



## FACTORS AFFECTING THE RECEDING AGE OF ONSET OF MENARCHE IN YOUNG GIRLS – AN OBSERVATIONAL STUDY

<b>Ramesh H</b>	Department of Pediatrics, JJM Medical College, Davanagere.
<b>Spoorthi S M*</b>	Department of Pediatrics, JJM Medical College, Davanagere. *Corresponding Author
<b>Mounika B</b>	Department of Pediatrics, JJM Medical College, Davanagere.
<b>Ashok B</b>	Department of Pediatrics, JJM Medical College, Davanagere.

**ABSTRACT** **Background:** The time of first menarche is an important milestone in female sexual maturation. Studies have shown trends of decreasing age of menarche in most Indian states.

**Objective:** To trace the factors associated with receding age at menarche and to evaluate the strength of association between those factors with receding age at menarche.

**Materials And Methods:** An observational study was done in the schools in Davanagere from July 2018 to June 2019. 372 menstruating girls between the age of 9–15 years were included in the study. The participants data regarding chronological age, age of menarche, socioeconomic status, physical activity and diet were collected using a questionnaire. The anthropometric measurements were taken using standard techniques and general physical examination was done for all the participants.

**Results:** The mean age of attainment of menarche was  $11.94 \pm 1.02$  years. The study had a strong association between age at menarche and socioeconomic status ( $p < 0.001$ ). Body mass index (BMI) and waist circumference (WC) was inversely and significantly associated with age of menarche ( $p < 0.01$ ).

**Conclusion:** The world wide trends of declining age of menarche were seen in our study too. The factors affecting being mother's age of menarche, BMI, Waist circumference and higher socioeconomic status. This underline that further evaluation of factors associated with it and studying future implications of lower age at menarche is important.

**KEYWORDS :** Menarche, BMI, Socioeconomic status, Waist circumference

### INTRODUCTION:

Early age at menarche is a universal trend due to the concept of positive health and environment. The triad of early menarche has biomedical, emotional and socio-cultural components. All these components predispose to non communicable diseases such as cancer and cardiac diseases and early participation in adverse social behaviours such as cigarette smoking, alcoholism, drug abuse and sexual activity[1-2].

The temporal association of early menarche and triad associated with it has to be studied extensively across India with different ethnic, race and socio-cultural groups. There is a strong determination in the age of menarche with psycho-socio-sexual and environmental influences.

Steingraber et al[1] concluded that HPO axis is an internal monitor, which is very sensitive to disruptions, and can trigger the premature release of estrogen in girls. Delemarre-van de Waal et al [2] suggests that environmental factors could outweigh the influence genetics has on timing of menarche. Belsky et al, suggested that societal factors affect timing of puberty[3]

The web of causation of receding age at menarche are indefinite and multifactorial. In this article we tried to trace the factors associated with receding age at menarche and to evaluate the strength of association between those factors with receding age at menarche.

### MATERIALS AND METHODS

A cross sectional study was performed in the schools, from July 2018 to June 2019 in Davanagere city, Karnataka, India. Girls in the age group of 9 to 15 years who have attained menarche have been included in the study. A total of 372 menstruating girls were enrolled for the study. Girls with chronic medical, surgical, genetic and chromosomal disorders were excluded from the study. Informed consent was taken from the mother or guardian for all the participants.

Data was collected using a pre-designed questionnaires. The questionnaire included socio-demographic information about the respondent age, educational status of self and family income & residence and information related to menstruation comprised age of menarche, diet, weight, height, waist circumference, level of physical activity, stress levels, age of menarche in mothers, exposure to cigarette smoke, divorce of parents. The respondents were not allowed to discuss any answers to minimize the bias over statistical analysis.

### Statistical Analysis

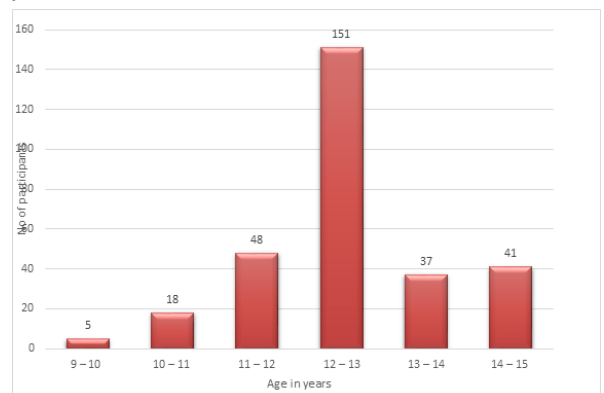
Data was entered and analysed using IBM SPSS Statistics for

Windows, Version 24.0, (IBM Corp, Chicago, IL). The qualitative data was represented in the form of frequency and percentage.

### RESULTS

Out of 372 enrolled for study, 72 were unable to answer the questionnaire completely, so excluded from the study. Remaining 300 menstruating girls who completed the questionnaire were taken up for the study.

Out of 300 cases, 50.33% of girls belong to 12 to 13 years of age followed by 16.00% in 11 to 12 years of age (as shown in graph 1). The mean age of attainment of menarche in our study was  $11.94 \pm 1.02$  years.



**Graph 1: Distribution Of Study Participants According To Age Of Menarche**

A few parameters like socio-economic status, mother's age of menarche, nature of diet, body mass index, waist circumference and amount of exercises were studied among the participants where participants were divided into two groups with age group below or above 12 years. There was a positive Pearson correlation between mother's age of menarche and age at which the girl attained menarche. There is a statistical significant difference among age of attainment of menarche and socio-economic status, body mass index, waist circumference & amount of exercises ( $p < 0.05$ ) and insignificant difference among age of attainment of menarche and nature of diet ( $p = 1.052$ ) (as shown in table 1).

**Table 1: Socio Economic, Physical And Cultural Parameters Among Study Participants**

Variables	Age of menarche		Statistical test	P value	
	<12 years	>12 years			
Socio-economic status	Lower (Upper lower & Lower middle)	58 (82.85%)	122 (53.04%)	Chi square test = 6.193	<0.001
	Upper (Upper middle & Upper)	12 (17.14%)	108 (46.95%)		
Mother's age of menarche	9 – 12 years	32	138	Pearson correlation r = 0.712	0.000
	12 – 15 years	6	124		
Nature of diet	Vegetarian	54	112	Chi square test = 3.926	1.052
	Non vegetarian	38	96		
Body mass index	Under weight	4	32	Chi square test = 1.705	0.049
	Normal weight	91	98		
	Over weight	38	17		
	Obese	12	8		
Waist circumference	<80 cm	98	142	Chi square test = 1.317	0.04
	>80 cm	47	13		

## DISCUSSION

Nowadays, the receding age of menarche is a universal trend and is associated with serious future implications of development of non-communicable diseases[4-13]. Thus determining the age of menarche in our urban Indian population and the associated factors is of paramount importance. The exact causal relationship is yet to be established.

We found the mean age at menarche to be 11.94±1.02 years and most (50.33%) respondents reported that they attained menarche between 12 – 13 years of age as studied by P. Iyer et al[4](12.7 years) and by S. Sinha et al[5](12.69 years). The trend of declining puberty has also been reported by several studies done in Bangkok, North Uganda, Europe and USA[6-9].

Gluckman P et al[14] linked the disparity between biological and psychosocial maturation with receding age of menarche among adolescent girls. We found a strong correlation between age at menarche and the high socioeconomic status class according to modified Kuppuswamy scale ( $p<0.001$ ), which is supported by Yarmchenko et al[15] and Dvornyk et al[16].

Graber JA et al[17] and Meyer et al[18] found out genetic linkage as a cause for earlier menarche. Towne et al[19] and Suman et al[20] suggested that no single gene has been found that controls timing of puberty and that intrinsic factors are not the only determinates of age at menarche for a girl. In our study, we observed a strong association between the respondent's age at menarche and her mother's age at menarche ( $p=0.000$ ).

As stated by Castilho SD et al[21] Gunther ALB et al[22], we also found no significant correlation between age of menarche and the type of diet ( $p=1.052$ ). We found a significant correlation between BMI and age at menarche ( $p<0.05$ ) which are inconsistent with Raveendran RC et al[23] and Rao S et al[24] & consistent with Guo et al[25] and Ji and Qing et al[26] who reported decrease in age at menarche with every unit increase in BMI.

We found a significant association between increased waist circumference and age at menarche ( $p=0.04$ ) in par with Guo et al[25].

Stress is an important psychological factor affecting teenagers nowadays. The causes of stress are negative body image, peer pressure, increased competition and academic pressure, stress due to unstable environment at home, alcoholic father and broken families, among many other possible stressors [28,29]. Our study did not include all these factors in the statistical analysis as they were responded irrelevantly.

## CONCLUSION

We conclude that receding age of menarche is an ominous physiological event with long term risks which can be prevented by identifying the associated risk factors, adopting a healthy life style and self-care. In our study we found that factors like mother's age of menarche, socio economic status, BMI, WC. We recommend to evaluate menarche onset in a prospective research by studying the same number of girls classified in two groups of fit and fat participants.

## Limitations

- The findings of this study were based on self-reported data.
- This study doesn't compare the rural and urban girls.
- Sample size is less to conclude the findings to the general population.

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