Evaluation Of Menstrual Health In Females Of Reproductive Age

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Abstract

Background: Variations in menstrual cycle like amenorrhoea, oligomenorrhoea, polymenorrhoea, menorrhagia, hypomenorrhoea etc. occur due to lifestyle factors like obesity, junk food intake, stress, lack of physical activity, skipping breakfast & diseases like uterine fibroids, ovarian cysts, thyroid dysfunction etc. The purpose of this study is to identify menstrual irregularities and assess the impact of lifestyle factors and diseases on menstrual pattern in females of reproductive age.

Methodology: In this cross-sectional study conducted for 6 months, we collected data from 217 subjects who were females, attained menarche and of age 13-49 years. Relevant data was collected. Two different scales were used to know the extent of stress and menstrual symptoms.

Results: In our study of 217 subjects, serious percentages of subjects who were suffering from many kind of menstrual problems were obtained. Some significant positive relationships between menstrual rhythm and life style factors such as obesity (75%), high stress (58%), intake of junk food ≤3times/week (42%) and 4-7 times/week (75%),skipping breakfast (54.5%), lack of physical activity (59%) were obtained. Our results also showed a significant relationship between dysmenorrhea and intake of junk food ≤3times/week (50%) and 4-7times/week (43%), stress-moderate (53%) and high (58%). The most common diseases affecting menstrual pattern were ovarian cysts, PCOD, uterine fibroids, adenomyosis, endometrial hyperplasia etc., where high percentage of subjects were with irregular menstrual rhythm or some kind of menstrual disorder.

Conclusion: The findings indicate that life style factors and diseases directly influence menstrual health of reproductive age females. Therefore, it is recommended that they are provided with early psychological and gynecological counseling to prevent future complications.

Keywords: Fibroids, junk food, menstrual rhythm, obesity, ovarian cysts, skipping breakfast.

INTRODUCTION

The Menstrual Cycle: The hypothalamus, pituitary gland, ovaries, and uterus all contribute in maintaining the menstrual cycle. The menstrual cycle is divided into two 14-day phases, the follicular and luteal phases, describing changes in the ovary over the duration of the cycle, and the proliferative and secretory phases, describing concomitant changes in the endometrium over the same time period. During the follicular phase, a primary ovarian follicle develops as a result of the release of Follicle Stimulating Hormone (FSH) from the pituitary gland. The ovarian follicle produces estrogen, which causes proliferation of the uterine lining. At midcycle, around day 14 there is a spike of Luteinising Hormone (LH) in response to a preceding surge of estrogen, which triggers ovulation, releasing of the ovum from the follicle. The luteal phase begins upon ovulation. The follicle remnants left behind in the

ovary develop into the corpus luteum. This corpus luteum is responsible for progesterone secretion, which holds the endometrial lining in readiness to receive a fertilized ovum. If there is no fertilization the corpus luteum degenerates and levels of progesterone drop. The endometrial lining is shed off without progesterone, which is known as menstruation. [1]

2. Menstrual Irregularities:

1. Amenorrhoea means the absence of menstruation. It is a symptom but not a disease entity.

2. Oligomenorrhoea signifies infrequent, irregularly timed episodes of bleeding usually occurring at intervals of more than 35 days.

3. Polymenorrhoea indicates frequent episodes of menstruation, typically occurring at intervals of 21 days or less.

4. Menorrhagia denotes regularly timed episodes of bleeding that are excessive in quantity (80 mL) and/or flow length (5 days).

5. Metrorrhagia refers to irregularly timed bleeding episodes which are superimposed on normal cyclical bleeding.

6. Menometrorrhagia means excessive, prolonged bleeding occurring at irregularly timed and frequent intervals.

7. Hypomenorrhoea refers to regularly timed yet scanty episodes of bleeding.

8. Intermenstrual bleeding refers to bleeding (usually not excessive) occurring between menstrual cycles which are otherwise normal.

9. Precocious menstruation indicates the occurrence of menstruation before the age of 10 years. [2]

3. Factors affecting the menstrual cycle:

3.1 Stress*:* One mechanism that links stress with menstrual function occurs through dysregulation of the body's response to stress, particularly along the hypothalamic-pituitary-adrenal axis. The hypothalamus controls menstrual activity by secreting gonadotropin-releasing hormone in the pulses, which induces the regular release of both FSH and LH from the pituitary gland. FSH is essential for follicular maturation while LH, which activates the secretion of estradiol by the maturing follicle, is essential for ovulation and helps to sustain corpus luteum after ovulation. If this cycle is disturbed, maintenance of normal menstrual function temporarily stops. The extent and duration of cessation relies on the continuation of the initiating stressor. [3]

3.2 Intake of junk food: Most Indian foods are prepared by deep frying in especially transfat fats and saturated fat. Intake of fast food results in a higher proportion of calories being obtained from total and saturated fats. In addition, the fast food also has a poor micronutrient quality. [4] Junk foods being rich in saturated fatty acids, can interfere with progesterone metabolism in the luteal phase of the menstrual cycle and cause premenstrual symptoms. Junk foods also lack micronutrients, such as vitamin B6, calcium, magnesium and potassium, and can also be responsible for premenstrual symptoms. [5]

3.3 Obesity**:** There are many known mechanisms for the effect of adipose tissue on ovulation and menstrual cycle: (1) adipose tissue transforms androgens to estrogen via the aromatization in the breast, uterus, abdomen, and fatty marrow of long bones; (2) body weight affects the course of the synthesis of estrogen, with very lean women developing a less potent inactivated form of estrogen (2-hydroxylated form) and obese women produce more active forms of estrogen due to activated estrogenic activity (16-hydroxylated form); (3) obese women have diminished capacity for estrogen binding with Sex Hormone Binding Globulin (SHBG) which inactivates estrogen and results in an increased levels of free serum estradiol; and (4) adipose tissue stores steroid hormones in obese women. In addition, central effects on hypothalamic pituitary axis also control ovarian function. [6]

3.4 Lack of physical activity: Regular physical activity helps in maintaining an ideal body weight, improves insulin sensitivity, improves BMR and endorphin release, which in turn helps to regularize the menstrual cycle, improves PCOD and hypothyroidism, minimize PMS and overall feeling of being healthy. [7] Less

physical activity is most closely correlated with irregular cycles. Women who are both obese and sedentary have a higher incidence of irregular cycles relative to women of normal weight who do moderate exercise. Excess adipose tissue can influence levels of androgens and estrogens in many ways: it can provide a reservoir for lipid-soluble steroids, and it can influence the relationship between hormones and sex-hormone-binding globulin. [8]

3.5 Skipping breakfast: Several studies have documented correlations between breakfast skipping and tiredness at noon, deteriorating memory and higher BMI, as well as increased prevalence of chronic diseases related to obesity, total energy deficiency, vitamins and minerals, increased risk of central adiposity, and the risk of insulin resistance and cardiometabolic disorders. Reports stated that the reasons behind missing breakfast were lack of time, inability to cook, lack of appetite, eating late at night, weight control, as a habit etc. Skipping breakfast has a greater impact on both BMI and waist circumference. Regardless of the cultural diversity, a strong correlation between missing breakfast, overweight and obesity is observed worldwide. Skipping meals can be related to excess body weight, insulin resistance and elevated concentrations of fasting lipids among adults. Breakfast has a direct effect on blood glucose levels resulting in a direct effect on cognitive performance. [9]

3.6 Uterine Fibroids: The most common tumours found in women are uterine fibroids, or leiomyomata. Menorrhagia can occur when submucous fibroids expand the surface of the uterine cavity. Sometimes, submucous fibroids aren't present but there is severe uterine bleeding. The increased bleeding may be due to either increased uterine vascularity or anovulatory cycles. Using radiographic methods, Farrer-Brown et al showed that fibroids that occur at different locations in the uterus may cause congestion and dilation of endometrial venous plexuses by obstructing veins in the myometrium. This resulting obstruction may cause endometrial venule ectasia, which may lead to increased uterine bleeding. These events

may be dependent on steroid or peptide growth factor. Intermenstrual bleeding can occur when a fibroid polyp is necrosed. [10]

3.7 Adenomyosis: Adenomyosis is a common disorder characterized by the presence endometrial glands and stroma within the uterine myometrium, usually surrounded by hypertrophied myometrial smooth muscle. HMB, with other symptoms and signs including dysmenorrhea, an swollen tender uterus, dyspareunia, and metrorrhagia, is the most common symptom. Adenomyosis can impair normal myometrial contractility and this may lead to the HMB. Superficial adenomyosis with associated myometrial hypertrophy can result in compression of the overlying endometrium, leading to severe bleeding similar to the effects of fibroids resulting in HMB. Adenomyosis foci have been reported to express higher ER levels indicating a high estrogen sensitivity in adenomyotic lesions resulting in mitosis. Adenomyosis tissue also expresses aromatase, resulting in local estrogen development which can lead to further growth stimulation. [11]

3.8 Thyroid dysfunction: A network of gonadotropins (e.g., luteinizing hormone (LH) and follicle-stimulating hormone (FSH)) and sex steroid hormones (e.g., estrogens and progesterone), main components of the hypothalamic-pituitary-gonadal axis regulates the menstrual cycle. This system is closely linked to the hypothalamic-pituitary-thyroid axis which regulates thyroid function. The relationship between thyroid function and female physiology of reproduction is complex. T4 and T3 in particular have a strong relationship to urinary estrogen and metabolite levels of progesterone during the menstrual cycle. This indicates that thyroid hormones may have effects on the female reproductive system even within normal ranges, possibly via mechanisms involving gonadotropins and steroid hormones, especially estrogens and progesterone. [12]

3.9 Ovarian cysts: Endocrine dysfunctions, particularly inhibition of luteotropic secretion (LH) from the pituitary, are considered a major cause of the development of ovarian cysts. Disturbances in the pulsatile GnRH secretion

from the hypothalamus can also cause dysfunction in proper LH secretion and, subsequently, to a decrease in pre-ovulatory LH discharge. Dysfunctions of the endocrine system cause abnormalities in the growth of ovarian follicles, suppression of ovulation and ultimately formation of ovarian cysts. A vicious pathogenic cycle occurs, through negative hormonal feedback on the ovary-pituitary-hypothalamus axis. [13]

3.10 Cervicitis: Acute cervicitis is typically associated with infection with gonococci or puerperium. Many causes include an infection with the primary chancre and herpes simplex. Chronic cervicitis is also observed, and is the primary cause of leucorrhea. The most common responsible organisms are the usual mixed vaginal flora which contains streptococci, enterococci, staphylococci. Certain species include gonococci, Trichomonas vaginalis, herpes simplex and Candida albicans. The predisposing factors include sexual activity, estrogen excess or deficiency, childbirth trauma and instrumentation.

3.11 Endometrial hyperplasia: Exaggerated development of glandular and stromal tissues characterizes endometrial hyperplasia. Prolonged, frequent and recurrent uterine bleeding is commonly associated with this. Hyperplasia results from extended, unopposed estrogenic stimulation without any progestational activity. Such disorders include Stein-Leventhal syndrome, excessive estrogen administration. Owing to the presence of cellular atypia which is closely related to endometrial carcinoma, endometrial hyperplasia is clinically important. [14]

METHODOLOGY

This study is a cross-sectional study conducted for 6 months among female patients visiting Chalmeda Ananda Rao Institute of Medical Sciences, Bommakal, Karimnagar and female students of Vaageswari College of Pharmacy, Thimmapur, Karimnagar and female students from schools nearby our work site in Karimnagar.

1. Study Period: This study was conducted for 6 months.

2. Study Criteria:

Inclusion Criteria-

Females who have attained menarche and of age 13-49 years.

Exclusion Criteria-

1. Pregnant women.

2. Lactating mothers.

3. Women who have attained menopause.

4. Women using oral contraceptives because oral contraceptives regulate cycles and establish cycles of timed frequency.

Data Collection:

The following data was obtained from each subject:

1. Demographics

2. Body Mass Index (BMI), Waist Circumference.

3. Diagnosis

4. Relevant histories

5. Laboratory data like CBP, Thyroid profile, USG etc.

6. Symptoms during menstrual cycle

7. Parameters like age at menarche, duration of menstruation, frequency of menstruation, menstrual rhythm, blood loss etc.,

8. Factors like intake of junk food, skipping breakfast, physical activity, stress.

All the data were documented in a suitably designed data collection form developed for the study.

Study Procedure: Female patients visiting inpatient and outpatient settings at Chalmeda Ananda Rao Institute of Medical Sciences and female students of Vaageswari College of Pharmacy, from schools nearby our work site were reviewed and the subjects who met the inclusion criteria were enrolled. A suitable data collection form was designed to collect, document and analyze the data. This form included the provision for information about demographic details, menstrual characteristics (age at menarche, duration and frequency of menstrual cycle etc.), lifestyle factors (intake of junk food, physical activity, stress, skipping breakfast, obesity), patient

data (complaints, diagnosis, laboratory data), symptoms experienced during menstrual cycles. Menstrual Symptom Questionnaire (MSQ) was used to assess the menstrual symptoms and Perceived Stress Scale-10 (PSS-10) was used to know the extent of stress.

Study Methodology: Data was collected, documented in the data collection forms and entered into Microsoft Excel and analysed using GraphPad Prism 8.0.1 (244)

RESULTS

1. Chi square test was used to demonstrate the significance of risk factors like stress, skipping breakfast, intake of junk food and BMI.

2. Pearson's correlation coefficient was used to show the relation between intake of junk food and dysmenorrhea.

Age Distribution:

Table 1: Summarization of subjects based on age

Age (in years)	No. of subjects	Age group(%)	Mean age ± SD
13-20	142	66	15.67 ± 2.42
21-30	53	25	23.72 ± 2.87
31-40	18	8	36 ± 3.21
41-49	03	1	46.33 ± 1.52

Figure 1: Summarization of subjects based on age
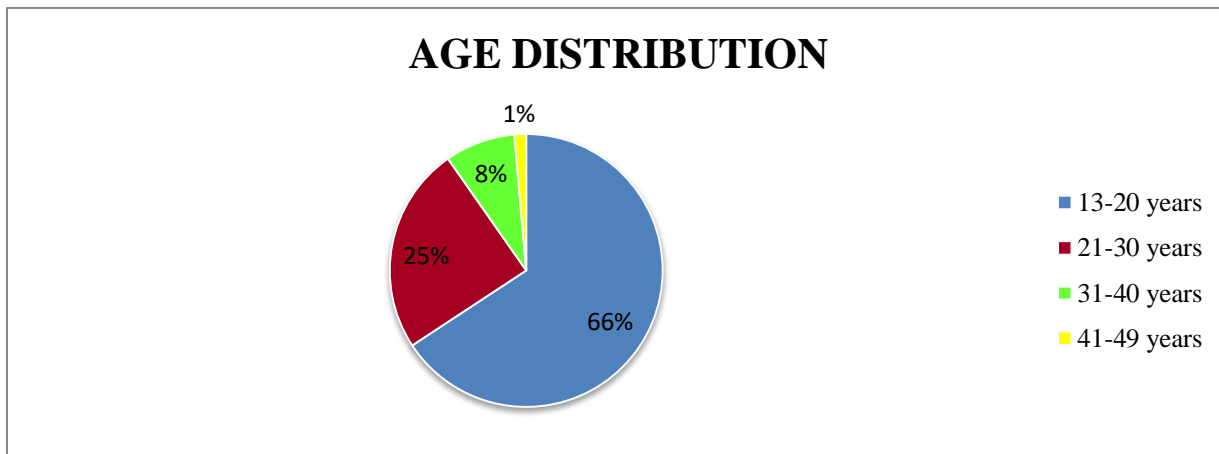
Out of the 217 subjects involved in the study, subjects of age 13-20 years are 66%, 21-30 years are 25%, 31-40 years are 8%, 41-49 years are 1%. Majority of the subjects were 13-20 years with a mean age of 15.67 ± 2.42.
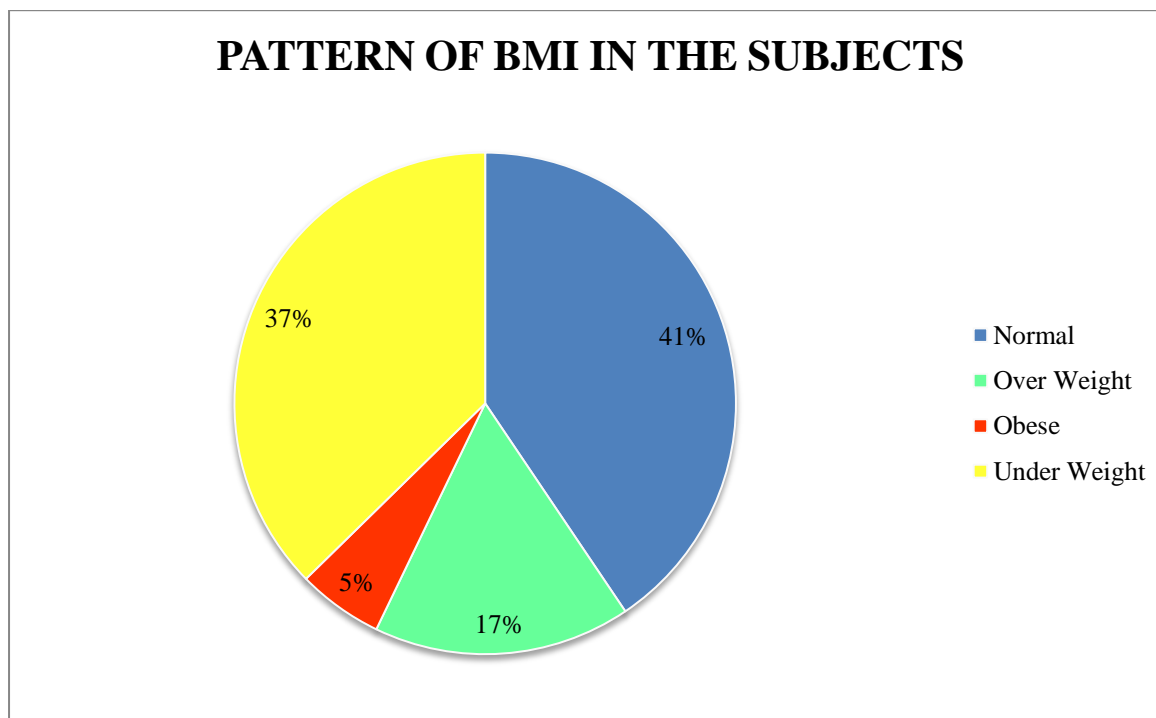
BMI Distribution:

Table 2: BMI distribution in the subjects

Category according to BMI	No. of subjects(N=217)	Percentage (%)
Normal	88	41
Under Weight	81	37

Over Weight	36	17
Obese	12	5

Figure 2: BMI distribution in the subjects


PATTERN OF BMI IN THE SUBJECTS

Among all the participants of the study, 41% of them were normal, 37% were under weight, 17% were overweight and 5% were obese.

BMI and Menstrual Rhythm:

Table 3: Association between BMI and menstrual rhythm

BMI Category	Total no. of Subjects(N=217)	No. of subjects with irregular menstrual rhythm(%)
Normal	88	42 (47.7)
Under weight	81	33 (40.7)
Over weight	36	27 (75)
Obese	12	9 (75)

**Figure 3: Association between BMI and menstrual rhythm**
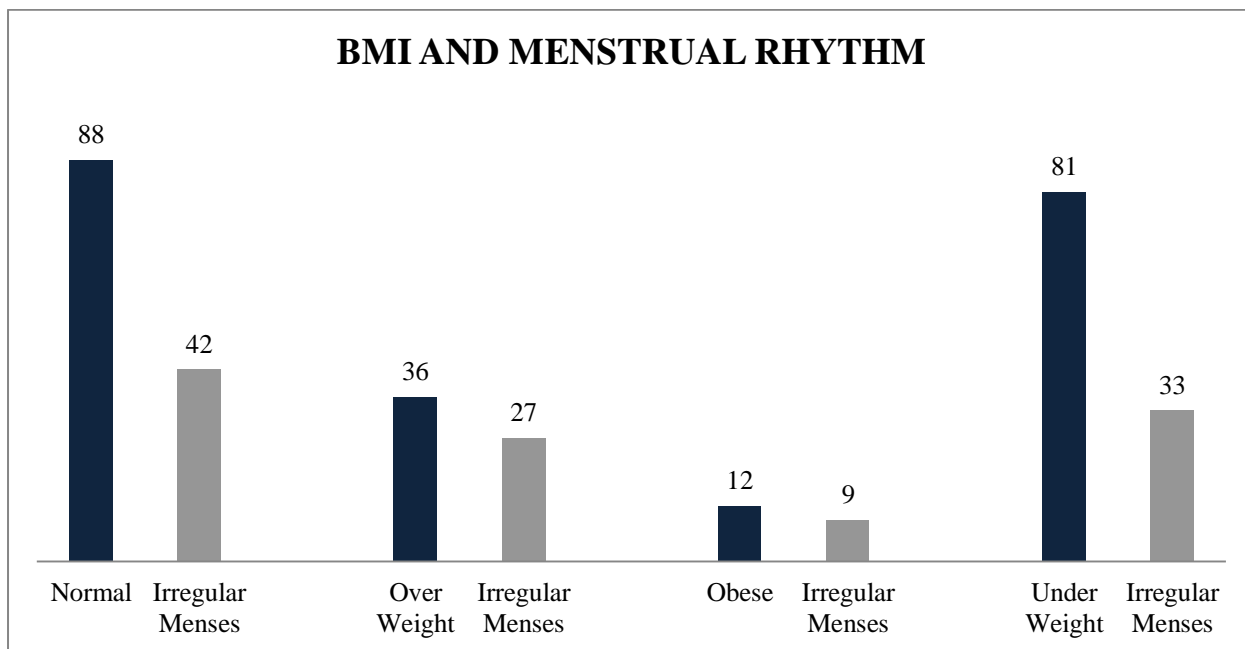
Among the subjects of the study, 40.7% of underweight subjects were having irregular menstrual rhythm, 75% of overweight participants were having irregular menstrual rhythm and 75% of obese subjects were experiencing irregular menstrual rhythm. The obtained p value was 0.0019. A significant association (p<0.01) was found between BMI and menstrual rhythm using Chi-square test.

Skipping Breakfast and Menstrual Rhythm:

Table 4: Association between skipping breakfast and menstrual rhythm

Skipping Breakfast	Total no. of subjects (N=217)	No. of subjects with irregular menstrual rhythm(%)
Yes	44	24 (54.5)
No	77	31 (40.2)
Sometimes	96	56 (58.3)

Figure 4: Association between skipping breakfast and menstrual rhythm
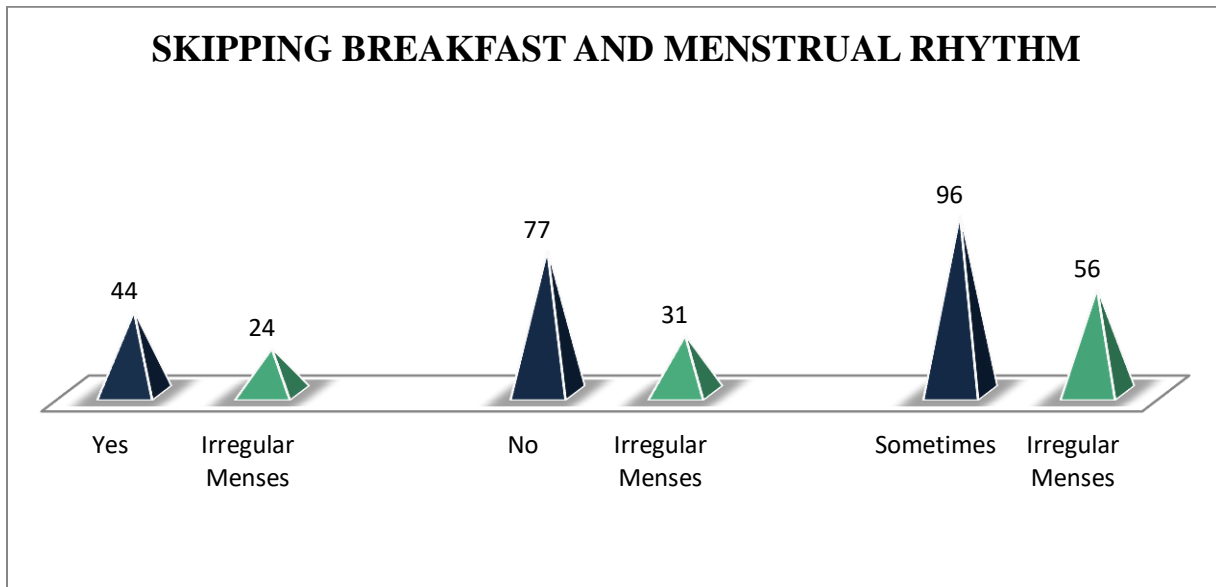

SKIPPING BREAKFAST AND MENSTRUAL RHYTHM

Out of the 44 participants who skipped breakfast daily, 54.5% had irregular menstrual rhythm and among the 96 participants who skipped breakfast sometimes, 58.3% had irregular menstrual rhythm.

Physical Activity and Menstrual Rhythm:

Table 5: Association between physical activity and menstrual rhythm

Physical activity	Total no. of subjects (n=217)	No. of subjects with irregular menstrual rhythm(%)
Yes	134	62(46.3)
No	83	49(59)

Figure 5: Association between physical activity and menstrual rhythm

PHYSICAL ACTIVITY AND MENSTRUAL RHYTHM

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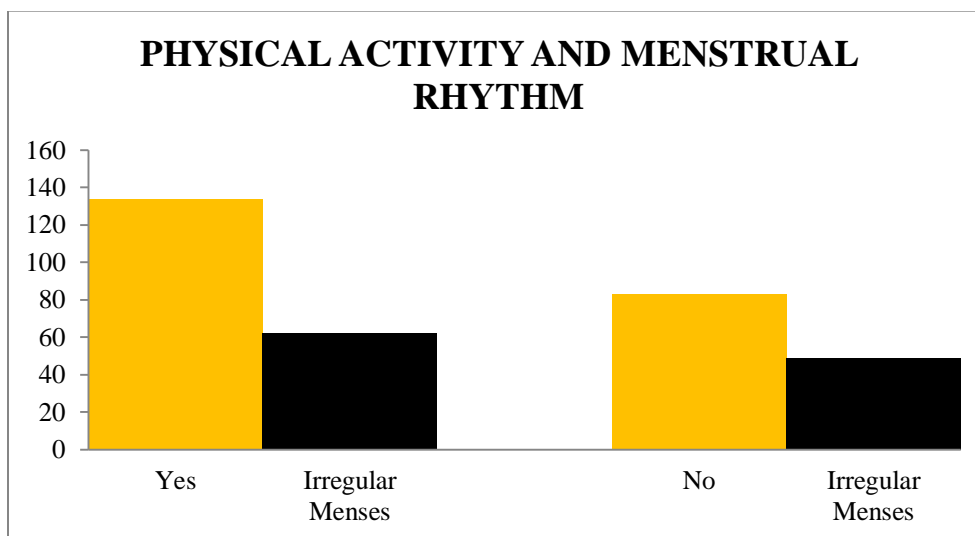
In the 134 subjects who were having physical activity, 86.7% of the subjects had regular menstrual cycle. Among the 83 subjects who were not having any kind of physical activity, 59% were experiencing irregular menstruation.

Stress and Menstrual Rhythm:

Table 6: Association between stress and menstrual rhythm

Level of Perceived Stress	Total no. of Subjects(n=217)	No. of subjects with irregular menstrual rhythm(%)
Low	35	15 (42.6)
Moderate	158	82 (51.9)
High	24	14 (58.3)

Figure 6: Association between stress and menstrual rhythm
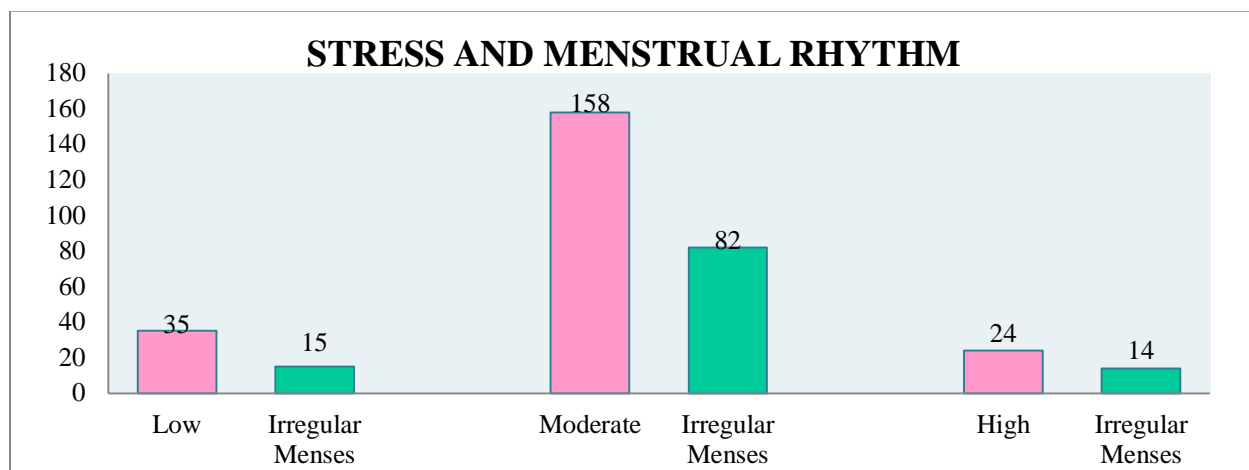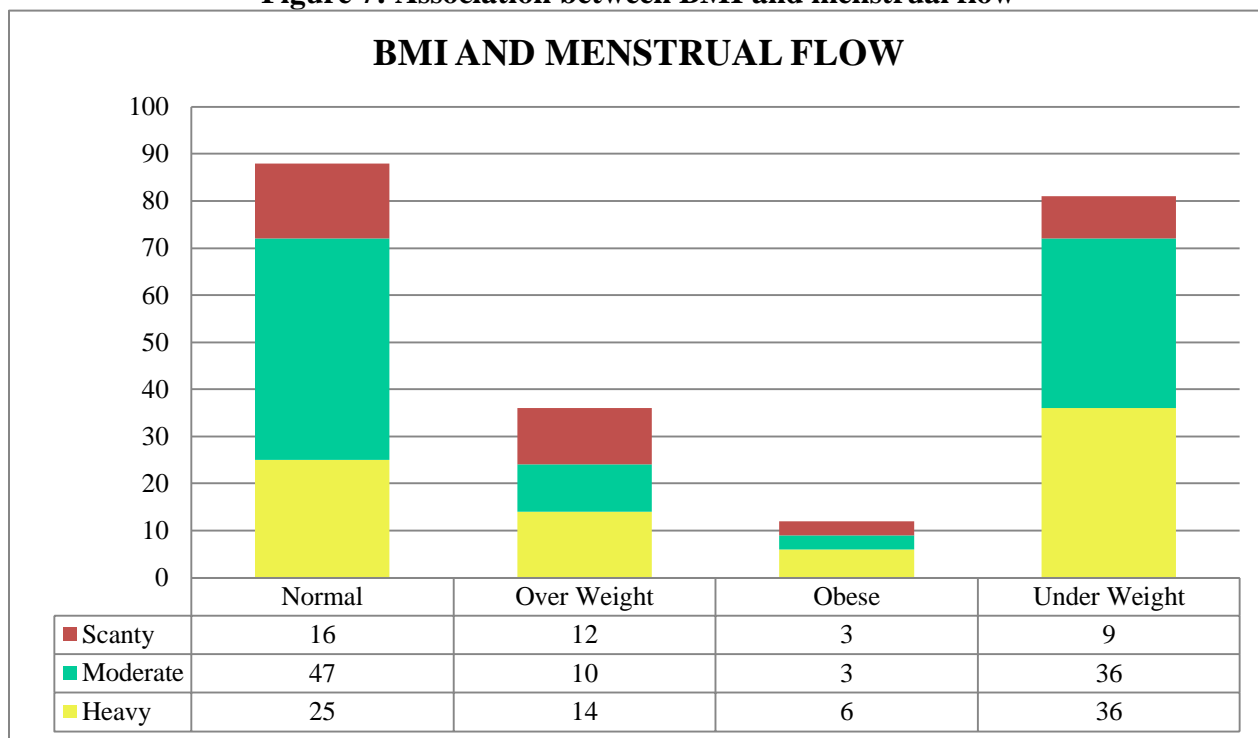

Out of the 158 subjects having moderate levels of perceived stress, 51.9% were experiencing irregular menstrual rhythm. Of the 24 subjects having high levels of perceived stress, 58.3% were experiencing irregula menstruation.

BMI and Menstrual Flow:

Table 7: Association between BMI and menstrual flow

BMI Category	No. of subjects with heavy menstrual flow	No. of subjects with moderate menstrual flow	No. of subjects with scanty menstrual flow
Normal	25	47	16
Over weight	14	10	12
Under weight	36	36	9
Obese	6	3	3

Figure 7: Association between BMI and menstrual flow

BMI AND MENSTRUAL FLOW

|	Normal	Over Weight	Obese	Under Weight
■ Scanty	16	12	3	9
■ Moderate	47	10	3	36
■ Heavy	25	14	6	36

Out of the 36 subjects who were over weight, 38.9% were having heavy menstrual flow. Of the 12 subjects who were obese, 50% were having heavy menstrual flow. The obtained p value was 0.0176. A statistically significant relationship ($p < 0.05$) was found between BMI and menstrual flow when analysed using Chi-square test.

Stress and Dysmenorrhea:

Table 8: Association between stress and dysmenorrhea

Level of Perceived Stress	Total no. of Subjects(n=217)	No. of subjects with dysmenorrhea (%)
Low	35	14 (40)
Moderate	158	84 (53.7)
High	24	14 (58.3)

**Figure 8: Association between stress and dysmenorrhea**
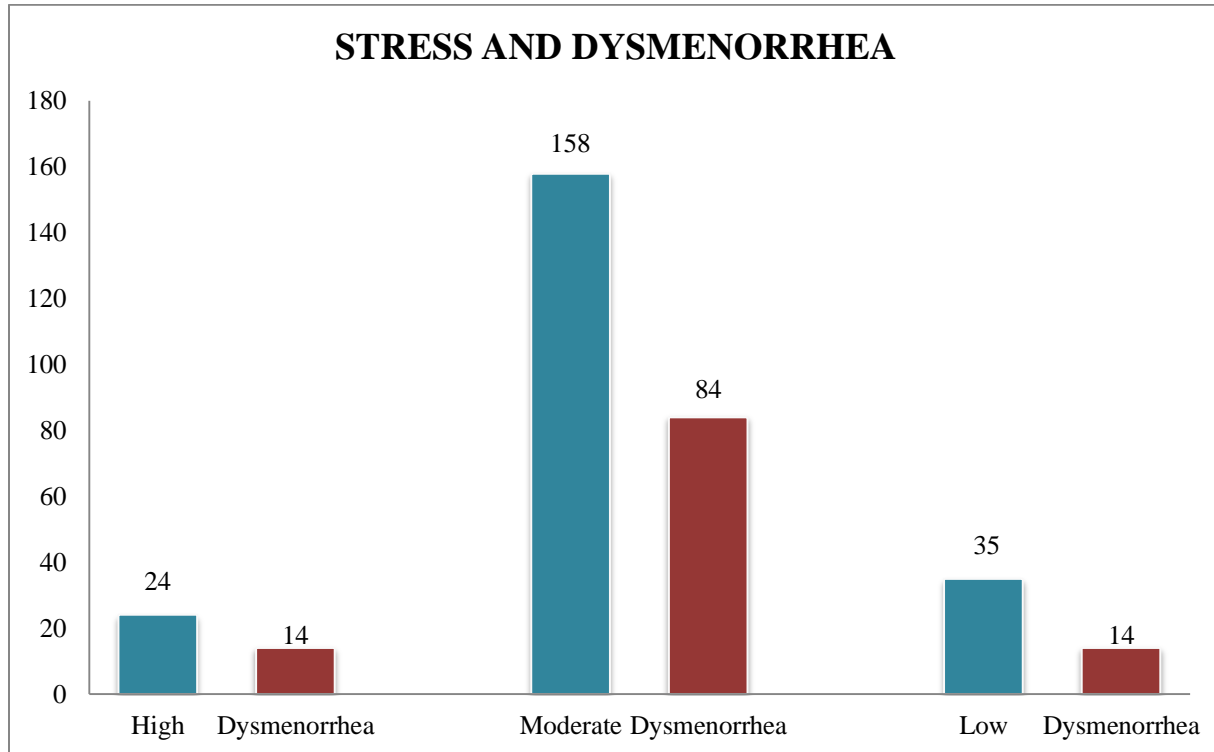
Among the 24 subjects perceiving high stress, 58.3% were experiencing dysmenorrhea and out of the 158 members having moderate stress, 53.7% reported dysmenorrhea. A statistically significant association (p=0.0376) was found between stress and dysmenorrhea when analysed using Chi-square test (p<0.05).

Abdominal fat and Oligomenorrhea:

Table 9: Association between abdominal fat and oligomenorrhea

Distribution of central fat	Total no. of Subjects(n=217)	No. of subjects with oligomenorrhea(%)
Normal central fat	147	40 (27.2)
Moderate central fat	51	19 (37.2)
High central fat	19	6 (31.6)

**Figure 9: Association between abdominal fat and oligomenorrhea**
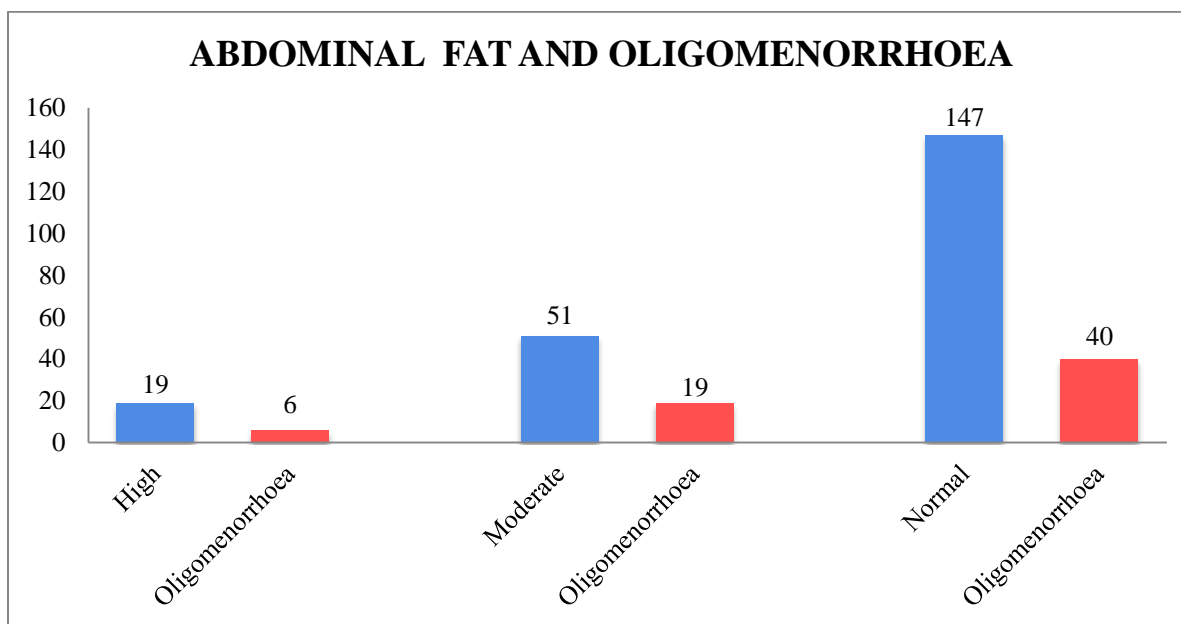
Among the 51 subjects with moderate central fat distribution, 37.2% were having oligomenorrhea. Out of the 19 subjects with high central fat distribution, 31.6% were having oligomenorrhea.

Intake of Junk food and Menstrual Rhythm:

Table 10: Association between intake of junk food and menstrual rhythm

Frequency of intake of junk food	Total no. of Subjects(n=217)	No. of subjects with irregular menstrual rhythm(%)
No	31	18 (58)
≤3 times/week	142	60 (42.2)
4-7 times/week	44	33 (75)

Figure 10: Association between intake of junk food and menstrual rhythm
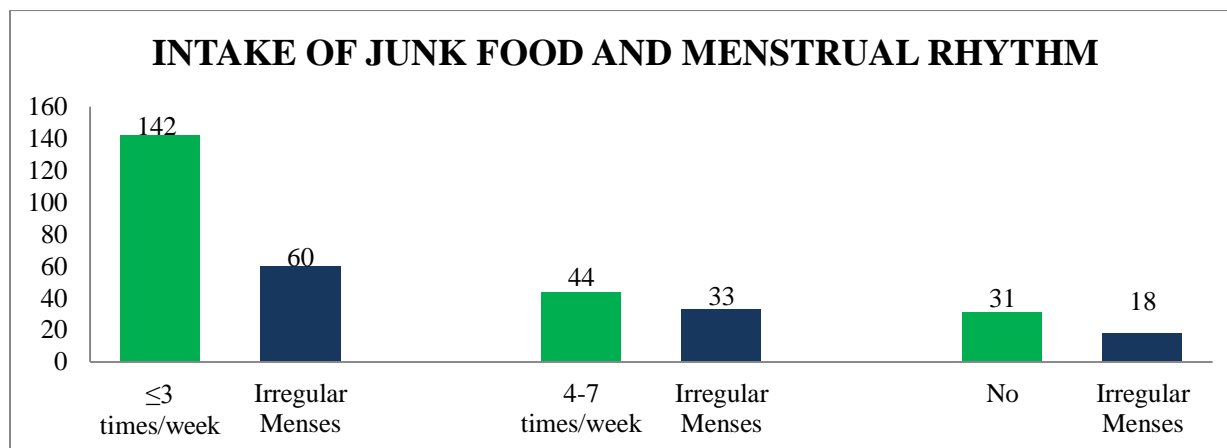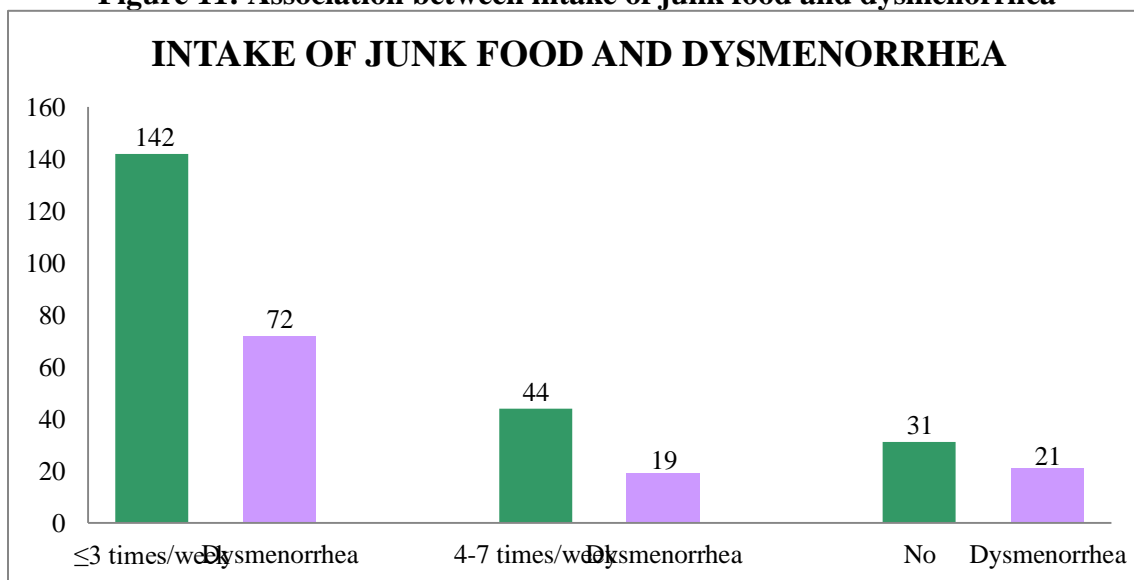
Of the 44 subjects who consumed junk food 4-7 times/week, 75% of them were having irregular menstrual cycles. Among the 142 subjects who consumed junk food ≤3 times/week, 42.2% of them reported irregular menstrual cycles. The p value was found to be 0.0005. A significant association ($p<0.01$) was found between frequency of intake of junk food and irregular menstrual rhythm using Chi-square test.

Intake of Junk Food and Dysmenorrhea:

Table 11: Association between intake of junk food and dysmenorrhea

Frequency of intake of junk food	Total no. of Subjects(n=217)	No. of subjects with dysmenorrhea (%)
No	31	21 (67.7)
≤3 times/week	142	72 (50.7)
4-7 times/week	31	19 (43.2)

Figure 11: Association between intake of junk food and dysmenorrhea

Among the 31 subjects who consumed junk food 4-7 times/week, 43.2% reported having dysmenorrhea. Out of 142 subjects who consumed junk food ≤3 times/week, 50.7% reported dysmenorrhea. A statistically significant correlation ($p<0.05$) was found between frequency of consumption of junk food and dysmenorrhea using Pearson's correlation coefficient with an 'r' value of 0.137.
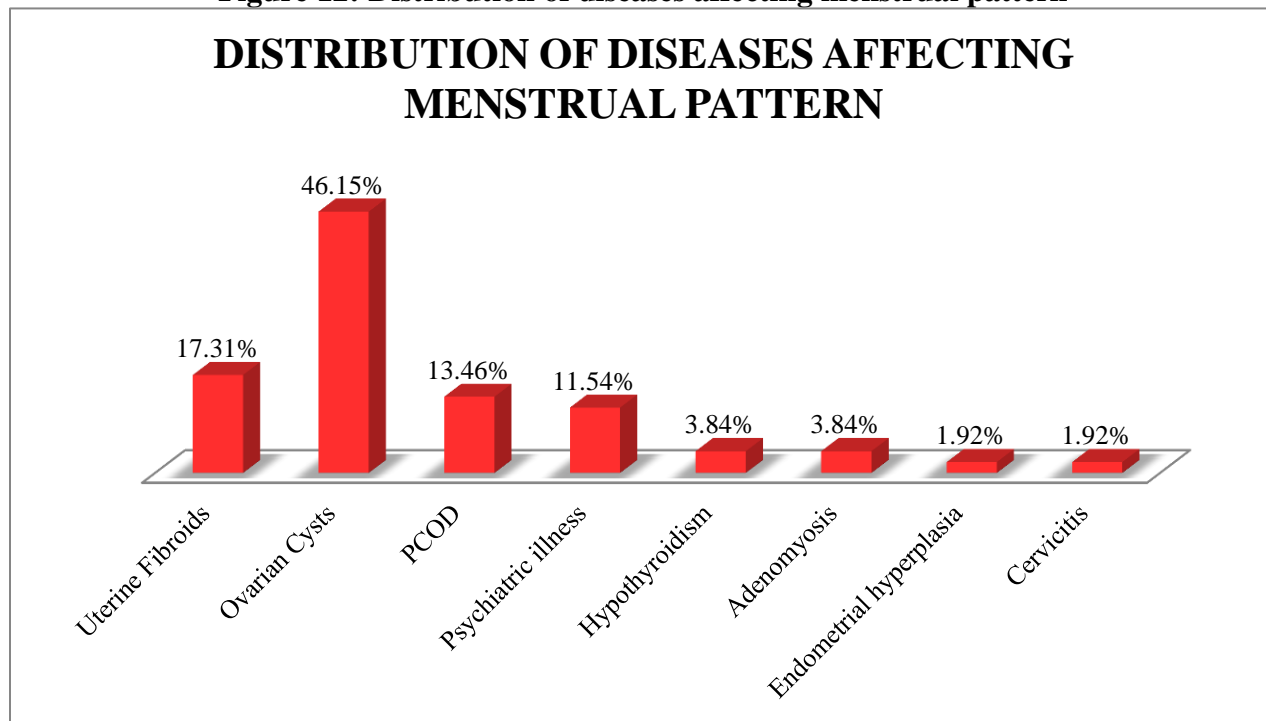
Diseases and Menstrual Pattern:

Table 12: Distribution of diseases affecting menstrual pattern

Disease	No. of patients	Percentage (%)
Uterine fibroids	09	17.3
Ovarian cysts	24	46.1
PCOD	07	13.5
Psychiatric illness	06	11.5

Hypothyroidism	02	3.8
Adenomyosis	02	3.8
Endometrial hyperplasia	01	1.9
Cervicitis	01	1.9

Figure 12: Distribution of diseases affecting menstrual pattern

The most commonly seen disease which was affecting menstrual pattern was ovarian cysts, diagnosed in 46.1% patients. The least commonly occurring diseases affecting menstrual pattern were endometrial hyperplasia and cervicitis, seen in 1.9% patients.

Diseases and Menstrual Pattern:

Table 13: Diseases affecting menstrual pattern and associated menstrual problem

Disease affecting menstrual pattern	No. of patients diagnosed with the disease	Most common menstrual problem in the patients (no.)	Percentage (%)
Ovarian cysts	24	Oligomenorrhea (10)	41.6
Uterine fibroids	09	Menorrhagia (05)	55.5
PCOD	07	Amenorrhea (05)	71.4
Psychiatric illness	06	Amenorrhea (05)	83.3
Hypothyroidism	02	Amenorrhea (01), Oligomenorrhea (01)	50 50

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Adenomyosis	02	Menorrhagia (02)	100
Endometrial hyperplasia	01	Amenorrhea (01)	100
Cervicitis	01	Menorrhagia (01)	100

Figure 13: Diseases affecting menstrual pattern and associated menstrual problem
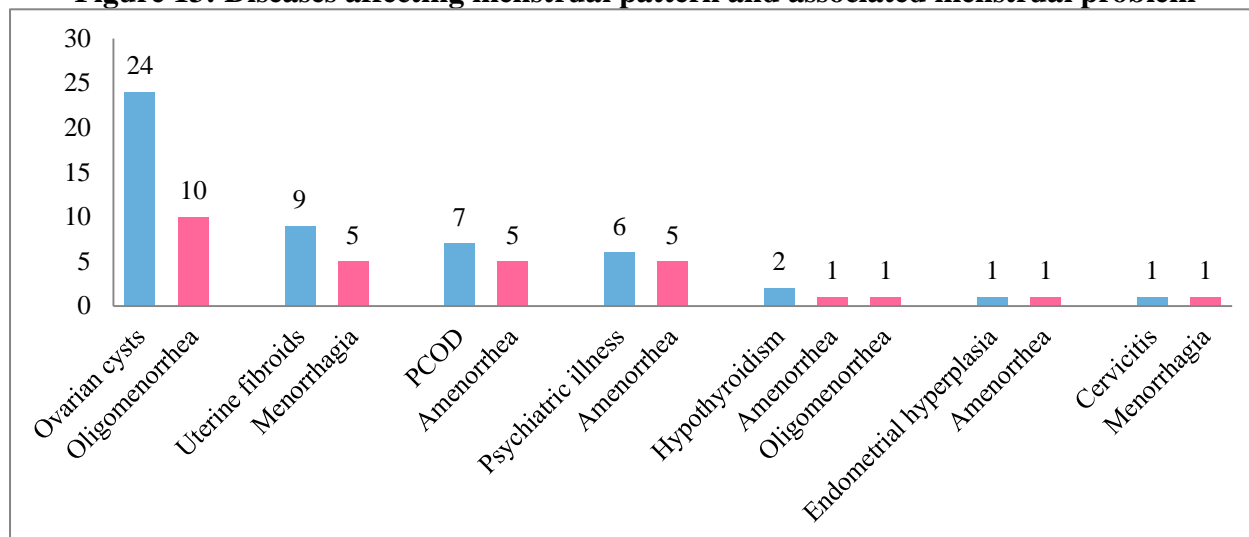
Among all the 24 patients diagnosed with ovarian cysts, 41.6% of them reported oligomenorrhea. Of the 9 patients with uterine fibroids, 55.5% presented with menorrhagia. Among the 07 patients diagnosed with PCOD, 71.4% were having amenorrhea. Out of the 06 patients with psychiatric illnesses, 83.3% were having amenorrhea. Menorrhagia was seen in all the patients with adenomyosis and cervicitis.

Evaluation of Menstrual Symptoms using Menstrual Symptom Questionnaire:

Table 14: Occurrence of menstrual symptoms

SYMPTOM	No. of subjects reporting the symptom	Percentage (%)
Irritability	90	41.5
Cramps	81	37.3
Depressed mood	41	18.9
Abd pain 1 day before	46	21.2
Tiredness	68	31.3
Prescription drug	5	2.3
Weakness	75	34.6
Tense and nervous	24	11
Diarrhea	8	3.7
Backache before period	68	31.3
Pain killer	7	3.2
Breast tenderness	20	9.2
LBA, thighs pain	90	41.5

Weight gain	13	5.9
Constipation	19	8.7
Intermittent pain	79	36.4
Continous dull aching	59	27.1
Abd pain >1 day	40	18.4
Backache on first day	84	38.7
Bloating	15	6.9
Nausea	21	9.7
Headache	21	9.7

Figure 14: Occurence of menstrual symptoms
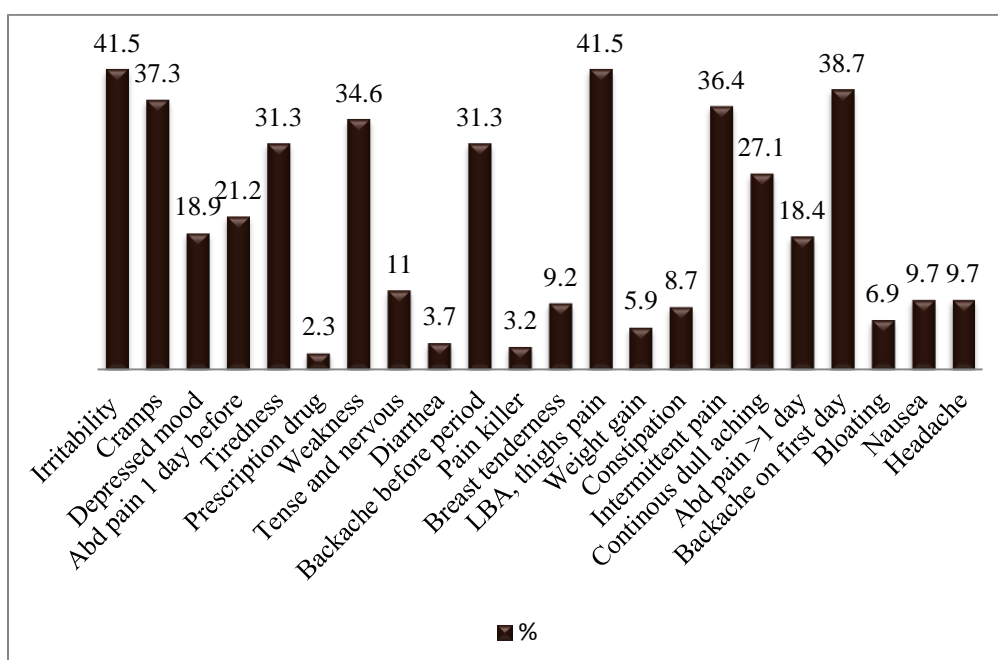
In our study the most commonly reported symptoms were irritable mood, lower back ache and tenderness and pain in thighs (41.5%), followed by backache on first day (38.7%), cramps on the first day (37.3%), intermittent pain (36.4%), weakness during menstruation (34.6%). The least commonly reported symptoms were diarrhea (3.7%), weight gain (5.9%), abdominal bloating (6.9%). Among the subjects of the study, 2.3% of them reported that they take a prescription drug for the pain during menstruation and 3.2% reported taking a non-prescription drug for the pain during menstruation.

DISCUSSION

In the present study, data was collected from 217 subjects whose age was between 13-49 years with a mean of 19.79 ±7.3. Out of the 217 subjects involved in the study, 66% (n=142) of study subjects were of age 13-20, 25% (n=53) of study subjects were 21-30 years, 8% (n=18) of subjects were 31-40 years, 1% (n=3) of study subjects were of age 41-49 years. Majority of the subjects were 13-20 years with a mean age of 15.67 ± 2.42.

Among all the participants of the study, 41% of them were normal, 37% were under weight, 17% were overweight and 5% were obese. Among the subjects of the study, 40.7% (n=33) of underweight subjects were having irregular menstrual rhythm, 75% (n=27) of overweight participants were having irregular menstrual rhythm and 75% (n=9) of obese subjects were experiencing irregular menstrual rhythm. Our results were consistent with the findings of Jinju Bae

et al. who found that women who were overweight (BMI =25–30) or obese (BMI ≥30) have high possibility of developing irregular menstruation. [15]

Out of the 44 participants who skipped breakfast daily, 54.5% had irregular menstrual rhythm and among the 96 participants who skipped breakfast sometimes, 58.3% had irregular menstrual rhythm. This is found to be consistent with the findings of Hayam Fathy A. Eittah where 300 subjects were included and an increase in the percentage of menstrual regularity in group one who had breakfast (89.1%) than group two who skipped breakfast (83.9%) was found. [16] Our results were also in agreement with the findings of the study conducted by Tomoko Fujiwara and Rieko Nakata in which the incidence of irregular menses was higher in the population that skipped breakfast. [17]

Among all the 217 subjects involved in the study, 61.7% (n=134) were physically active and 86.7% of them had regular menstrual cycle. 38.2% (n=83) of the subjects were not having physical activity and among them, 59% (n=49) were reporting irregular menstrual rhythm. These results were consistent with the study conducted by Audhi lakshmi S in which 151 subjects were included and 21.2% respondents did regular exercise out of which 68.8% subjects had regular menstrual cycle. 78.8% respondents did no physical exercise out of which 26.9% had irregular menstrual cycle. [7]

Out of the 158 subjects having moderate levels of perceived stress, 51.9% (n=82) were experiencing irregular menstrual rhythm. Of the 24 subjects having high levels of perceived stress, 58.3% (n=14) were experiencing irregular menstruation. These findings were consistent with the study of Nazish Rafique, Mona H. Al-Sheikh where 738 females were included and this study identified that 39% of participants had high perceived stress, and 91.9% were suffering from some type of menstrual problem. [18]

In our study, among the 24 subjects perceiving high stress, 58.3% (n=14) were experiencing dysmenorrhea and out of the 158 members having moderate stress, 53.7% (n=84) reported dysmenorrhea. This was consistent with the findings of Nazish Rafique, Mona H. Al-Sheikh where 738 females were included in the study and the

participants with high perceived stress showed a significant and positive association with dysmenorrhea. [18]

In the current study, out of the 36 subjects who were overweight, 38.9% (n=36) were having heavy menstrual flow. Of the 12 subjects who were obese, 50% (n=6) were having heavy menstrual flow. These results were consistent with the study performed by Dr. Nabila Hassan Ali Abdella et al. in which almost half of the studied adolescents were overweight and obese (33.9% and 12.0% respectively) with a mean BMI 25.2±3.5. Students who were obese were more likely to have an excessive amount of blood flow and long interval between the menstrual periods (14.3% and 28.6% respectively), compared to those who had normal BMI (13.1% and 20.7% respectively). [19]

Among the 51 subjects with moderate central fat distribution, 37.2% were having oligomenorrhea. Out of the 19 subjects with high central fat distribution, 31.6% were having oligomenorrhea. This is consistent with the findings of G. De Pergola et al. This study revealed that women with oligomenorrhea had higher waist circumference, BMI, insulin levels, and HOMAIR than women with normal weight. [20]

Of the 44 subjects who consumed junk food 4-7 times/week, 75% (n=33) of them were having irregular menstrual cycles. Among the 142 subjects who consumed junk food ≤3 times/week, 42.2% (n=60) of them reported irregular menstrual cycles. Among the 31 subjects who consumed junk food 4-7 times/week, 43.2% reported having dysmenorrhea. Out of 142 subjects who consumed junk food ≤3 times/week, 50.7% reported dysmenorrhea. Our results were homogenous with the study conducted by Purushottam Pramanik and Arunima Dhar. [4]

The most commonly seen disease which was affecting menstrual pattern was ovarian cysts, diagnosed in 46.1% patients. The least commonly occurring diseases affecting menstrual pattern were endometrial hyperplasia and cervicitis, seen in 1.9% patients. Among all the 24 patients diagnosed with ovarian cysts, 41.6% of them reported oligomenorrhea. Of the 9 patients with uterine fibroids, 55.5% presented with menorrhagia. Among the 07 patients diagnosed with PCOD, 71.4% were having amenorrhea. Out of the 06 patients with psychiatric illnesses, 83.3% were having amenorrhea.

Menorrhagia was seen in all the patients with adenomyosis and cervicitis.

In our study the most commonly reported symptoms were irritable mood and lower back ache, tenderness and pain in thighs (41.5%), followed by backache on first day (38.7%), cramps on the first day (37.3%), intermittent pain (36.4%), weakness during menstruation (34.6%). The least commonly reported symptoms were diarrhea (3.7%), weight gain (5.9%), abdominal bloating (6.9%). Among the subjects of the study, 2.3% of them reported that they take a prescription drug for the pain during menstruation and 3.2% reported taking a non-prescription drug for the pain during menstruation.

CONCLUSION

Menstrual health is pivotal to women's sexual and reproductive health. Menstrual problems are the most conventional gynaecological disorders in females of reproductive age. Even though not life threatening, menstrual problems can influence their daily life, work efficiency and performance. This is also a significant reason of absenteeisms in colleges, schools and business firms.

Our study demonstrated that irregular menstrual cycle had a significant relationship with BMI and also affected by central fat distribution which was estimated by waist circumference. Our study concluded that the prevalence of menstrual problems and stress is quite high in females of reproductive age along with dysmenorrhea. Based on the study findings, there was an increase in percentage of menstrual irregularity in the subjects who skipped breakfast than the other subjects who had regular breakfast.

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Significant correlation was noted between frequency of junk food intake with menstrual rhythm and dysmenorrhea. Our results also suggest that physical activity is directly affecting menstrual health in females of reproductive health.

Thus, decreasing intake of junk food, promoting healthy eating habits, modifying life style patterns like doing regular physical activity, weight control, stress management are beneficial components in ameliorating reproductive health of women. Menstrual morbidities constitute an important unmet section of reproductive health services for women and attention should be given to inclusion of diagnosis and treatment of menstrual complaints within reproductive health care programs.

ABBREVIATIONS

BMI: Body Mass Index

BMR: Basal Metabolic Rate

ER: Estrogen Receptor

FSH: Follicle Stimulating Hormone

GnRH: Gonadotropin Releasing Hormone

HMB: Heavy Menstrual Bleeding

LH: Luteinizing Hormone

MSQ: Menstrual Symptom Questionnaire

PCOD: Polycystic Ovarian Disease

PMS: Premenstrual Syndrome

PSS: Perceived Stress Scale

SHBG: Sex Hormone-Binding Globulin

T3: Triiodothyronine

T4: Thyroxine

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