to specific risk factors might correlate with particular outcomes. Study duration was from November 2019 to May 2020. It was conducted to find out association of diet, physical activity and psychosocial factors on menstrual cycle abnormalities. All the girls between the age group of 18 - 26 years belonging to different colleges in Karad were included in the study.

Among the targeted population by randomisation (chit method), we selected Yashwantrao Chavan College of Science for our study. Our target population consisted of 1200 participants pursuing Bachelor of Science (BSc) and Master of Science (MSc) course in Yashwantrao Chavan College of Sciences, Karad. Among these 1200 participants, we asked questions regarding their menstrual cycle and explained the difference between normal and abnormal menstruation. Questions such as intensity of pain experienced during menstruation, duration of bleeding, excessive bleeding experienced during menstruation, interval between 2 cycles, pain, bloated ness and mood swings experienced before the onset of menstruation were asked to the participants. A total of 649 participants were enrolled for our study, on basis of the questions asked about menstruation. Out of 649 participants, 300 participants were selected as per the simple random sampling technique by using the stratified sampling method on the basis of the inclusion and exclusion criteria.

Inclusion Criteria

1. Girls aged between 18 - 26 years
2. College students
3. Having the following menstrual abnormalities
 - Dysmenorrhea
 - Oligomenorrhea
 - Premenstrual Symptoms
 - Polymenorrhoea
 - Menorrhagia

Exclusion Criteria

1. Participants who were receiving medications for polycystic ovary syndrome (PCOS), medications for regulating menstrual cycles
2. Participants who had other systemic illness and were receiving treatment / medications for the same.

Formula for sample size:

$$N = Z^2 pq$$

L^2

Z = standard normal variant at 45 % confidence interval = 1.96

p = prevalence of menstrual abnormalities in different study parameters such as diet, physical activity and psychosocial factors = 26.5 %

q = no abnormalities = 73.5 %

L = Allowable errors 5 % at 95 % confidence interval

$$N = (1.96)^2 (26.5) (73.5) = 300$$

$$(5)^2$$

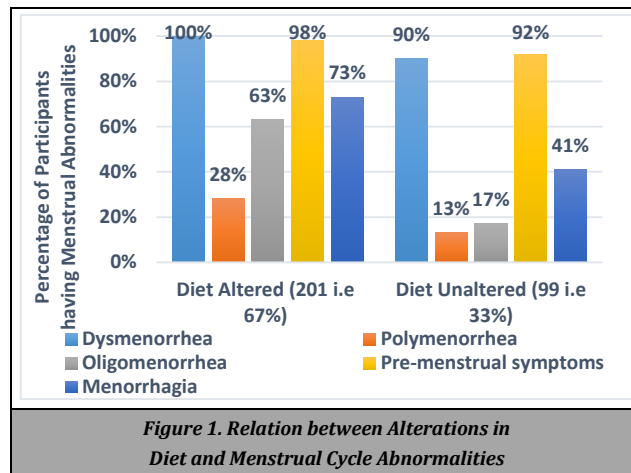
Ref-Rupa Vani K, Veena KS, Subitha L, Hemanth Kumar VR, Bupathy A. Menstrual Abnormalities in School Going Girls – Are They Related to Dietary and Exercise Pattern? Journal of clinical and diagnostic research: JCDR. 2013 Nov; 7 (11) :2537. The study was carried out with the permission of the college authorities. A structured questionnaire consisting of questions about participant’s diet, physical activity and the alteration of psychosocial factors along with details about existing menstrual abnormality was used. This questionnaire consisted of 23 questions. This questionnaire was validated through professors from within and outside the university. The questionnaire had sensitivity and specificity of more than 80 % and hence was included in this study. The questions were explained to the participants before the filling of questionnaire was carried out.

The questionnaire consisted of 15 questions with the options for scoring as 0 = never, 1 = sometimes, 2 = often, 3 = very often, 4 = frequently for recording the information about diet, physical activity and the alterations in the psychosocial factors experienced. Following 15 questions, another 8 questions were used to record the information about the menstrual cycle such as days of bleeding, interval between 2 cycles, and level of pain experienced etc. This study was carried out after an approval taken from institutional ethical committee of Krishna Institute of Medical Sciences “Deemed to Be” University.

RESULTS

The findings are summarized in a graph format as per the percentage of alteration in the factors and the abnormality

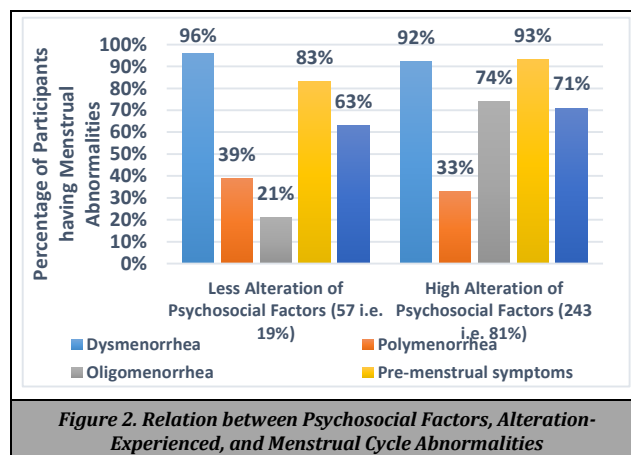
experienced by that particular group. The analysis was done with the help of chi-square test. InStat software was used to carry out analysis. Graph Pad in Stat 3.1 version was used for this study.



As per the above graph, it can be seen that among the 300 participants, 201 had altered diet due to weight gain / weight loss programs. The incidence of dysmenorrhea and pre-menstrual symptoms in the subjects was seen in both type of population.

However, it can be seen that the occurrence of oligomenorrhea (63 % with altered diet) (P < 0.0001) and menorrhagia (73 % with altered diet) (P < 0.0001) has a higher incidence in the population who had altered diet. This could be due to improper nutritional intake due various programs that were being followed. While conducting the study it was also noted that the age group of 18 - 26 years had poor knowledge about the nutritional benefits and how nutrition alterations can affect their menstrual cycle.

According to the above graphical presentation, among 300 participants, 183 were involved in physical activity like exercise, yoga, sports etc., whereas 117 individuals with limited physical activity or led a sedentary lifestyle. The incidence of dysmenorrhea (94 % with limited physical activity) (P < 0.0001) and menorrhagia (78 % with limited physical activity) (P < 0.0001) can be seen higher in individuals who had limited physical activity. There was no significant difference in the incidence of occurrence of poly menorrhea and oligomenorrhea. Pre-menstrual symptoms occurred in both the groups irrespective of the alterations in physical activity.



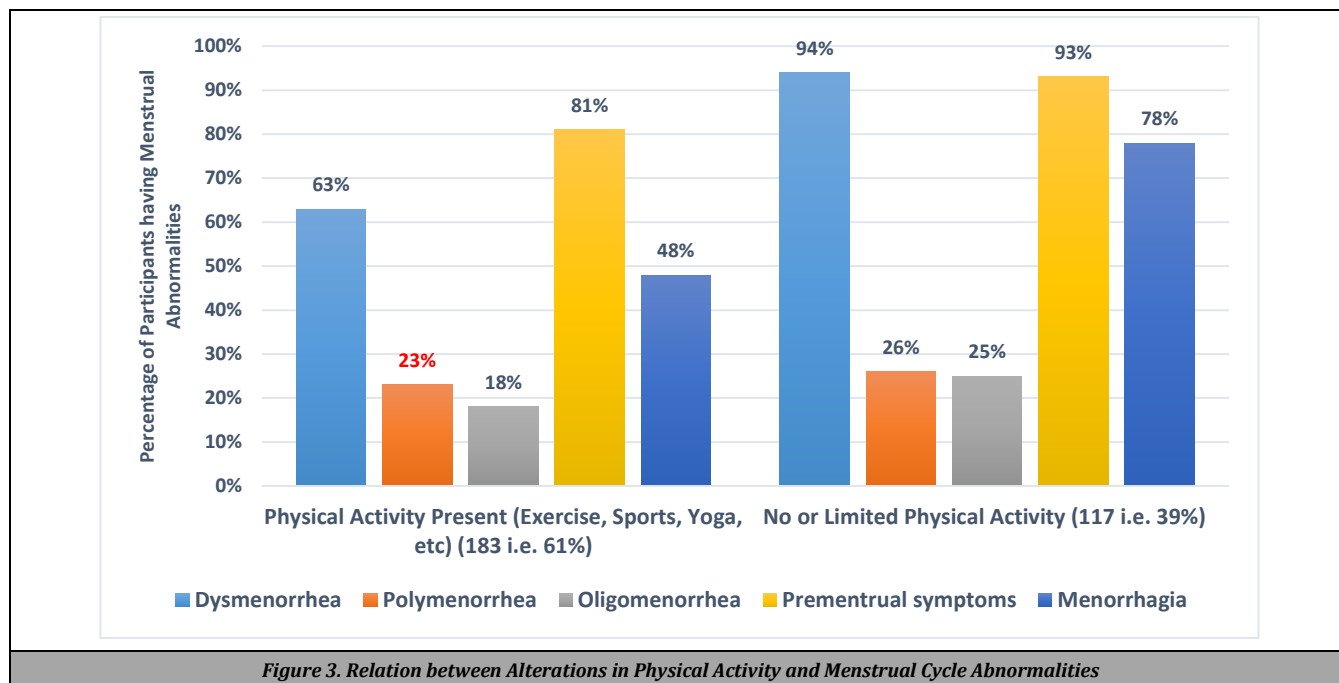


Figure 3. Relation between Alterations in Physical Activity and Menstrual Cycle Abnormalities

The above statistics indicate that high levels of alteration in psychosocial factors was experienced by 243 participants whereas 57 individuals of the population experienced low levels of alteration. This was mainly experienced by students during examinations or when things wouldn't go as planned. As it can be seen, individuals with higher levels of alteration in psychosocial factors have higher incidence of occurrence of oligomenorrhea (74 % of the affected participants) ($P < 0.0001$) and to some extent an increase in pre-menstrual symptoms (94 % of the affected participants) ($P = 0.0345$) was also noted. The occurrence of dysmenorrhea and menorrhagia was almost similar in both the groups.

The study showed us that diet, physical activity and psychosocial factors have effect on menstrual health and cause abnormalities in respective subjects. Among the 300 participants, 67 % participants had diet alteration due to various weight loss / weight gain programs which resulted in irregular cycles in 63 % of the participants ($P < 0.0001$) and menorrhagia in 73 % participants ($P < 0.0001$) as compared to those who had unaltered diet. High levels of alteration in psychosocial factors was seen in about 81 % of the population due to various reasons which resulted in occurrence of pre-menstrual symptoms in 93 % of that population of participants ($P < 0.0345$) and 71 % experienced higher incidence of menorrhagia ($P < 0.0001$) as compared to those who had low / moderate alteration in psychological factors. Among the 300 participants, 61 % participants were involved in physical activity like exercise, sports, yoga etc. whereas 39 % had limited physical activity. Of the 39 % who had limited physical activity, 94 % participants experienced higher incidence of dysmenorrhea ($P < 0.0001$) and 78 % had irregular cycles ($P < 0.0001$) as compared to those who were involved in physical activity. In this study, more than 80 % population had given the positive results based on the questionnaire provided. Hence, this study shows the effect of diet, physical activity and stress can cause various menstrual cycle abnormalities in college students.

DISCUSSION

Menstrual abnormalities are commonly seen in India. The abnormalities could be due to various reasons such as smoking, alcohol intake, dietary changes, lack of physical activity, stress etc. This study focused on 3 factors that could lead to menstrual abnormalities, diet, physical activity and psychosocial factors. The study identified that almost 81 % study population was suffering from high levels of alteration in psychosocial factors and had a higher incidence of occurrence of oligomenorrhea and pre-menstrual symptoms. Higher levels of psychosocial factors (anxiety, stress etc.) can cause difficulty in release of certain hormones required for ovulation. This in turn can cause delayed ovulation and thus result in a delayed menstruation. Higher levels in alteration of psychosocial factors leads to prolonged cycles and heavy bleeding during menstruation. Hormonal imbalance and excessive levels of psychosocial factors (stress, anxiety, emotional changes etc.) can aggravate premenstrual symptoms. In a study conducted in Saudi Arabia, it was seen that out of 1200 students, 39 % had high stress levels of which 91 % were suffering from some menstrual abnormality, most commonly, pre-menstrual symptoms and dysmenorrhea and to some extent, irregular menstrual cycles.¹ Another prospect found in this study was that there was some shift in the chances of occurrence of menorrhagia in participants with high alteration in psychosocial factors levels. Another study conducted on workplace stress levels and their association with menstrual cycles, found that high levels of stress could alter their menstrual cycle length.² A study conducted on 100 undergraduate girls of medical college, 30 % had high stress levels and higher incidence of dysmenorrhea and abnormal menstrual cycle length.⁶ A study conducted in Japan to establish the relationship between premenstrual symptoms, menstrual pain and irregular cycles with stress, it was seen that 79 % study population had higher stress levels and thus experienced high level of premenstrual symptoms as well as pain and 69 % population experienced irregular cycles.⁷

This study also focuses on the relation between diet and menstrual cycle abnormalities. In this study it can be seen that about 66 % population had diet altered due to various weight loss / weight gain programs and in them 63 % had irregular menstrual cycles and 73 % had menorrhagia as compared to those who had unaltered diet. Menstrual cycle of women is regulated by oestrogen and progesterone hormones, alteration of which can disrupt the menstrual cycle. The production of these hormones is affected by change in dietary intake. Programs followed for weight loss, results in restrictive eating that results in reduced calorie intake thus disrupting the balance of oestrogen and progesterone levels, hence affecting the menstrual cycle. A study conducted in Japan showed the effect of skipping breakfast on menstrual cycle. The result of this study showed significant occurrence of dysmenorrhea and irregular menstrual cycles.³ A study conducted on 18 women to study the effect of vegetarian and non-vegetarian diet on menstrual cycle, showed that considerable changes in diet lead to amenorrhea in some women whereas others experienced significant changes in the cycle length.²⁰ This study shows that along with irregular cycle length and menorrhagia, some participants also experienced increased intensity of pain during their cycle.

The study focuses on the effects of physical activity on the menstrual cycle. Physical activity causes reduction in incidence of cramps during or before menstruation. Physical activity causes sweating which helps reduce the water in the body thus relieving gastritis during periods. In addition, exercise causes the release of endorphins which helps relieve discomfort and dysmenorrhea. Physical activity increases the metabolism of the body which helps to regulate the oestrogen and progesterone levels and thus regulate the menstrual cycle. In this study, it can be seen that 61 % participants were involved in physical activity, like exercise, yoga etc. whereas, 39 % had limited physical activity. Of this 39 % participants, 94 % participants experienced higher incidence of dysmenorrhea compared to those who were involved in physical activity and 78 % participants experienced menorrhagia more frequently than those involved in physical activity. It can also be seen that the participants who had limited physical activity experienced pre-menstrual symptoms more commonly. A study conducted in North Trøndelag, stated that excessive as well as low physical activity may cause menstrual abnormalities. Hence physical activity should be done regularly, and in moderation to avoid any reproductive health problems.⁴ In a study conducted in Pondicherry among school going girls, it was noted that lack of physical activity caused higher incidence of dysmenorrhea in 72 % students compared to those who were involved in some physical activity. 48 % students also experienced pre-menstrual symptoms more commonly than those involved in moderate physical activity.⁵

CONCLUSIONS

Diet, physical activity and psychosocial factors have an effect on the menstrual cycle abnormalities in college students. It is necessary for women to understand the importance of menstrual cycle abnormalities and the factors affecting it at an

early age to prevent adverse effects on the reproductive health. It is necessary to conduct educational programs educating these young women about the menstrual cycle and the abnormalities with the factors affecting it. The study signifies the importance of adapting a proper health pattern which can result in better menstrual health and overall improved quality of life. The study also highlights the cumulative effects of all the factors on menstrual cycle abnormalities in college students, which gives us an idea of its negative effects on body and mental health.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

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