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Relation of Anthropometric and Lifestyle Related Factors with Primary Dysmenorrhea

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Abstract

Menstrual cycle is a cycle of natural changes that occurs in the uterus and ovaries as an essential part of making sexual reproduction possible. The biological activity of the menstrual cycle is created by coordination among hypothalamic, hypophyseal and ovarian hormones. Many females suffer from dysmenorrhea, painful cramping sensation in the lower abdomen during menstruation. It is one of the most frequently encountered gynaecological disorders, often accompanied by other biologic symptoms, including fatigue, dizziness, sweating, headaches, back ache, nausea, vomiting, and diarrhoea, all occurring just before or during menses

Our aim was to assess the anthropometric measurements during the different phases of menstrual cycle in premenopausal girls and women. The present study was targeted at further unveiling the effect of menstrual cycle on weight changed during its different phases. Body mass index was calculated and the interconnection of the same with the prevalence and the severity of dysmenorrhea was sought.. The major findings of the present study are high prevalence of dysmenorrhea (68%) among healthy female volunteers. Among them 36% suffered from severe pain during their menstruation when they had to cut down on their activities and take medications to ameliorate their pain. There is **no** significant relation existed between dysmenorrhea and age at menarche, nature of diet, and BMI. On the other hand, weight changes were of equal significance in women afflicted and not afflicted with dysmenorrhea. Hence they are not related to occurrence of painful periods.

Key words: *Menstrual cycle Dysmenorrhea Anthropometry*

Introduction

One of the most important attributes of female body that makes it the seat of procreation is menstrual cycle. Menstrual cycle is a cycle of natural changes that occurs in the uterus and ovaries as an essential part of making sexual reproduction possible.[1,2] The first cycle usually begins between twelve and fifteen years of age, a point in time known as menarche.[3] The biological activity of the menstrual cycle is created by coordination among hypothalamic, hypophyseal and ovarian hormones.[4]

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Menstrual cycle has been divided into two major phases, one before ovulation known as follicular phase and one after ovulation known as luteal phase**.** . During follicular phase of each menstrual cycle, a cohort of follicles begins to grow in the ovary.[5] As the dominant follicle grows, there is a concomitant rise in estrogen levels.[5] In the same phase, increasing levels of estrogen are responsible for the growth of fresh uterine endometrium post menstruation.[5]As the estrogen levels peak, the resulting LH surge occurs 10-12 hrs before ovulation.[5]Once ovulation occurs, a cascade of changes transform the remnant follicle into corpus luteum.[6] Nine to eleven days after ovulation corpus luteum regresses rapidly, a process known as luteolysis.[5]This is followed by a massive dip in circulating levels of estradiol and progesterone, a phenomenon heralding

phase of menstruation. Menstruation in many females is associated with painful cramping sensation in the lower abdomen. It is known as dysmenorrhea.

Dysmenorrhea is one of the most frequently encountered gynecologic disorders.[7] More than 50% of postpubescent menstruating women are affected by dysmenorrhea, with 10% to 12% of them having severe dysmenorrhea with incapacitation for 1 to 3 days each month.[8,9,10] Dysmenorrhea is most common in women between the ages of 20 and 24 years, with most of the severe episodes occurring before 25 years of age.[11] Primary dysmenorrhea is painful menstruation seen only in ovulatory cycles usually developing within 6 to 12 months of menarche with no pathology or organic basis.[7,12,13] Primary dysmenorrhea usually begins a few hours before or just after the onset of menstruation. The main causes of primary dysmenorrhoea are prostaglandins, leukotrienes and genetic factors. The cramps are most severe on the first or second day of menstruation. Secondary dysmenorrhea is usually due to pelvic pathology and it is not common in adolescent girls. The causes of secondary dysmenorrhea include endometriosis, presence of the intrauterine device, pelvic inflammatory disease and infection, adenomyosis, uterine myomas, polyps and adhesions, congenital malformation of the müllerian system, cervical stricture or stenosis, ovarian cyst, pelvic congestion syndrome, and Allen-Masters syndrome. The appearance of painful menstrual cramps years after the menarche may be a sign of secondary dysmenorrhea, frequently caused by endometriosis. In women with anovulatory cycles, the menstrual pain is likely to be secondary dysmenorrhea.[14]

In some studies, it has been demonstrated that women suffering from primary dysmenorrhea had higher BMI.[15] Also U-shaped association between dysmenorrhea and BMI has been shown, revealing a higher risk of dysmenorrhea for both underweight and obese women. Hence maintaining a healthy weight over time may be important for women to have pain-free periods.[16]

The present study was targeted at further unveiling the effect of menstrual cycle on weight as it changed during its different phases. Body mass index was calculated and the interconnection of the same with the prevalence and the severity of dysmenorrhea were sought.

Materials and Method

This cross sectional study was carried out on healthy female volunteers in the age group of 15 to 45 years. A total of 50subjects were included in the study using a predesigned proforma and by measuring physiological parameters of weight, height and BMI during the two major phases of menstrual cycle, follicular and luteal phases. . Participants were asked to report their menstruation characteristics based on their experience over the last twelve months. The first day of bleeding was to be considered as the first day of cycle. Duration of bleeding was to be defined by the first day of the appearance of any spots until the complete spotlessness. Physical activity was measured using a semantic scale in which participants were asked to rate their physical activity from 'inactive' to 'very active.' The severity of dysmenorrhea was assessed by a scoring system reported by Anderch and Milsom [1982].[17] The height was measured using a non-elastic measuring tape fastened to a vertical wall in an erect standing position. Weight was recorded twice during the menstrual cycle. Once in follicular phase (on average 9th day of cycle) and once in luteal phase (on average 25th day of cycle).Weight was recorded using standard bathroom weighing scale. BMI [Body Mass Index] was calculated using internationally accepted formula:

BMI = Weight (Kg)/ Height (m)2 i.e., Kg/m2[18]

Observations and Results

Out of 50 subjects included in the study, majority [28] were in the age groups 15-20 and 20-25 [13] years, with mean age being 26.18 years. Their mean weight was 60.43 kg and the mean height was 5.32 feet. Their mean BMI was in healthy range 23.04.

The mean age at menarche was 13.08 years. 19 out of 50 subjects had their menarche at the age of 12 and 17 out of 50 at the age of 14.

32 % subjects were without Dysmenorrhea, majority 68% were with Dysmenorrhea of which 12% suffered mild pain, 20% suffered from moderate pain and 36% severe pain..

Mean ± SD of BMI in subjects with dysmenorrhea was 22.97±4.18 and in subjects without dysmenorrhea was more at 23.19±3.91. Subjects who are thinner seem to suffer more but the difference is not statistically significant at $p<0.858$.

Table 1:- Association between Dysmenorrhea and diet

	Number of subjects	No. of sub. Consuming veg. diet	No. of sub. Consuming mixed diet	P value
Dysmenorrhea	34	15	19	0.193
No Dysmenorrhea	16	4	12	

Table 2:- Interconnection between Dysmenorrhea and Family History

	Number of subjects	Number of subjects with positive family history	Number of subjects with negative Family history	P value
Dysmenorrhea	34	29	05	0.008
No Dysmenorrhea	16	08	08	

Table 3:- Relationship Between age and severity of dysmenorrhea

Age group [years]	Number of subjects	No. of sub. With no pain	No. of sub. With mild pain	No. of sub. With moderate pain	No. of subjects with severe pain
15-20	15	2	0	3	10
20-25	13	2	4	2	5
25-30	6	3	0	3	0
30-35	5	2	2	0	1
35-40	5	3	0	1	1
40-45	6	4	0	1	1

Table 4:- Effect of follicular and luteal phases of menstrual cycle on different physiological parameters

Physiological parameters	Follicular phase	Luteal Phase	t-value	p-value
Weight	59.78±9.36	61.08±9.43	12.876	0.000
BMI	22.79±4.02	23.29±4.09	12.34	0.000

Table 5:- Association of weight gain during follicular and luteal phases with severity of Dysmenorrhea

History of painful periods	Number of subjects	Weight [Follicular Phase]	Weight [Luteal Phase]	T value	P value
No pain	16	60.91±8.76	62.16±8.55	8.257	0.000
Mild pain	6	54.58±3.77	55.58±3.87	7.74	0.001
Moderate pain	10	56.80±6.16	58.10±6.77	4.80	0.001
Severe pain	18	62.17±11.76	63.62±11.79	7.49	0.000

Table 6:- Inter relationship between dysmenorrhea and weight gain

History of painful periods	Number of subjects	Weight [Follicular phase]	Weight [Luteal phase]	t value	P value
No pain	16	60.91±8.76	62.17±8.55	8.25	0.000
Pain	34	59.25±9.70	60.58±9.90	10.06	0.000

Discussion

The current study shows that 68% of healthy subjects (34 out of 50) included in the study suffered from dysmenorrhea. Out of these 50 subjects, 12%, 20% and 36% suffered from mild, moderate, and severe dysmenorrhea respectively (categorized on the basis of Andersch and Milsom scoring scale).[17]Similar findings were reported by Mckay and Diem (67%)[19],Sundel et al (67%)[20],Harlow and Park (71.6%)[21] and Ibrahim NK et al (60.9%).[22]Two more studies reported prevalence of 72.4% in Sweden [12] and 72% in Nigeria.[23,24]An Indian study reported relatively lower prevalence of 33.84% .[25]A Turkish study also showed a slightly lower prevalence of dysmenorrhea (55.5%).[26]Higher prevalence was reported by an Egyptian study.[27] The results of this study showed that the prevalence of dysmenorrhea was 76.1% (n = 643); of these, 26.6% described their menstrual pain as mild, 32.0% as moderate and 41.4% as severe.[27] The causes of discrepancies may be attributed to the use of different scales for grading pain.[28]Pain is an extremely subjective symptom which is very difficult to quantify. Researchers have, therefore, reported different ways to measure pain by various scoring systems. Some studies used VAS whereas others used Andersch & Milsom scale. Further, the variations may be due to differences between the target populations, lifestyle, or due to absence of a standardized universally accepted method for defining dysmenorrhea.[29,30] Present study showed an insignificant association between BMI and dysmenorrhea ($p > 0.05$). The results are in coherence with studies conducted in Sweden and New Zealand, that demonstratedseverity and prevalence of dysmenorrhea were unaffected by women's weight.[17,20,31]However, it has been shown in studies in US and Poland that being overweight was an important risk factor for experiencing menstrual pain.[21,32]The findings could be attributed to possibility of obese women tending to have higher estrogen levels.[33]It has also been shown that people with higher BMI have higher levels of prostaglandin.[34] Both high estrogen and high prostaglandins are probable mechanisms of dysmenorrhea. On the other hand, a study done in Taiwan found that nurses with dysmenorrhea had both lower body weight and Body Mass Index.[35] The results of the present study showed that the mean weight of subjects increased significantly by 1.3 kg during luteal phase compared to follicular phase of the menstrual cycle ($p < 0.05$). Almost similar results were shown by a study conducted by Oian P et al,reporting a significant, average weight gain of 0.7 kg in the subjects during the luteal phase.[36]The same study reported that the plasma and interstitial colloid osmotic pressures were reduced with no significant change in the serum albumin levels during the luteal phase and concluded it could be due to

water retention. [37]In another study, Robinson and Watson noted daily fluctuations in weight, of 0.59 to 2.07 kg, in women throughout the menstrual cycle with an increase in weight prior to menstruation and a decrease in weight eight days after the onset of menses. A slight increase in weight was also noted two days after ovulation.[38] The study by Rosenfeld et al also revealed exaggerated increases in Plasma renin angiotensin (PRA) and plasma aldosterone levels during the late luteal phases of women suffering from PMS. Furthermore, plasma levels of both fluid regulatory hormones positively and significantly correlated with plasma levels of progesterone. Summing it all up, the study pointed towards a relation between fluid retention and increased levels of plasma aldosterone and PRA which in turn seemed to be due to imbalance in levels of estrogen and progesterone during the late luteal phase. Present study also shows that the weight gain that occurred during the luteal phase of the menstrual cycle was statistically significant in both groups ($p < 0.05$), subjects who suffered from dysmenorrhea and those who didn't. As the p values are similar for both the groups, weight gain during the luteal phase has no significance in relation to dysmenorrhea.

Conclusion and Summary

Menstrual cycle is a cycle of natural changes that occurs in the uterus and ovaries as an essential part of making sexual reproduction possible. The biological activity of the menstrual cycle is created by coordination among hypothalamic, hypophyseal and ovarian hormones. Many females suffer from dysmenorrhea, painful cramping sensation in the lower abdomen during menstruation[39]. It is one of the most frequently encountered gynaecological disorders, often accompanied by other biologic symptoms, including fatigue, dizziness, sweating, headaches, back ache, nausea, vomiting, and diarrhoea, all occurring just before or during menses. The major findings of the present study are high prevalence of dysmenorrhea (68%) among healthy female volunteers. Among them 36% suffered from severe pain during their menstruation when they had to cut down on their activities and take medications to ameliorate their pain. There is no significant relation existed between dysmenorrhea and age at menarche, nature of diet, and BMI. On the other hand, weight changes were of equal significance in women afflicted and not afflicted with dysmenorrhea. Hence they are not related to occurrence of painful periods.

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