A cross sectional study to assess the determinants of early menarche in school going population in catchment area of UHTC of tertiary health care facility in Raigad district

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Abstract
Objectives: To study the mean age at menarche and factors influencing onset of menarche. **Materials and Methodology:** A Cross-sectional study among female students between 10 to 16 years of age of a Higher Secondary School in catchment area of UHTC. Pre-designed and tested questionnaire was used for data collection. Anthropometric measures recorded and BMI calculated. **Results:** Out of total sample size of 197, 129(65%) had got the menses. Mean age of menarche was found as 12.4years. Smart phone use also resulted in early menarche among the study population. **Conclusion:** Apart from genetics, other factors like socioeconomic, nutritional habits, exercise, use of smart phones also influence menarche. Health educational session at schools should stress on modifiable factors for better health implications.
Key Words: Menarche, Factors affecting menarche, Socioeconomic status.

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INTRODUCTION

Menarche is one of the most important event in a women's life. Menarche is a rather late event in puberty and heralds the transformation from childhood to adolescence. The age that menarche occurs varies and is dependent on the interaction between genetic and environmental factors. However, enormous spatial variations in age at menarche were documented both between and within sub-national human populations. Owing to commendable improvements in the field nutritional supply, public health interventions and socioeconomic advancement, the menarcheal age exhibited a secular declining trend across human population of late with considerable variability[1]. The mean age at menarche reportedly varied from 16.50 years to 12.43 years across various subgroups of Indian women over the past four decades. Notably, most of the studies that reported age at menarche above 13 years were estimates during 1970–1990, while remaining studies that provided estimates of age at menarche below 13 years were recent studies mostly after 2000[2,3,4]. Factors which have an impact on the menarche are heredity, racial or ethnic differences, geographical differences, body mass index, body fat, nutrition, physical activity, socioeconomic status, parental education, stressful family environment and acute or chronic illnesses[5]. So this study

is intends to find the average age at menarche in the population under study and various factors which will have influence on the menarche by assessing various parameters like socioeconomic factors, nutritional factors, mass media influences and smartphone usage.

MATERIALS AND METHODOLOGY

This was a cross sectional study carried out on female students of a secondary school in a urban area of Raigad District. All girl children between 10 to 16 years who are willing to participate for the study were included in the sample size. School was selected by random sampling method out of 5 schools which was semi-government schools. The study was conducted in 2018 for a period of three months. A pre-designed and tested questionnaire was used for data collection which was prepared in local language. Questionnaire was given to students and they were not allowed to discuss among themselves. Anthropometric measures were recorded with the help of teachers and BMI calculated later. Data entry and analysis was done using Microsoft Excel. Chi square test and p value were calculated for each pararmeters with respect to the menarchal categories. Institute Ethics Committee Clearance was obtained before start of study. Parental consent, verbal consent from the students and consent from the Principal of the School were also obtained.

RESULTS

Out of a sample size of 197 subjects,129(65%) were found to have attained menarche. 83.76% of students were aware about the menstruation at the time of study and most of them(60.6 %) were about the same through their mothers. Average age at menarche was found to be 12.4 years from the study where as average age at menarche of mother's were14 years. Early menarche (10-11years) was seen in 23.3% of subjects and late menarche (14-15) in 16.3%. Average age at menarche was lower in girls who are over-weight (11.7years) and higher in those who are under-weight (12.56) but p-value was not significant(p0.6).Another significant finding was that the onset of menarche was seen early in girls who used smart phones for more than 30 minutes (p 0.007).

Table 1: Comparison of menarche with different factors

Parameter	frequency	Percentage	Average age at menarche	P value
Religion				
Buddhist	11	5.58%	12.18	
Christians	4	2.03%	12.5	
Hindus	171	86.80%	12.4	0.4
Muslims	11	5.58%	12.1	
Socioeconomic Class (kuppuswamy's)				
Upper	21	10.66%	12.6	
Upper Middle	104	52.79%	12.2	
Lower Middle	62	31.47%	12.78	0.06
Upper Lower	10	5.08%	12.29	
Dietary pattern				
Vegetarian	38	19.3%	12.7	
Non-Vegetarian	159	80.7%	12.3	0.1
BMI				
< 18.5	109	55.33%	12.56	
18.5 to 24.9	74	37.56%	12.33	
> 25	14	7.11%	11.7	0.6
Exercise				
No exercise	62	48.1%		
Less than 30 minutes	36	27.9%		
More than 30 minutes	31	24.0%		0.8

Table 2:

Smart Phone usage	Early menarche	Ideal Age	Late menarche	Grand Total	P value
Not using phone	10	24	4	38	
Less than 30 minutes	4	29	13	46	
More than 30 minutes	16	25	4	45	
Grand total	**30**	**78**	**21**	**129**	0.007

DISCUSSION

This study found that the average age at menarche was 12.4 years in an urban area in Raigad district of Maharashtra which is less compared to a study by Dambhare *et al* (2011) conducted in Wardha district which was 13.5 years[6.]. Another study by Khadgawat R *et al* (2016) in Delhi found the average age at menarche to be 12.4 years[7]. Study shows that 23.3% attained early menarche and 16.3 % were under late menarcheal age group. The early onset of menarche was recorded in 18% and late onset in 13.6% of the girls in a study conducted by Bagga A *et al* (2000) in Pune, Maharashtra[8]. In another study conducted at Aligarh 25.8% were found as early matures and 15.5% girls as late matures[9]. Average age at menarche was lower in girls who are over-weight (11.7years) and higher in those who are under-weight (12.56) but p-value was not significant. Awadhi N A *et al* (2013) in Kuwait showed that median age at menarche in overweight girls as 12.00 years, in obese as 12.19 years, those with normal BMI as12.61 years and underweight as13years[10]. Ahmed S M *et al* (2016) in a study conducted in Karachi observed no significant difference with BMI[11]. Some other studies also showed no assosciation with BMI and menarcheal age[12,13,14]. Quality of food is also said to influence the menarche. Studies have been conducted to find any association between intake of animal protein versus vegetable protein and also of carbonated drinks[15-19].Present study compared vegetarianism and non-vegetarianism and found no association with the same. Socioeconomic status studied did not show any difference. Studies conducted in Karachi by Ahmed S M *et al* and another study in Turkey also showed varied results[11]. Strenous physical activity is another factor which influences menarche. In our study most of the subjects who attained menses had no physical activity or did it for less than 30 minutes however pvalue is non-significant.Dambhare D G *et al* in a cross-sectional study conducted in adolescent age group concluded that mean age of menarche is lower in children of higher socio-economic class and higher in those involved in vigorous sports activity[6.] Watching movies or reading a book of any particular type was not found significant. However,early menarche was seen in girls who uses smartphones for more than 30 minutes. A study by Brown JD *et al* in 2005 concluded mass media as a sexual super peer for early maturing girls[20].

CONCLUSION

Age at menarche has definitely fallen from what it was a decade ago. Apart from those factors which are conventionally studied there are many more which influences menarche. It was difficult to draw a casual inference since this was a cross-sectional study and because of limited sample size. We collected data close to the time of menarche so as to reduce the recall bias. Menarcheal age has important health implications as early menarche is associated with more cardiovascular risk, cancer risk, anxiety, depression and sexually transmitted diseases. So more multicentric studies are needed to find the cause for change in trends of menarchal age including the role of mass media and smartphone usage and of any possible interventions

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