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Original Research Article

A cross-sectional study on relationship between body mass index and menstrual irregularity among rural women in Tamil Nadu

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ABSTRACT

Background: Menstruation is a normal physiological process and irregular menstrual pattern is a problem affecting the quality of life among women in the reproductive age group. Although many factors contribute to the irregularity in menstrual cycles this study was conducted to find out the relationship between the body mass index (BMI) and irregular menstrual pattern.
Methods: A cross-sectional study was conducted in the rural health and training centre of SRM hospital between August and October 2018 by using a convenience sampling method and data was collected from 163 women in the reproductive age group and analysed to find out the relationship between the BMI and menstrual irregularity.
Results: The mean age of the study participants was 31.29 (±8.32) years and their mean age at menarche was 12.59 (±1.86) years. Majority of the study participants belongs to lower middle class (25%), Hindus (85%) by religion, married (82%), homemakers (53%) belongs to nuclear family (45%) having education up to high school level (61%). Only 44% of the participants have their BMI within normal range and 8% are obese. Irregular menstrual pattern was present in 13% of the study participants. The association between the BMI and the irregular menstrual pattern was found to be significant with a $p<0.05$.
Conclusions: A significant association between the BMI and the irregular menstrual pattern highlights the importance of adapting simple and effective lifestyle and behavioural modifications in the reduction of excess weight thereby leading to healthy reproductive life among women.

Keywords: Body mass index, Menstrual irregularity, Obesity

INTRODUCTION

Menstruation is a normal physiological process which every woman undergoes for more than 35 years in her lifetime from menarche till menopause.[1] Menstrual cycles are said to be regular when the cycle length is between 21 to 35 days with a menstrual flow for 2 to 7 days and any deviation from this normal menstrual pattern i.e., either with increased or decreased duration of cycles (polymenorrhea or oligomenorrhea), heavier (menorrhagia) or decreased flow, associated with other symptoms like severe abdominal cramps (dysmenorrhoea) is considered as abnormal or irregular menstrual cycle. Irregular cycles is common during the beginning phase of menstruation in life (menarche), around the time when it is going to end (peri-menopausal period), after pregnancy and during some medications like hormonal contraceptives but if the cycles are

continuously irregular in the last six months without any physiological reasons it needs to addressed as early as possible.[2-4] There are many factors responsible for the irregular menstrual pattern which includes stress, hormone imbalance, thyroid disorders, increased weight gain, polycystic ovarian disease, diabetes, metabolic syndrome, medications, environment, behavioural and lifestyle factors. Irregularity in the menstrual cycles can have a serious impact on the immediate as well as long-term health of the women causing distressing symptoms affecting the metabolism, sleep, fertility, sexual, reproductive life and more.

Obesity or excessive weight gain is a global issue affecting more than 13% of the adult population particularly females (15%). Overweight a prequel to obesity was present in almost 39% of the global adult population with slightly female predominance (40%).[5] Although irregular menstrual pattern has numerous causes obesity is one of the most important risk factors as most of the time the women failed to realise it as a cause for the irregularity and also it is easily preventable and modifiable with simple but effective lifestyle, behavioural and dietary modifications without the support of unnecessary medications. Body mass index (BMI) is one of the simple and commonly used indices (taking into account the height and weight of the individual which can be easily recorded without much intervention) for the assessment of obesity among adults. Although many studies conducted across the globe to establish the association between body weight and menstrual pattern among adolescent girls the current study focussed on women in the reproductive age group as a whole instead of particular age groups and tried to bring out the relationship between the BMI and irregular menstrual pattern especially in the rural areas.

METHODS

A cross-sectional study was conducted in the rural health and training centre of SRM hospital in Kancheepuram district, Tamil Nadu for a period of three months between August 2018 and October 2018. Based on the data from a study in India prevalence of menstrual irregularity among rural women was taken as 10% with 95% confidence level and 5% absolute precision assuming a non-responsive rate of 10% the minimum required sample size was calculated to be 153.[6] Using convenience non-probability sampling method all female patients attending the outpatient department of the rural health training centre fulfilling the eligibility criteria (i.e., non-pregnant women in reproductive age group without using any hormonal contraceptives and free from any pre-existing chronic disorders like thyroid, reproductive tract diseases, diabetes etc.,) during the study duration were included in the study after giving proper information regarding the nature of study and obtaining the consent to participate in the study. Using a pre-tested questionnaire socio-demographic profile of the study participants were collected by personal interview. The height and weight of all the study participants was recorded using a stadiometer and standardized weighing scale for calculating the BMI. We were able to collect the data from 163 women in the reproductive age group within the study duration which is well above the minimum sample size required.

The collected data were entered in Microsoft Excel and after cleaning analysed with SPSS version 21.0. WHO classification of BMI was used to classify the study participants as normal (18.5-24.99), underweight (<18.5), overweight (25-29.99) and obese (≥30) and modified BG Prasad scale 2018 was used to determine the Socio-economic status of the study participants.[7,8] Results were tabulated and descriptive statistics was used for socio-demographic profile of the study participants and chi-square test/Fischer's exact test (wherever applicable) was used to find out the association between the BMI and other variables with the menstrual irregularity. A p value of less than 0.05 was considered to be statistically significant.

RESULTS

The mean age of the study participants was 31.29 (±8.32) years and their mean age at menarche was 12.59 (±1.86) years. Majority of the study participants were Hindus (85%) by religion followed by Christians (13%) and Muslims (2%), belonging to class IV (lower middle class 25%) and class III (middle class 24%) socio-economic status. Most of the females were married (82%), single (15%) and less than 2% of the women was either widowed or divorced. Majority of the females were housewives (53%) followed by working women (39), students (7%) and belongs to nuclear family (45%). More than 60% of the females who participated in the study were educated till high school, 20% were illiterates and 18% were graduates (Table 1).

Around 72 (44%) women have BMI within the normal range, 34 (21%) are underweight, 44 (27%) women falls in overweight category and 13 (8%) of the study participants were obese as per the WHO standards. Among the obese women more than 69% have menstrual irregularities suggesting a strong relationship between the two when compared to women with normal BMI (7%).

We found no significant association between education, occupation and religion of the study participants with the menstrual pattern with $p>0.05$. Association between age at menarche and the socio-economic status of the study participants with menstrual irregularity was also not found to be significant with p values of 0.436 and 0.474 respectively. But the relationship between the BMI and the irregular menstrual pattern was found to be significant with $p=0.037$ (OR:3.078, CI:1.077-8.801) and with further analysis involving the individual categories of BMI the association between the obese women and menstrual irregularity when compared to underweight or overweight women was found to be extremely significant with a $p<0.001$ (Table 2).

Table 1: Socio-demographic profile and BMI of the study participants.

Socio-demographic profile	N (%)	
Age of the study participants (years)	Mean	31.29
	S.D	8.32
Age at menarche (years)	Mean	12.59
	S.D	1.86
Education of the study participants		
Primary	30 (18.40)	
Secondary	36 (22.08)	
Higher secondary	33 (20.24)	
Undergraduate	23 (14.11)	
Post graduate	7 (04.29)	
Illiterate	34 (20.85)	
Occupation of the study participants		
Student	12 (07.36)	
Housewife	87 (53.37)	
Working	64 (39.26)	
Religion of the study participants		
Hindu	138 (84.66)	
Muslim	3 (01.84)	
Christian	22 (13.49)	
Marital status of the study participants		
Single	26 (15.95)	
Married	134 (82.20)	
Divorced	1 (00.61)	
Widowed	2 (01.22)	
Type of family		
Nuclear	73 (44.78)	
Joint	24 (14.72)	
Three generation	66 (40.49)	
SES (modified BG Prasad 2018)		
I	27 (16.56)	
II	28(17.17)	
III	39 (23.92)	
IV	41 (25.15)	
V	28 (17.17)	
BMI		
Underweight	34 (20.85)	
Normal	72 (44.17)	
Overweight	44 (26.99)	
Obese	13 (07.97)	

SES- socio-economic status, BMI- body mass index.

Table 2: Association between menstrual irregularity and other factors.

Factor analysed	P value (Odds ratio, CI)
Age at menarche	0.436
Religion	0.652
Education	0.586
Occupation	0.097
SES	0.474
BMI	0.037 (3.078, 1.077-8.801)
Obese women	<0.001 (30.150, 6.512-133.452)

CI– confidence interval, SES– socio-economic status, BMI– body mass index; p<0.05 is considered as significant.

DISCUSSION

The mean age of the study participants was 31.29 (±8.32) years which is almost similar to a study conducted by Gunjan et al in Delhi among the reproductive age group women win which the mean age of the study participants was 29.9 (±9.7) years.[9] Likewise the mean age at menarche of the study participants (12.59±1.86 years) matches with the study conducted by Siti-Arffah et al in Selangor (12.21±1.09 years) and also with various other studies.[6,10,11] Most of the study participants belongs to lower socio-economic class and educated only up to high school level or even lower which may have determined their knowledge and awareness level regarding the importance of maintaining the body weight under control and its relationship with menstrual cycle. Although other studies show a significant association between the age at menarche and socio-economic status with the menstrual irregularity our study failed to establish the same, may be due to the small sample size or the sampling methodology we used involving all eligible participants within the time frame and restricting the study to rural area only.[10,12] But there are some studies which favour our insignificant association of age at menarche with Menstrual irregularity.[13] Majority of the study participants were married and housewives which may be a reason for their weight gain due to lack of self-care and in turn the irregularity in menstrual pattern.

The prevalence of obesity in our study was around 8% which is slightly lower than the global prevalence which is around 15% among adult females.[5] The prevalence of irregular menstrual cycles was found to around 13% (C.I=8.7-19.7) which was similar to a study conducted among rural women in Kashmir by Samreen et al were the prevalence was found to be around 10% and also comparable with the global prevalence which is between 14% to 25%.[3,6,14] This shows the strong comparability in terms of prevalence of menstrual irregularity within the nation (northern and southern parts of the country) and also with the other nations across the globe irrespective of the place of the study. Our study finds a very strong and significant association between the BMI and irregular menstrual pattern similar to various studies across the globe.[15,16] This strong association particularly among obese when compared with those belong other categories of BMI signifies that if BMI is kept within the normal range or even switching over to a lower weight category (i.e., obese to overweight) by adapting simple but proven effective measures like physical activity, dietary modifications etc., we can regulate the menstrual cycles to a certain extent without the requirement of any medications.

CONCLUSION

Although many factors contribute to irregularity in menstrual cycle we studied the relationship between the BMI and menstrual irregularity and found a significant association between the two highlighting the importance

of adapting simple and effective behavioural, lifestyle and dietary modifications to maintain the BMI within the normal range by losing the excess weight gained thereby preventing the irregularity in menstrual cycles and eventually leading to a healthy and productive reproductive life among women.

Limitations

Being a cross-sectional study conducted within a short duration of time we used a non-probability sampling method and focussed on only one of the risk factor for menstrual irregularity without adjusting for other confounding factors so further studies have to be carried out using probability sampling techniques to analyse the relationship between all the other possible risk factors among both rural and urban women to give a comprehensive and comparative picture of the same.

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