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Original Research Article

A study on body mass index and menstrual cycle length in reproductive age women

Shilpi Vashishta[1]*, Sushila Gahlot[2]

[1]Department of Physiology, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India
[2]Department of Physiology, Gian Sagar Medical College and Hospital, Patiala, Punjab, India

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***Correspondence:**
Dr. Shilpi Vashishta,
E-mail: shilpivash@gmail.com

ABSTRACT

Background: Menstrual cycle length is an indicator of reproductive health of a woman. Duration of menstrual cycle in a woman is affected by a number of factors including BMI. The effect of BMI on menstrual cycle length has been studied less extensively. Not many studies have been conducted on Indian populations. This study was conducted to study the relation of body mass index and menstrual cycle length in reproductive age women.
Methods: The study included 225 women of age 15-45 years. Women with average menstrual cycle length of 24-38 were regarded as regularly menstruating women. Menstrual cycle length was defined as short (<24 days), normal (24-38 days), long (>38 days). During the menstrual phase of the cycle BMI of each participant was recorded.
Results: A significant (p=0.0008) increase in mean BMI was found with increased in length of menstrual cycle. The majority of the women with long menstrual cycle were obese compared to women having normal and short length of menstrual cycle.
Conclusions: The results of present study indicates that women with long menstrual cycle have increased body mass index compared to women having normal or short menstrual cycle length.

Keywords: Menstrual cycle length, Body mass index, Reproductive age women

INTRODUCTION

The regular cyclic changes in the reproductive system of women is called menstrual cycle, and its most conspicuous feature is the periodic vaginal bleeding that occurs with the shedding of uterine mucosa.[1]

The menstrual cycle is a complex process with the average length of 28 days, involving multiple hormones such as LH, FSH, estrogen and progesterone which follow a cyclical pattern which is co-ordinated by the hypothalamic-pituitary-ovarian axis.[2]

The first half of the cycle is known as the follicular (proliferative or preovulatory) or estrogen dominant phase responsible for endometrial growth and ovulation. The second half of the cycle is called the luteal phase (secretory or postovulatory phase) or progesterone dominant phase responsible for stabilizing the thickened endometrial lining in the uterus.[3]

Menstrual functions such as length of menstrual cycle and levels of reproductive hormones are affected by several factors like age at menarche, body mass index, waist-hip ratio, physical activity, smoking, stress and nutritional status. There is growing evidences reporting high BMI with variability in length of menstrual cycle.[4]

Fluctuations in reproductive hormones during the menstrual cycle causes increase in weight.[5] The effect of BMI measure on menstrual cycle length has been studied

less extensively. However, the effect of body mass index on menstrual function is not yet fully understood. And not many studies have been conducted on relationship between menstrual cycle length and BMI measures in Indian populations. The present study aims for the same.

METHODS

The prospective study was conducted in Gian Sagar Medical College and Hospital (GSMCH) for a period of one year (March 2016 to February 2017). Before commencing the data collection permission from the Institutional Ethical Committee and written informed consent from all the participants were obtained.

A total of 225 reproductive age women of 15-45 years were included in the study. 111 females having regular menstrual cycle length of 24-38 days were the staff members of Gian Sagar Medical College and Hospital (GSMCH).[6] While 114 participants having irregular menstrual cycle of length <24 days or >38 days were selected from gynecology OPD of GSMCH. They were recruited for one menstrual cycle.

Females who were pregnant or breast-feeding in last six-months, using oral-contraceptives from past three months, currently using any supplements or prescription medications, diagnosis of poly-cystic ovarian syndrome, recent history of infections or diagnosis of chronic medical conditions were excluded from the study.

At the beginning of the study, participants were given a questionnaire to find out length of menstrual cycles and personal information.

During the menstrual phase of the cycle height and weight measures were taken of all the participants three times by trained personnel unless the first two measurements were identical. Height was measured without shoes to the nearest 0.1 cm using a portable stadiometer. Weight was measured in light clothing to the nearest 0.1 kg using a digital portable weighing machine.

BMI was calculated by taking a person's weight, in kilograms, divided by their height, in meters squared, or BMI = weight (in kg)/ height2 (in m2). BMI was classified according to the ethnicity-specific WHO classification for Asian women: underweight (under 18.4 kg/m2), normal weight (18.5–22.99 kg/m2), overweight (23–24.9 kg/m2), and obese (over 25 kg/m2).[7]

Microsoft excel data analysis tool was used to analyze data related to body mass index and average length of menstrual cycle using one way- ANOVA and chi –square test. Mean, standard deviation and percentage were used to describe the main variables. The statistical difference in mean BMI during menses between women with normal weight and underweight women, or overweight women or obese women was assessed with a ANOVA. P<0.05 were considered significant.

RESULTS

Table 1 shows the characteristics of study population. Most of the study participants (42.66%) were normal weight and majority of women were having normal length of menstrual cycle of 24-38 days.

Table 1: Characteristics of study participants.

Characteristics of study participants	N	%
BMI		
underweight (under 18.4 kg/m2)	17	7.55%
Normal weight (18.5–22.99 kg/m2)	96	42.66%
Overweight (23–24.9 kg/m2)	35	15.55%
Obese (over 25 kg/m2)	77	34.22%
Menstrual cycle length		
Short cycle (<24 days)	37	16.44%
Normal length (24-38 days)	111	49.33%
Long cycle (>38 days)	77	34.22%

Table 2: Mean BMI in relation to length of menstrual cycle.

Menstrual cycle length	BMI	F-value	P value
Women with short menstrual cycle length (<24 days)	22.14±5.50	7.24	0.0008
Women with normal menstrual cycle length (24-38 days)	22.57±8.43		
Women with long menstrual cycle length (>38days)	24.32± 21.69		

Table 2 shows the mean value of BMI according to the duration of menstrual cycle. The BMI increased with the increasing duration of the menstrual cycle.

The maximum number of women with normal (24–38 days) and short (<24 days) menstrual cycle were in normal weight category 52.25% and 54.05% respectively. The majority of the women with long menstrual cycle (40.25%) were obese.

The minimum number of women with normal menstrual cycle length (6.3%), short menstrual cycle (8%) and long menstrual cycle (9.09%) were in underweight category.

37.81% of overweight/obese women were found to have short menstrual cycle while among women with normal cycle length 41.44% were over-weight/obese of women. Similarly, 55.83% women having cycle length of more than 38 days were over-weight/obese.

Table 3: Analysis of length of menstrual cycle according to BMI categories.

Menstrual cycle length	Underweight (under 18.4 kg/m2)	Normal weight (18.5–22.99 kg/m2)	Overweight (23–24.99 kg/m2)	Obese (over 25 kg/m2)
Short cycle length (<24 days)	3 (8.11%)	20 (54.05%)	8 (21.6%)	6 (16.21%)
Normal cycle length (24-38 days)	7 (6.3%)	58 (52.25%)	15 (13.51%)	31 (27.93%)
Long menstrual cycle length (>38days)	7 (9.09%)	27 (35.06%)	12 (15.58%)	31 (40.25%)

DISCUSSION

Menstrual cycle length have enormous implications on women's health, and is an indicator of serious health outcomes such as type 2 diabetes, cardiovascular disease, endometrial cancer, osteoporosis, rheumatoid arthritis and infertility.[8-13]

The average length of the menstrual cycle in a woman indicates cumulative exposure to ovarian steroids. Increased in the average length of cycle may be associated with reduced production of ovarian steroid, while women having average shorter menstrual cycles may have increased cumulative exposure to ovarian steroid.[14]

The present results shows that there is a relation between the length of menstrual cycles of a woman and the BMI. An increase in mean body mass index in women was observed in women with prolonged menstrual cycles. The difference in the mean value of BMI with length of menstrual cycle between the three groups of subjects was found to be statistically significant. This indicates that there might be a relationship between the hormonal pattern associated with cycle length and BMI.

These findings were consistent with previous studies demonstrating probability of increased BMI in women with long menstrual cycles. Obesity leads to increase in length of menstrual cycles by inhibiting reproductive hormones.[15-18] In contrast other studies observed that women with short and long cycles had lower BMI.[14] While few researchers found an association between long cycles and BMI while no association between short cycles and BMI.[19] Some investigators noticed higher percentage of short and long menstrual cycle in overweight as well as underweight women compared with women of normal.[20,21] But some studies found no association of BMI with menstrual cycle length.[22,23]

Our study results indicates that obesity may lead to suppressed reproductive hormones and longer cycles.

CONCLUSION

The results of present study indicates that there is a relationship between body mass index and duration of the menstrual cycle. Our data recommends that weight control is important for improving a woman's quality of life during her reproductive years. Further intervention studies are needed to assess the effect of management of BMI for reducing the irregularity in length of menstrual cycle in women of reproductive age.

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