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Irregular Menstruation among University Student in Tamil Nadu, India: A Study on Prevalence and Associated Factors

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Abstract

Background: Menstrual irregularity is a common gynaecological issue that can significantly impact women's quality of life and academic performance. Various factors including, age, reproductive characteristics, lifestyle, and physical activity, can influence menstrual patterns.

Objective: To estimate the prevalence of menstrual irregularities and associated factors among university students in Tamil Nadu.

Methods: A descriptive cross-sectional study was conducted among 1000 university students aged 18-25 years. A structured questionnaire was used to collect data on socio-demographic profiles, menstruation characteristics, reproductive health, and lifestyle factors. Data were analyzed using STATA SE 17, with multivariate logistic regression to identify the factors associated with irregular menstruation.

Results: The prevalence of irregular menstruation was 23.6% (n=236). Factors significantly associated with irregular menstruation included age (20-21 years: AOR=1.5; 95% CI [1.07, 2.26], 22-23 years: AOR=1.8; 95% CI [1.14, 2.84]), family history of irregular menstruation (AOR=2.7%; 95% CI [1.82, 4.05], skipping meals (AOR=1.59; 95% CI [1.05, 2.04]), and the presence of clots during menstruation. Unhealthy dietary habits, such as junk food and soft drink consumption, were also significantly associated with irregular menstruation.

Conclusion: The study highlights the prevalence of irregular menstruation and its associated factors age, lifestyle, and family history. The students should practice healthy dietary habits and stress management that may help in reducing the risk of menstrual irregularities among university students.

Introduction:

Menstruation is a natural biological process that occurs monthly during a woman's reproductive years. The menstrual cycle is characterized by its length, duration, and regularity, which can vary among individuals. On average, the menstrual cycle typically spans 21 to 35 days, with menstruation lasting between 2 and 7 days.[1]. A regular menstrual cycle during puberty depends on complex interactions involving the hypothalamus, anterior pituitary, and ovaries. Interruption of the hypothalamic-ovarian (HPO) axis pathway results in an irregular menstrual cycle [2]. Irregular menstruation refers to any deviation that occurs from the normal cycle including, irregular onset, frequency of onset, flow duration, or volume[2].

It is a major gynaecological problem that affects the students' quality of life and academic performance and impacts their daily activities [2]. Several factors adversely affect the normal menstrual pattern,

including genetic predisposition and lifestyle modification [6]. The factors that are linked with irregular menstruation are the history of early menarche, age, socio-economic, increased BMI, stress, overweight, anemia, alcohol intake, smoking, unhealthy food habits, and physical activity [1,2,3].

According to a study conducted in India, the prevalence of menstrual irregularity among university students is about 29.1% [3]. In a cohort study, irregular menstruation and a long menstrual cycle in adolescence and adulthood are associated with a great risk of premature mortality [4]. Menstrual cycle abnormality has been associated with numerous health outcomes such as breast and ovarian cancer, diabetes, cardiovascular disease, and fractures as well as reduced fecundity and increased risk of abortion [5]. Lifestyle modification can effectively reduce the risk of menstrual disorders [6].

With this background in mind, this study endeavoured to explore the prevalence of menstrual irregularity among university students in Tamil Nadu, India. Additionally, this study aims to identify the factors associated with irregular menstruation.

Objective:

The study objective was to estimate the prevalence and factors associated with irregular menstruation among university students in Tamil Nadu, India.

Materials and Methods:

Study Design: The study adopted a descriptive cross-sectional study design.

Timeline of the study: The study followed different phases that were carried out at different points of the research cycle: conceptualization (March 2023), Ethical approval, and questionnaire design (April 2023), pilot testing (May 2023), Data collection (June-Sept 2023), Analysis and report writing was carried out in November and December 2023.

Study Setting: The study was conducted among students at various universities across Tamil Nadu.

Study sample: University students aged 18-25 years pursuing education were selected through a convenient sampling technique.

Sample size: The Leshlie Kish formula is used to calculate the minimum sample size

$n = Z^2_{\alpha} \times p\,(1-p)/d^2$

$n = (1.96)^2 \times (44 \times 56)$

5×5

$n = 379$

The minimum estimated sample size was further adjusted with 2.5 times of design effect and 10 percent of non-response

i.e.

Adjusting with design effect 2.5

$n = 379 \times 2.5 = 948$

Adjusting with 10 percent of non-response

$n = 379 + (379 \times 5\%) = 995$

Approximately, the sample size was fixed at 1000.

Inclusion and exclusion criteria: The study included women aged 18 to 25 who attained puberty and are currently studying in universities. The study excluded women with a history of stillbirth, abortion, and pregnancy.

Study tool: A structured questionnaire was used to estimate the prevalence and assess the factors associ-

ated with irregular menstruation among university students. The questionnaire consists of the following sections, socio-demographic profiles, menstruation and reproductive health, and lifestyle factors. Each question had multiple choices to answer. Physical activity was assessed by using the International Physical Activity Questionnaire short form.

Data collection method: The questionnaire was distributed using an online tool among the study participants, and brief information about the study's objectives was narrated in the local language to all the study participants. Investigator details were appended in the tools for clarifications about the tools, if any.

Timeline of data collection: The data collection was conducted from June 2023 to September 2023.

Analysis: The collected data were checked for missing data and then transposed to STATA (SE Standard Edition-17, developed by STATA Cop, Texas 77845, USA) analysis software, and the required analysis was carried out. In the descriptive analysis, the mean, standard deviation, percentage, and skewness of the distribution were analyzed. In the inferential statistics, the point estimate for the mean and standard deviation for the sample was calculated with a 95% confidence interval. The study used multivariate logistic regression to identify the factors that affect irregular menstruation among university students.

Ethical approval: The study proposal was approved on April 26, 2023, by the Institutional Ethical Committee of SRMIST (Deemed University). Written informed consent was obtained from each of the study participants.

Results:

Demographic characteristics

In total, 1000 students aged 18-25 years were included in the study, with a mean age of 20±1.7 years. Most of the participants were between 18-19 years (50.7%), followed by 20-21 years (28.9%), 22-23 years (16.8%), and 24-25 years (3.6%). The majority of participants (78.8%) were pursuing a Diploma or Bachelor's degree, 19.8% were holders of a Master's degree, and only 1.4% had a Doctoral degree.

The distribution of the participants by district revealed that 30.2% were Kancheepuram, followed by Coimbatore (25%), Chengalpattu (20%), Chennai (11.5%), and others (13.1%). Regarding marital status, 98.4% were unmarried, and 1.6% were married. Most of the participants (62.2%) resided in urban areas, while 37.8% were from rural settings. Regarding socio-economic status, 51.5% belong to the upper class, 22.5% to the upper middle class, 17.4% to the middle class, 7.5% below average, and 1.1% were categorized as poor [Table 1].

Menstrual irregularities and their associated factors:

The study estimates the prevalence of irregular menstruation is 23.6% (n=236) among 1000 respondents. The factors influencing irregular menstruation were categorised into lifestyle, reproductive, and physical activity-related characteristics.

Among the participants, 58.5% (n=585) had a normal BMI, while 22.2% were underweight, 15.8% overweight and 3.5% obese. Nearly half (47%) of the students reported experiencing stress in daily life and the sleep pattern of the students 85.1% used to sleep for 6-8 hours, 8.8% were less than 6 hours and 6.1% above than 8 hours. Only 1.6% reported the consumption of tobacco and 2.3% of students consumed alcohol. According to dietary habits, skipping of breakfast was reported by 33.1%, while 30.1% skipped other meals regularly. In junk food consumption the range between 2-4 times per week was reported by 49.8% of participants and 52.7% reported regular consumption of soft drinks.

According to the reproductive characteristics, the Majority (47.9%) attained menarche between 13-14 years, followed by ≤12 years (43.7%) and ≥ 15 years (8.4%). The presence of clots during menstruation (41.6%) was reported while the family history of irregular menstruation 14.9% had the family history of irregular menstruation and meanwhile 8.5% reported history of PCOD.
In term of physical activity, moderate physical activity was reported by 42.3% of the participants, while 36.4% in vigorous physical activity, and 21.3% was involved in mild physical activity.

Table 1: Demographic Characteristics of University Students in Tamil Nadu

Variable	frequency	percentage
Age Category		
18-19	507	50.7
20-21	289	28.9
22-23	168	16.8
24-25	36	3.6
Educational Qualification		
Diploma/Batchelor degree	788	78.8
Master's degree	198	19.8
Doctoral Degree	14	1.4
District		
Chennai	115	11.5
Chengalpattu	202	20.2
Coimbatore	250	25
Kancheepuram	302	30.2
Other	131	13.1
Marital Status		
Married	16	1.6
Unmarried	984	98.4
Place in Resident		
Urban	622	62.2
Rural	378	37.8
Monthly per capita Income		
Upper Class	515	51.5
Upper Middle Class	225	22.5
Middle class	174	17.4
Below average	75	7.5
Poor	11	1.1

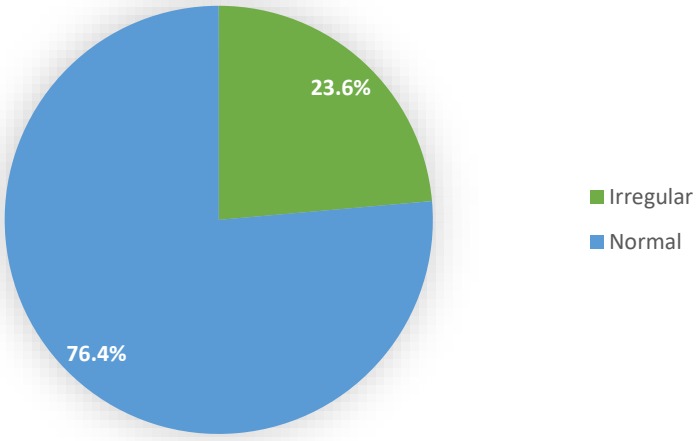
Factors associated with Irregular menstruation:

The factors associated with irregular menstruation using chi-square analysis show the association between the presence of clots during menstruation, family history of irregular menstruation, family history of polycystic ovarian disease, stress in daily life, consumption of junk food, consumption of soft drinks, and

consumption of Tea and coffee.

Table 2 shows the univariant analysis of age, family history of irregular menstruation, family history of polycystic ovarian disease, presence of clot during menstruation, skipping of break of fast, Sleep pattern, stress in daily life, consumption of soft drinks, and consumption of tea and coffee were associated with the irregular menstruation. Based on the result of multiple logistic regression analyses age, family history of irregular menstruation, family history of PCOD, presence of clots during menstruation, skipping of meals, and stress in daily life significantly affected the menstrual cycle. However, the adjusted odds ratio shows a higher risk of irregular menstruation in the age group between 20-21 (AOR =1.5; 95% CI [1.07,2.26], 22-23 (AOR=1.8; 95% CI [1.14, 2.84], skipping of meals (AOR =1.59; 95% CI [1.05,2.4] and the study female students who do not have the family history of irregular menstruation has higher risk of irregular menstruation (AOR =2.7; 95% CI [1.82,4.05].

Figure 1: Prevalence of Irregular menstruation among university Students (n=1000)



Discussion:

Our study identified various factors influencing the menstrual cycle and the effect of lifestyle factors, reproductive characteristics, and physical activity on the menstrual cycle among college students. The finding revealed that risk factors for menstrual cycle irregularities included age, family history of irregular menstruation, and meal-skipping behaviours.

According to our study, 23.6% of the students had irregular menstruation, it was identified if the cycle length, duration, and regularity were abnormal then it was considered irregular menstruation. It varies from woman to woman, but the average menstrual cycle usually occurs every 21 to 35 days and lasts 2 to 7 days [1]. The prevalence of irregular menstruation varies from 13% to 64.2% [6,7,8,9]. The variations are due to different researchers using varying definitions for irregular menstruation. However, the findings from the current are lower when compared with other studies from India, Ethiopia, and Saudi Arabia [3,11,16]. The difference may occur in India due to excluding non-pregnant women using hormonal contraceptives and who have medical problems [9]. Additional studies reported that irregular menstruation is determined by ethnicity, lifestyle factors, and physical activities [6,10,19].

The students whose ages are between 20-21 and 22-23 years old were shown 1.5 times and 1.8 times more likely to have irregular menstruation than those less than 20 years and greater than 23 years in this study. A previous study conducted in Ethiopia with a similar age group shows that students who age ≤20 years

old have 3.88 times more experienced irregular menstruation than those who are ≥25 years old [13]. An Indian study shows that age group 16-19 years 31.4% of them experience irregular menstruation. It is common in the first 2 years of menarche and is related to hypothalamus pituitary-ovarian axis maturation [14]. However, our study reveals that the participants between the two age groups 20-21 and 22-23 have experienced irregular menstruation when compared to greater or lesser than these age groups.

The study found that those who do have a family history of irregular menstruation are significantly associated with irregular menstruation. Similarly, in Saudi Arabia, a study found that students with a family history of menstrual irregularity 48% of the students has irregular menstruation [15]. This study shows that students have the habit of skipping meals 1.59 times have a higher risk of getting irregular menstruation. A study from India supports our findings and shows an association between irregular menstruation on skipping breakfast and meals [16]. Univariant analysis from this study reveals that unhealthy dietary habit influences irregular menstruation. This finding is supported by an Indian study, which shows a direct association between dietary habits and irregular menstruation [16,17].

The study relied on convenience sampling, which may limit the generalizability of the findings. Data collection was succeeded by using online tools with self-reported questionnaires, which might have introduced recall and reporting bias.

Table 2: Multivariant analysis of factors associated with Irregular menstruation (n=1000)

Variable	Irregular	Regular	Chi-Square	Univariate	P value	Multivariate	P Value
Age Category	Yes	No		AOR		AOR	
18-19	136 (27%)	371 (73%)	6.7	1		1	
20-21	61 (21%)	228 (79%)		1.3 [0.97, 1.93]	0.073	1.5[1.07, 2.26]*	0.019
22-23	35 (19%)	154 (81%)		1.8 [1.16, 2.87]*	0.008	1.8 [1.14, 2.84]*	0.011
24-25	4 (27%)	11 (73%)		0.83 [0.39, 1.73]	0.627	1.2 [.35, 4.51]	1.25
BMI Category							
Underweight	50 (23%)	172 (77%)	4.55	1		1	
Normal	130 (22%)	455 (78%)		1.01 [0.70, 1.47]	0.92	0.87 [.58, 1.3]	0.585
Overweight	44 (28%)	114 (72%)		0.75 [0.47, 1.2]	0.23	0.73 [0.43, 1.23]	0.25
Obese	12 (34%)	23 (66%)		0.55 [0.25, 1.19]	0.13	0.79 [.03, 1.83]	0.587
Age of Menarche							

12 & Below	106 (24%)	331 (76%)	0.431	1		1	
13-14	115 (24%)	364 (76%)		1.01 [0.74, 1.37]	0.93	1.2 [0.89, 1.73]	0.198
15 & Above	15 (18%)	69 (82%)		1.47 [0.80, 2.68]	0.205	1.63 [0.86, 3.10]	0.133
Family history of PCOD							
No	199 (22%)	716 (78%)	20.46	1		1	
Yes	37 (44%)	48 (56%)		0.36 [0.22, 0.56]*	0.00	0.51 [0.30, 0.86]*	0.012
Presence of Clot							
No	106 (18%)	478 (82%)	23.12	1		1	0.00
Yes	130 (31%)	286 (69%)		0.48 [0.36, 0.65]*	0.00	0.58 [0.41, 0.80]*	0.001
Family history of Irregular Menstruation							
Yes	69 (46%)	80 (54%)	50.08	1		1	
No	167 (20%)	684 (80%)		3.5 [2.45, 5.08]*	0.00	2.7 [1.82, 4.05]*	0.00
Skipping of Breakfast							
No	144 (22%)	525 (78%)	4.83	1		1	
Yes	92 (28%)	239 (72%)		0.71 [0.52, 0.96]*	0.028	0.71 [0.48, 1.06]	0.102
Skipping of Meals							
No	164 (25%)	535 (75%)	0.024	1		1	
Yes	72 (24%)	229 (76%)		0.97 [0.70, 1.33]	0.876	1.59 [1.05, 2.4]*	0.027
Sleep Pattern							
5 & Below	30 (34%)	58 (66%)	5.95	1		1	
6 to 8	193 (23%)	658 (77%)		1.7 [1.10, 2.81]*	0.018	1.18 [0.7, 1.98]	0.534

9 & Above	13 (21%)	48 (79%)		1.9 [0.89, 4.06]	0.093	1.31 [0.50, 2.97]	0.504
Consumption of Tobacco							
No	235 (24%)	749 (76%)	2.71	1		1	
Yes	1 (6%)	15 (94%)		4.7 [0.61, 35.8]	0.135	4.79 [0.60, 37.91]	0.137
Stress in daily life							
No	106 (20%)	424 (80%)	8.1	1		1	
Yes	130 (28%)	340 (72%)		0.65 [0.48, 0.87]*	0.005	0.81 [0.58, 1.14]*	0.004
Junk food							
0 to 1	28 (23%)	94 (77%)	2.61	1		1	
2 to 4	128 (26%)	370 (74%)		0.86 [0.53, 1.37]	0.53	0.82 [0.49, 1.35]	0.43
5 to 7	80 (21%)	300 (79%)		1.11 [0.68, 1.82]	0.65	0.92 [0.54, 1.57]	0.77
Consumption of Soft drink							
No	92 (19%)	381 (81%)	8.572	1		1	
Yes	144 (27%)	383 (73)		0.64 [0.47, 0.86]*	0.004	0.82 [0.58, 1.17]	0.28
Consumption of Tea and Coffee							
Tea	70 (18%)	319 (82%)	11.86	1		1	
Coffee	93 (26%)	266 (74%)		0.62 [0.44, 0.89]*	0.009	0.76 [0.52, 1.11]	0.17
Others	73 (29%)	179 (71%)		0.53 [0.36, 0.78]*	0.001	0.77 [0.51, 1.16]	0.22
Physical activity							
Mild	49 (23%)	164 (77%)	3.17	1		1	
Moderate	11 (3%)	312 (97%)		0.83 [0.57, 1.23]	0.37	0.93 [0.61, 1.41]	0.73
High	76 (21%)	288 (79%)		1.13 [0.75, 1.70]	0.55	1.9 [0.70, 1.70]	0.68

* Significant p<0.05
Note: UOR- Un-adjusted Odds Ratio, AOR-=Adjusted Odds Ratio, BMI-body mass index, CI-confidence interval, PCOD-polycystic ovarian syndrome, MPCI-monthly per capita income.

Conclusion:

The study provides crucial insights into the prevalence of menstrual irregularities among university students in Tamil Nadu and identifies associated factors such as age, family history, and unhealthy dietary habits. These findings underscore the need for targeted intervention to promote healthy lifestyle practices and address stress and dietary habits among students. Education institutions should prioritize menstrual health awareness programs and provide support to improve the overall health of female students. Further, research should be focused on longitudinal studies to establish causality and include a more diverse population for broader generalization.

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