



# A SURVEY BASED RESEARCH ON PREVALENCE OF MENSTRUAL DISORDERS AND THEIR ASSOCIATION WITH FOOD FREQUENCY, PSYCHOLOGICAL STRESS, BMI AND VARIATION IN WEIGHT AMONG YOUTH

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## ABSTRACT

The menstrual cycle is an important sign of a woman's physiological and reproductive health. Any alterations in the menstrual cycle can cause menstrual disorders and there are many factors that lead to these abnormalities. This survey-based cross-sectional observational study of the prevalence of menstrual problems and their association with the Uttar Pradesh population aims to analyse prevalence of menstrual disorders in females of age between 15 and 30 and to look at how prevalent food frequency, stress, weight variation and BMI variation are associated with the changes in cycle pattern.

**KEYWORDS:** Menstrual cycle, Menstrual disorders, Prevalence, Association

## INTRODUCTION

Menstruation is a natural occurrence that occurs at more or less regular monthly intervals during the reproductive life of females and involves the ejection of blood from the uterus through the vagina.<sup>(1)</sup> Menstruation usually begins in adolescents aged 11 to 14 years old, with a period of 7 days or fewer and a regular cycle of 21 to 28 days, with an average blood loss of 20-80ml.<sup>(2)</sup> Predictable and consistent menstrual intervals, predictable and constant menstrual durations, and predictable and consistent flow patterns are all signs of regular ovulation. Menstrual disorders are any alterations in the regular menstrual cycle.<sup>(3)</sup> According to the survey, 64% of females suffer at least one menstrual-related issue.<sup>(4)</sup> Menstrual abnormalities were found to be prevalent in between 8% and 83 percent of women, according to a global survey done by the World Health Organization.<sup>(5,6)</sup>

Menstruation-related health problems affect a substantial percentage of women of reproductive age, according to studies.<sup>(7,8)</sup> Menstrual difficulties are not only costly, but they are also a leading cause of absenteeism and poor academic performance among young women.<sup>(9,10)</sup> Menstrual abnormalities are important because they are associated to anovulatory cycles (cycles in which ovulation does not occur), which can raise the risk of infertility, mental illnesses, and gynaecologic malignancies<sup>(8,9)</sup>. While these illnesses are rarely life-threatening, they can have a negative impact on women's personal, family, and social lives, as well as cause physical, psychological, and social issues<sup>(10,11)</sup>. Ethnicity, age, genetics, age at menarche, BMI, food frequency, obesity, low physical activity, birth control pills, hormonal changes, history of surgical or medical issues, reproductive system problems, endocrine diseases, socioeconomic status, and mental disorders are some of the factors that influence menstrual disorders<sup>(12,13)</sup>. Some research has revealed a link between each of these characteristics and their biological relationship<sup>(14,15)</sup>. But there is a dearth of studies that show a collective relationship between multiple variants (factors), so we are attempting to build a better relationship between the association of factors such as changes in food frequency, psychological stress, and BMI variation and menstrual-related health issues. The goal of this study is to see if there is a common link between eating frequency, psychological stress, and BMI variance and menstruation issues.

Stress influences human response in different ways like physiological and psychological state. The hormonal process, hypothalamic-pituitary-adrenal (HPA) axis is activated by stress. Cortisol and corticotropin-releasing hormone levels rise when the HPA axis is activated (CRH)<sup>(16)</sup>. The HPA axis, cortisol, and CRH all play a role in the body's stress response control.<sup>(17)</sup> Normal levels of reproductive hormones can be suppressed by CRH and cortisol, which can result in irregular ovulation, anovulation (no ovulation), or amenorrhea (no menstruation)<sup>(18)</sup>. Dysmenorrhea (painful menstruation) has been connected to occupations where you have little control, are insecure, and don't have much support from your co-workers<sup>(19)</sup>. The frequency of dysmenorrhea may be affected by previous month's stress<sup>(20)</sup>, so someone who has painful menstruation as a result of stress may not notice it until the following month's cycle.

Stressed women were more likely to have severe symptoms leading up to and during menstruation if they were stressed earlier in their cycle.

A well-balanced diet consists of a variety of foods that provide all of the nutrients required for optimum health in the right amounts and proportions. Unbalanced diet is defined as a diet that disrupts the balance of body constituents. Eating correctly or incorrectly can affect both physically and mentally of an individual's health. Eating well can also help to improve one's mood and reduce stress. With the body satisfied and working smoothly, mental health is greatly enhanced<sup>(21)</sup>. Changes in eating habits can lead to insufficient calorie intake, micronutrient deficiencies, unsaturated fat deficiency, phytoestrogen deficiency, and fibre deficiency, as well as an increase in environmental pollutants. Furthermore, the intake of dietary additives, anti-oxidants, processing agents, and sweeteners, which have been shown to be damaging to human health, increases risk. These factors may impact current lifestyles as well as cause gynaecologic problems like dysmenorrhea and irregular menstruation<sup>(22)</sup>.

Underweight, overweight, and obesity are all correctly diagnosed using BMI calculations. In terms of menstrual cycle difficulties, BMI is also highly important. With a prevalence of 60 percent to 93 percent, dysmenorrhea is the most frequent menstruation condition among women. Rates of overweight and obesity may play a role in the pathogenesis of menstruation issues such primary dysmenorrhea<sup>(23)</sup>. Primary dysmenorrhea is characterized by unpleasant menstrual cramps that are not accompanied by any obvious pelvic disease.

Obesity is associated to a number of comorbidities, and obese women are more likely to have reproductive problems like polycystic ovary syndrome, infertility, and monthly irregularities. However, it's unknown how adiposity or excess body weight affects the reproductive axis. The link between decreased LH levels and weight reduction is likely to be more dependent on absolute levels of insulin sensitivity than on total adiposity<sup>(24)</sup>.

## MATERIALS AND METHODS:

A survey based cross-sectional observational study carried out in Uttar Pradesh district, India belonging to 15-30 years age youth participate with their consent within the time interval of 6 months. Information was collected and circulated by means of questionnaire and google forms respectively. Only girls who had already begun menstruating were asked to take part. Questionnaire like menstrual history questionnaire (MHQ) and assessment scale such as healthy eating assessment tool (HEAT) and perceived stress scale (PSS) were used to assess food habits and stress respectively. Sample size of the survey study calculated using Rao software and it found to be 314 with 95% confidence interval and 5% margin of error.

Anthropometric measurements such as weight and height were collected, and body mass index was determined by calculating as the subject's weight in proportion to the square of the subject's height in metres. Questions related to menstruation elucidated characteristics such as age of menarche, cycle length, duration of flow, amount of flow, any other medications and diseases, premenstrual syndrome, dysmenorrhea, physical activities and weight variation were included. HEAT scale assessed food into excellent, good, fair and need improvement. The perceived stress scale evaluates stress and categorises it as low, moderate, as well as high. The questionnaire was self-administered, semi-structured and prepared in English language.

Students who did not attain menarche, who are suffering from any chronic health condition, married woman's and are using any medicines for long duration were excluded from the study.

Data collected through google forms analysed in Microsoft Excel 2019. Statistically chi-square and multinomial logistics regression were done using SPSS version 20.

## RESULTS AND DISCUSSION

An observational, prospective survey-based study was conducted using Google forms in Uttar Pradesh. Statistically chi-square and multinomial logistics regression were used using SPSS version 20 and following results were obtained. P values less than 0.05 were considered statistically significant at a 5% level of significance with a 95% confidence interval.

The demographic data of study population are shown below.

Table 1: Age group of study population

AGE GROUP	FREQUENCY	PERCENTAGE
15-19	51	16.2
20-24	211	67.3
24-29	51	16.2
30-34	1	0.3

Mean age of the study population was  $22.07 \pm 2.91$  years

Table 2: BMI of study population

BMI	FREQUENCY	PERCENTAGE
Underweight	55	18
Normal	186	59
Overweight	56	18
Obese	17	5

Table 3: Age of menarche in study population

AGE OF MENARCHE	FREQUENCY	PERCENTAGE
Below 11	13	4.1
11-14	241	76.8
Above 14	60	19.1

The average mean age of menarche is 12.5 in the participants.

The pattern of menstrual cycle in study population were classified into regular and irregular cycle was shown below.

Table 4: Menstrual pattern of study population

MENSTRUAL PATTERN	REGULAR CYCLE	IRREGULAR CYCLE
FREQUENCY	197	117
PERCENTAGE	63	37

The prevalence of the menstrual disorders was studied in our study.

Among 314 participants total 31 pre-menstrual syndromes were studied. Following table shows the percentage of each premenstrual symptoms discussed in study population.

Table 5: Premenstrual symptoms

PREMENSTRUAL SYMPTOMS	FREQUENCY	PERCENTAGE
Absent menstrual periods	78	25
Cold intolerance	27	9
Tingling sensation in hands or feet	38	12
Headaches	133	42
Lightheadedness/Dizziness	72	23
Stomach pain	167	53
Fainting	47	15
Change in energy	101	32
Change in urination	29	9
Sleeping difficulties	78	25
Skin changes	48	15
Hair loss	95	30
Hair growth on face and/or chest	34	11
Mood swings	167	53
Episodes of crying for “no reason”	70	22
Food Craving	88	28
Confusion	47	15
Difficulty concentrating	69	22
Breast pain	54	17
Taste changes	12	4
Constipation	31	10
Diarrhea	35	11
Muscle pain	83	26
Joint pain	44	14
Obsessive compulsive behavior	20	6
Feeling depressed	85	27

It is found that all study population had premenstrual symptoms. Both stomach pain and mood swings ranked the first by accounting for 53% of the total syndromes in females.

Other menstrual disorders such as dysmenorrhea, irregular menstruation, oligomenorrhea, hypomenorrhea, hypo menorrhagia, menorrhagia, hypermenorrhea, polymenorrhagia were studied.

Table 6: Table showing prevalence of menstrual disorders

DISORDERS	FREQUENCY	PERCENTAGE
PMS	314	100
Dysmenorrhea	128	41
Irregular	116	37
Oligo menorrhrea	94	30
Hypomenorrhea	88	28
Hypo menorrhagia	69	22
Menorrhagia	41	13
Hypermenorrhea	41	13
Poly menorrhagia	22	7

Factors that associated with menstrual disorders that included in our study such as BMI variation, weight variation, diet changes and psychological stress.

Table 7: Percentage showing weight variation and study population

Weight variation	Gain	Loss	No variation
Frequency	78	32	204
Percentage	24.8	10.2	65

Table 8: Percentage showing BMI and study population.

Interpretation	Underweight	Normal	Overweight	Obese
Frequency	55	186	56	17
Percentage	18	59	18	5

Table 9: Percentage showing food frequency and study population using HEAT score.

HEAT Score	Frequency	Percentage
Need improvement	79	25
Fair eating habit	48	15
Good eating habit	85	27
Excellent eating habit	102	33

Table 10: Percentage showing stress of study population using perceived stress scale.

Category	Frequency	Percentage
Low stress	88	28
Moderate stress	182	58
High stress	44	14

Following tables shows the association of these factors. The value of p value <0.05 shows the association with factors.

Table 11: Association between weight variation and menstrual cycle

Variation	Menstrual Cycle		P Value
	Regular	Irregular	
Gain	36	42	<0.0001
	15	17	
	146	58	

Table 12: Association between BMI and menstrual cycle

BMI Category	Menstrual Cycle		P Value
	Regular	Irregular	
Underweight	35	20	0.0239
	125	61	
	25	31	
	10	7	

Table 13: Association between food frequency using HEAT score and menstrual cycle

HEAT Score	Menstrual Cycle		P Value
	Regular	Irregular	
Need improvement	6	73	0.01
Fair eating habit	12	36	
Good eating habit	78	7	
Excellent eating habit	102	0	

Table 14: Association between stress and menstrual cycle

Stress Category	Menstrual Cycle		P Value
	Regular	Irregular	
Low	60	28	0.0124
Moderate	97	85	
High	19	25	

## DISCUSSION:

The present survey-based, observational, cross-sectional study aims to evaluate the prevalence of menstrual abnormalities and the association between food frequency, BMI, weight variation, and stress in Uttar Pradesh females with an age group between 15 and 30 years. A questionnaire was made which contains demographic details, menstrual history details, food healthy eating habits and stress assessment. A Questionnaire circulated through Google forms to females who had attained menarche.

The 314 females participated in the study and their confidentiality of data was preserved at all levels of the study. The data obtained from the Google forms was documented in a MS Excel sheet.

Among 314 females enrolled in the survey, the mean age of the study population was  $22.07 \pm 2.91$  years. The average mean age of menarche is 12.5 in our study, which is in absolute contrast with the results reported by Priyanka Rajipet et al., in which the mean age of menarche is 12.5 only.<sup>(25)</sup>

The results of our study are parallel to those of Najwa El Karout et al and Sonal Kulshrestha et al<sup>(26,27)</sup> PMS is the most prevalent among all the menstrual disorders, and dysmenorrhea is 41% prevalent, almost similar to that reported in Najwa El Karout et al, which is low in the case of PMS (97%) and high in the case of dysmenorrhea (44%). The most common PMS was found to be abdominal pain, which was reported by Franco Rigon et al<sup>(28)</sup>. It was followed by headaches (42%), hair loss (30%), food cravings (28%), feeling depressed (27%) and so on.

From the study, pattern of menstrual cycle were observed in 37%, which is relatable to the report by Dr. Nabila Hassan Ali Abdella et al<sup>(29)</sup>. Factors associated with menstrual cycle abnormalities include BMI, weight variation, food habits, and stress were studied. Each factor is compared on the basis of regular and irregular.

When we look into BMI, 43% of females had abnormal BMI (overweight, obese, underweight), which is higher as compared with reported by Dr. Nabila Hassan Ali Abdella et al<sup>(29)</sup> (25%), and there is a statistically association between menstrual irregularities and BMI abnormalities with P value of 0.02, which is approximately similar to that reported by Dinesh Kumar Ganesan et al<sup>(30)</sup> which is also 0.05. The percentage of weight gain in females is 25% and weight loss is 10%, which is low compared to the findings by Kyung Min Ko et al (33 and 13 respectively).<sup>(24)</sup> Statistically, there is an association between weight variation and menstrual irregularities as the p value was found to be 0.0001, which is low compared to the findings by Kyung Min Ko et al (0.001).<sup>(24)</sup> It shows that most females who participated have irregular menstruation due to weight gain and loss.

When comparing the severity of the problem and food habits, our study showed that 25% need improvement in food habits, 15% of them had fair eating habits and the rest of the females had good (27%) and excellent food habits (33%). Menstrual problems were associated with the eating patterns of the participants. The P value was found to be 0.01 and statistically associated with irregularity of menstruation. A similar report was found by Kapil Amgain et al in which the p value showed 0.01<sup>(31)</sup>.

Our study revealed that 28% had low stress and stress was shown in the remaining 72% of females in their daily lives. High perceived stress shows 14% and there is a statistically association between high perceived stress and menstrual irregularities. The p value was found to be 0.0124, which is comparatively lower than reported by Nazish Rafique et al which is 39% HPS and the p value 0.05<sup>(32)</sup>. Our study shows the association between BMI, weight variation, food habits, and stress with menstrual irregularities.

## CONCLUSION

Menstrual problems are becoming more common among adolescents, and they frequently go unreported due to a lack of knowledge about their reproductive health. The prevalence of menstrual disorders such as oligomenorrhea, amenorrhea, menorrhagia, and polymenorrhagia is revealed in our study.

Females of reproductive age are more likely to experience hypomenorrhea, hypermenorrhea, irregular menstruation, dysmenorrhea, and PMS also. According to the study, abdominal pain and mood swings are more common in PMS, which can have an impact on a woman's quality of life.

Although there are numerous factors that contribute to various types of menstrual irregularities, our study focused on the relationship between BMI, weight variation, food frequency, and stress with menstrual irregularities.

BMI and weight variation are associated with menstrual irregularities, highlighting the importance of simple dietary lifestyle changes that maintain an accurate weight, thereby improving health. In terms of eating habits, the main cause of irregular menstruation is a poor diet. To improve women's quality of life, public awareness about their diet should be implemented.

Stress is a major contributor to the link between menstrual irregularity and stress. As a result, early psychological and gynaecological counselling is required to deal with all menstruation issues.

Women should become aware of their reproductive issues in order to avoid negative consequences and promote proper reproductive health. As a result, they should monitor their menstrual irregularities beginning with menarche.

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