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Original Article

Age of Menarche among Girls at Allahabad, Uttar Pradesh

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ABSTRACT

The age of menarche at which first menstrual bleeding occurs in female is considered as an important indicator of women health and social wellness. The aim of this study was to find out the mean age at menarche among girls and its association with residential and socio-economic status, and dietary habits. This study was conducted on 265 medical and paramedical students at Allahabad, Uttar Pradesh between October and December 2014. The study was retrospectively conducted with the help of structured questionnaires. Data were analysed for association-of-age of menarche with residential and socio-economic status and dietary habits of girls. Mean and standard deviations (S.D.) were determined for each class observation. *Z* score was used to test for significance. The mean age at menarche was found to be 11.82 ± 1.42 years. Maximum girls (n = 79, 29.81%) achieved their menarche during 12–13 years of age and the least in age group 15–16 years (n = 5, 1.88%). Study revealed decreasing age at menarche as we moved from lower to higher socio-economic groups. Vegetarians attained age of menarche later than the non-vegetarian girls.

Keywords: Age at menarche, Secular trends, Socio-economic status, Residential Status, Dietary habits, Allahabad, social wellness

INTRODUCTION

Onset of menstruation at puberty brings a series of physical and psychological developments in a female when she advances to become a woman from a girl. Its significance is not restricted just as to a discrete physiological milestone, but it has been considered as a sensitive indicator of reproductive health, nutritional and socio-economic status as well as mental health of a woman.

Most of the females observed it between 10 and 16 years of age. In India, it has been reported to be around 12 years[1,2]. However, it shows a remarkable range of variation which have been claimed to be associated with climatic conditions, genetic influences and socio-economic status[3,4]. Studies have suggested that menarche tends to appear earlier in life as the social, nutritional and economic condition of the society improves[5].

In industrial societies, age at menarche has been declining over the last 150 years with a secular trend, and similar trends have been reported in some developing countries. During the nineteenth century, a decline in age of menarche by 2–3 months per decade is recorded in United States and Europe[6]. A decline of about 0.3 year per decade could be calculated from Norwegian and Finnish data[7]. In India, a decrease of 5–7 days per annum was observed in Bengali Hindu girls[8].

Early onset of menarche has been found associated with higher incidence pregnancy induced hypertension (PIH)[9], primary infertility, endometriosis of the uterus, polycystic

ovarian syndrome and cancers of the breast and uterus, when combined with other risk factors[10].

Over the decades, the population under study has also undergone through changes in nutritional status, work culture and educational status owing to increasing health awareness, employment and per capita income. Yet there is a little information on the prevailing trends of age of menarche in the region is available.

AIM

The present study attempts to find the mean age at menarche and its trend in girls at Allahabad district of Uttar Pradesh and to study the association of age at menarche with residential status, socio-economic status and dietary habits.

MATERIAL AND METHOD

The study was carried out on 251 medical and paramedical students of Allahabad between October and December 2014 after obtaining informed consent. Data were collected using 300 self-administered structured questionnaires which included questions regarding place of residence, family structure, income and occupation of head, family income, qualifications of members and age of attainment of menarche. Questions were properly explained to avoid any form of misunderstanding and to facilitate accurate response by the subjects. Among 49 questionnaires, the information provided were either irrelevant or incomplete and hence were excluded from the study. The questionnaires were distributed and collected immediately after the completion to prevent interpersonal communication and influence of peers on individual responses amongst the girls. Socio-economic status was assessed according to modified Kuppuswamy scale in urban girls & Pareek scale in rural girls. Mean and standard deviations (S.D.) were determined for each class observation. *Z* score was used to test for significance. In all cases, a 5% level of error assured 95% level of confidence, accommodated with a critical value of 1.96 on a two-tailed distribution.

OBSERVATION AND RESULTS

Frequencies of cases and their respective age of attainment of menarche have been shown in Table 1. All the cases found to show their age of menarche between 9 and 16 years of age. The mean age at menarche was found to be 11.82 ± 1.42 years. Maximum girls (*n* = 79, 29.81%) achieved their menarche during 12–13 years of age and least in the age group 15–16 years (*n* = 5, 1.88%). The observation revealed that up to 12–13 years of age, there was continuous rise in the number of cases attaining menarche which stars declining continuously thereafter till 15–16 years.

Table 1: Frequency distribution among different age of attainment of menarche

Age of Menarche	Frequency	%	
9–10	16	6.04	
10–11	31	11.7	
11–12	58	21.88	**Mean±S.D. 11.82±1.42 years**
12–13	79	29.81	
13–14	45	16.98	
14–15	31	11.69	
15–16	05	1.88	
Total	265		

Table 2 reveals association of various socio-economic factors and mean age of menarche. Among 106 cases from rural residential location, mean age of menarche was found to be 12.12 ± 1.36 (S.D.) years. A total of 159 urban dwelling girls reported slightly earlier age of menarche with mean 11.67 ± 1.46 years. Subjects of lower, middle and higher socio-economic status (as mentioned by Kuppuswami classes IV–V, III and I–II respectively) have shown their respective mean age of menarche as 12.12 ± 1.36, 11.74 ± 1.42 and 11.35 ± 1.16 years, respectively. Non vegetarian subjects (*n*= 183) reported slightly lower mean age of menarche (11.63 ± 1.26 years) as compared to the rest 82 vegetarian subjects (11.94 ± 1.47 years).

DISCUSSION

The mean age of menarche in the present study is found to be 11.82 years. The mean age of menarche has been observed in other previous studies as 14.76 years by Rakshit[11], 13 years and 2 months by Chakravartti and Renuka[12] and ICMR[13], 14 years and 4 months by Kundalkar[14], 12.5 years by Bagga and Kulkarni[15], 12.5 years and 12.3 years by Banerjee *et al.*[16]. Clearly, a decreasing secular trend in the age of menarche from

Table 2: Mean age of menarche according to demographic variables

Variables	Frequency	Mean ± S.D.	*Z* score
Residential status			
Rural	106 (40.0%)	12.05 ± 1.34	2.18*
Urban	159 (60.0%)	11.67 ± 1.46	
Socio-economic status			
Classes I–II	101(38.1%)	11.35 ± 1.16	3.25*
Class III	92 (34.7%)	11.74 ± 1.42	0.465
Classes IVV	72 (27.2%)	12.12 ± 1.36	-1.64
Food habits			
Vegetarian	82	11.94 ± 1.47	1.654
Non-vegetarian	183	11.63 ± 1.26	

*Indicates statistically significant observations.

1962 to 2014 can be interpreted from these data. In this way, this study verifies the decreasing secular trends in age of menarche over decades. A similar decline of about 0.3 year per decade could be calculated from Norwegian and Finnish data[6]. In the present study, lowest age group was found to be 9–10 years. According to Times of India report[10], paediatricians in Goa have witnessed young girls reaching menarche at early ages of 8 and 9 years as compared to 12 to 14 years a decade ago. However, mean age of menarche observed in our study was on lower side from recent cross sectional studies of Dambhare and Wagh[17], Dahiya and Rathi[18], Sachan *et al.*[19] and Khatoon *et al.*[20] who reported mean age of menarche as 13.51 years (urban) and 13.67 years (rural), 14.7 years, 12.84 years and 12.43 years, respectively. Difference in results may be attributed to memory-based data in a questionnaire-based study from real-time observation in a cross-sectional study and smaller sample size in present study.

In present study, urban girls acknowledged earlier mean age of menarche (11.67 ± 1.46 years) than rural girls (12.05 ± 1.34 years). The difference was found statistically significant. Similar trend has been observed in the study of Khatoon *et al.*[20].

The present study came up with the trend of lowering of age at menarche as we moved from lower to higher socio-economic groups. Lower (Kuppuswami classes I–II), middle (class III) and upper (classes IV–V) strata have shown mean age of menarche 11.35 ± 1.16; 11.74 ± 1.42 and 12.12 ± 1.36 years, respectively. It was further observed that majority of the subjects experiencing an earlier menarche belonged to middle and higher socio-economic classes. The difference was found statistically significant for lower strata. The observation is in agreement with study of ICMR[13], Ghosh *et al.*[21], Bhalla and Srivastava[22], Agarwal *et al.*[23], Bagga and Kulkarni[15] and Sidhu[24], Rokade and Mane[25], Khatoon *et al.*[20] and Aradhya[26] who revealed that mean age of menarche steadily increases with the decrease in per capita income and socio-economic status. However, studies of Eveleth[27], Tanner[28] and Bai and Vilajayalakshmi[29] observed that the association of age at menarche with socio-economic status is not significant. A plausible explanation could be the use of different criteria by different researchers to define the socio-economic status that makes it difficult to compare among studies.

Our study revealed that girls on non-vegetarian diet have attained early menarche (11.63 ± 1.26) than their vegetarian counterparts (11.94 ± 1.47). However, the difference was not statistically significant in our study. Result of this study was in agreement with the study of Ghosh *et al.*[21], Prakash *et al.*[30] who found a significantly higher age of menarche (14.60 ± 1.33 years), compared to girls having non-vegetarian diet (14.09 ± 1.56 years) in hilly region. However, Padmavati *et al.*[31] reported a delayed onset of menarche by 6 months in non-vegetarian girls than their vegetarian counterparts. Effect of diet on age of menarche is poorly understood; however, it can be correlated with the adequate protein and energy intake which can be achieved easily with non-vegetarian food articles in comparison to the vegetarian diet.

CONCLUSION

Age of menarche is an accepted indicator of women's health and wellness. Lower age of menarche has been continuously found associated with various pathological conditions. All over the world, a secular trend of decreasing age of menarche has been observed irrespective of race religion and boundaries. It indicates future risk to half of the population of world towards unwanted health conditions. Various factors associated

with early age of menarche are upper socio-economic status, urban living and lifestyle, obesity, non-vegetarian diet and many more. Legal implications of age of menarche can be found with legal age of marriage, age of consensual sex and sexual assault. Age of menarche have further educational and medical concerns like sex education, contraception and preventive surgical and medical intervention towards diseases. One disadvantage of lowering the age limits is that we could miss major medical problems such as intracranial pathology in girls between the ages of 6 and 8 which were present with premature sexual maturation.

It is a preventable condition and government authorities should take cognizance of these data revealed in various studies to encounter this problem in a systematic and scientifically competent manner.

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