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Research Article

AGE AT ONSET OF MENARCHE IN APPARENTLY HEALTHY URBAN SCHOOL CHILDREN- A CROSS SECTIONAL STUDY

Reena Francis., Umadevi L and Rajaguru Ganesan*

Department of Pediatrics, Chettinad Hospital and Research Institute, Kelambakkam-603103

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ABSTRACT

Objective: To study the relationship between anthropometric indices and age at onset ofmenarche in urban school girls.
Methods: Apparently normal 249 adolescent girls between age group of 11 to 15 years studying from class 6 to 10th were taken for study. Girls with prolonged medication and chronic diseases were excluded. Height, weight were measured and BMI was calculated. Age at menarche was determined by status quo method.
Results: Among 249 adolescent girls, 188(75.5%) attained menarche and 61 girls (24.5%) had not yet attained menarche. Median age at onset of menarche is 12 years in girls and 15 years in mothers. Majority of the girls attained menarche at 12yrs (40.42%).Mean (SD) BMI in menstruated and non-menstruated girls were 21.32 (4.5) and 18.6 (3.7) .There was a positive co-relation between BMI and age at menarche (p = 0.001). Girls with higher BMI attained menarche at early age. Daughters attained menarche earlier than the mothers which is significant by Kruskal Wallis test with p value of 0.038.
Conclusion: Menarche occurs earlier in daughters than their mothers.Higher BMI is associated with lower menarche age.

INTRODUCTION

Attaining menarche is an important milestone, resulting from activation of complex neuroendocrine mechanism. Globally there is a secular trend in the age at menarche. Studies shows enormous variation in the age at menarche of the women residing within the same country .Mean age at menarche of Indian women is 13.76yrs(1).Various factors affect the onset of age at menarche such as socio-economic status, nutrition , race, genetics, environmental factors and maternal age at menarche(2–4). In the developed countries trend in the age at menarche had flattened, however in developing countries still there is decreasing trend(1,5). Accumulated evidence shows, early onset of puberty and menarche in girls with higher body mass index(BMI)(6,7). Increase in body fat cause secretion of leptin which in turn stimulate hypothalamus to over secrete GnRH, leading to activation of pituitary ovarian axis speeding up of puberty. However no co-relation was showed between BMI and age at menarche in Indian girls(8). Since there is a paucity of data regarding the impact of obesity on age at menarche, we therefore conducted a study on south Indian adolescent girls from urban area, to assess the age at menarche and factors influencing it.

METHODS

This is a school based cross sectional study carried out in 3 urban schools located in Chennai city in Tamilnadu, India.

Corresponding author:* **Rajaguru Ganesan
Department of Pediatrics, Chettinad Hospital and Research Institute, Kelambakkam-603103

The study was conducted after obtaining permission from school management. Detailed written information regarding the study was given to the parents. Before obtaining consent, parents were called and explained about the study and their queries were addressed. Written consent was obtained from parents and verbal assent was obtained from the children who participated in the study. The study was approved by the institute ethics committee.

In our study apparently normal 249 adolescent girls between 11 to 15 years of age enrolled from class 6 to 10 grade were recruited from June 2016 to July 2016. Girls with chronic disease, systemic illness or taking long term medication were excluded from the study. A detailed history and clinical examination was taken to confirm whether the study population was representative of normal healthy children without any systemic illness. Data regarding age and anthropometry measurements (height, weight) were recorded. Height was measured with portable stadiometer and weight was measured with digital weighing machine. Height and weight were measured in light clothes without foot wear. BMI was calculated as weight divided by height in meter square for all recruited girls and they were grouped according to WHO into underweight, normal, obese and overweight. Information regarding Socio-economic class was obtained and recorded classified according to Modified kuppusamy scale. To determine the age at onset of menarche *status quo* method was used. In *status quo* method, data for menstrual age is obtained by asking subject of her current menstrual status,

whether she had achieved menarche or not and her date of birth.

Statistical Analysis

Statistical analysis was done by SPSS software version 22. Meanage of menarche and 95% CI was obtained using the same software. Associations between socio-economic class, BMI class and age at menarche were assessed using the independent t-test.Kruskal Wallis test is used for comparing the Mean rank of Age at Menarche of daughter for each Age category of the mother**.** Statistical significance was assumed at $p < 0.05$ and a confidence interval of 95%.

RESULTS

Totally 249 adolescent girls participated in the study, among the study group 188(75.5%) girls attained menarche and 61 girls (24.5%) had not yet attained menarche. Anthropometric characteristics (height, weight and BMI) of all the girls in the age groups are shown in table 1.Girls from age group of 11 to 15 were taken into the study. Mean BMI of the girls ranged from 19.59 to 21.99. The mean height ranged from 140cm to 158cm and the meanweight ranged from 42.1 kg to 49.8 kg.

Table 1 Age and anthropometric measurements of the study population (n=249)

Age group	Number	Height(m) mean(SD)	Weight(kg) Mean (SD)	BMI(kg/m2) Mean(SD)
11	48	1.40(0.08)	42.1(10.23)	20.33(4.12)
12	50	1.52(0.07)	49.8(11.07)	21.99(4.17)
13	50	1.55(0.06)	49.7(10.76)	20.70(4.16)
14	50	1.56(0.05)	49.3(11.52)	20.54(4.13)
15	51	1.58(0.07)	48.8(10.84)	19.59(4.17)

Table 2 cumulative distribution of age at menarche of study population (n=188)

Age of menarche(in years)	Number of girls	% of menarche
10	23	12.23
11	34	18.08
12	76	40.42
13	54	28.72
14	1	0.53

Table 3 Distribution of age at menarche of mothers, of study population

Age at menarche of mothers (in years)	Number	% of menarche
13	6	2.4
14	42	16.9
15	121	48.6
16	73	29.3
17	7	2.8

The lowest and highest age at onset of menarche was 10 and 14 years respectively. Majority of the girls attained menarche at 12 yrs (40.42%) followed by 23(12.23%) girls attained at 10 yrs, 34(18.08%) of girls attained at 11 yrs and only 1 girl attained menarche at 14yrs of age as shown in table 2. Majority of the mothers attained menarche at mean age of 15 yrs (48.6%) and the age at menarche ranged from 13 to 17yrs as shown in table 3.

Table 4 Menstrual cycle characteristics of girls attained menarche (n=188)

Variable	Frequency	Percentage
Menstrual pattern (n=188)		
Regular	134	71.3
Irregular	54	28.7
Presence of Dysmenorrhoea		
Yes	132	70.21
No	56	29.79

Table 5 BMI distribution of age at menarche of study population (n=249)

Age group (in years)	Number	BMI		p value
		Attained MenarcheMean(SD)	Not Attained Menarche Mean(SD)	
11	48	18.6(1.1)	17.3(2.1)	0.065
12	50	21.4(2.6)	17.5(3.2)	0.042
13	50	21.8(2.9)	18.4(3.7)	0.031
14	50	22.3(4.1)	19.6(4.4)	0.432
15	51	22.5(4.9)	20.2(4.7)	0.453

Among 188 girls who had attained age at menarche, 134 (71.3%) had regular and 54(28.7%) had irregular menstrual cycle and dysmenorrhoea was present in 132 girls (70.1%) as shown in table 4.Girls who attained menarche at 12 and 13 years of age had higher BMI, which is statistically significant as shown in table 5. Most of the Obese and overweight children had attained menarche than the underweight girls which is statistically significant as shown in table 6.

Table 6 Relationship between BMI and Age at menarche

Nutritional status	Menarche status		Chi-square value	p value
	Not attained n (%)	Attained n (%)		
Underweight	7 (11.5)	1 (0.5)		
Normal	48 (78.6)	157 (83.5)		
Overweight	4 (6.5)	18 (9.5)	**27.038**	**<0.001**
obese	2(3.4)	12(7.5)		

Table 7 Relationship between socio-economic status and age at menarche

Socioeconomic status	Menarche status		Chi-square value	p value
	Not attained n (%)	Attained n (%)		
Upper class	12 (19.7)	57 (30.3)	**2.606**	**0.106**
Upper middle class	49 (80.3)	131 (69.7)		

Socioeconomic class was classified according to modified Kuppusamy scale 2016, upper class (26-29 score), uppermiddle class (16-25 score)

However the most of the girls belong to upper and upper middle class socioeconomic status, it doesn't influence the age at menarche among the study girls as shown in table 7. Comparing the means of age at menarche of daughters with their mothers, daughters had lower age at menarche than the mothers which is statistically significant by Kruskal Wallis test with p value of 0.038 as shown in table 8.

Table 8 Kruskal Wallis test for comparing the Mean rank of Age at Menarche of daughter for each Age category of the mother

Age at menarche of mother	Frequency	Mean Rank	Kruskal Wallis test value	p value
13	5	73.5		
14	36	102.75		
15	81	82.59		
16	59	108.07	10.158	0.038
17	7	90.5		
Total	249			

DISCUSSION

This cross sectional study conducted in southern Chennai shows that most of the girl's attained menarche was in the range of 13 to 15 years (80.31%) and age of the study group is between 11 yrs to 15 yrs. The median age of menarche in our study is 12yrs which is lower than previous studies from India (1) and median age at menarche of mothers is 15 years, which clearly shows decreasing trend in the onset of menarche in Indian girls in our study group. The mean (SD) menarcheal age of the mother's in our study was 15± 1.6 yrs, which is higher than the mean age at menarche of the daughters 12± 1.2yrs. A secular trend of decline in age at menarche which was reported earlier is still persisting in our study population. Erosy *et al* in their studies showed mean menarche age of the girls was 12.82 ± 1.07 years and for the mothers was 13.6 ± 1.39 years which was statistically significant and it is also independent of the socio-economic and nutritional state(3). Menstruated girls had higher BMIthan the non-menstruated girlswhich is also statistically significant in our study. Khadgwat *et al*(9) showed that puberty occurred earlier in obese and overweight Indian girls regardless of the hormone levels .Variability and disorders of menstruation are common after the onset of menarche in adolescent girls, which is also noted in our study , which showed that girls had higher percentage of irregular cycles and dysmenorrhoea compared to the study done by Lee *et al* (10) which shows 37.2% of menstruated girls had irregular cycles and 69.4 percent had dysmenorrhoea.When the Mean rank of age at Menarche of daughter for each age category of the mother was compared, it was noted that daughters had lower age than the mothers in the onset of menarche which achieved statistical significance in our study. Early onset of menarche in our population may be attributed to early stimulation GnRH - pituitary ovarian axis speeding up of puberty and also contributed by various factors such as area of residence, geographic region, linguistic groups, educational attainment, wealth status, caste and religious affiliations as studied earlier in Indian women by Pathak *et al*(1). Socio-economic status had no effect in the onset of menarche in our study population. Only selective variables have been analysed in our study and parents were over concerned regarding pubertal staging and hormonal assessment, which could not be carried in our study. Girls belonging to upper middle class and upper class were only included in our study, which is not representative of all group of population in our society. So caution must be taken before interpreting data. Although our study group doesn't represent the whole of southern India but it is one of the studies showing temporal relationship between BMI and early onset of menarche.

Bibliography

1. Pathak PK, Tripathi N, Subramanian SV. Secular trends in menarcheal age in India-evidence from the Indian human development survey. PloS One. 2014;9(11):e111027.
2. Thomas F, Renaud F, Benefice E, de Meeüs T, Guegan JF. International variability of ages at menarche and menopause: patterns and main determinants. Hum Biol. 2001 Apr; 73(2):271-90.
3. Ersoy B, Balkan C, Gunay T, Egemen A. The factors affecting the relation between the menarcheal age of mother and daughter. *Child Care Health Dev*. 2005 May; 31(3):303-8.
4. Zacharias L, Wurtman RJ. Age at menarche. Genetic and environmentalinfluences. *N Engl J Med*. 1969 Apr 17; 280(16):868-75.
5. Junqueira Do Lago M, Faerstein E, De Souza Lopes C, Werneck GL, Pró-Saúde Study (Rio de Janeiro, Brazil). Family socio-economic background modified secular trends in age at menarche: evidence from the Pró-Saúde Study (Rio de Janeiro, Brazil). *Ann Hum Biol.* 2003 Jun; 30(3):347-52.
6. Kaplowitz PB. Link between body fat and the timing of puberty. Pediatrics. 2008 Feb;121 Suppl 3:S208-217.
7. Mohamad K, Jamshidi L, Nouri Jelyani K. Is Age of Menarche Related with Body Mass Index? *Iran J Public Health.* 2013 Sep; 42(9):1043-8.
8. Banerjee I, Chakraborty S, Bhattacharyya NG, Bandyopadhyay S, Saiyed HN, Mukherjee D. A cohort study of correlation between body mass index and age at menarche in healthy Bengali girls. *J Indian Med Assoc.* 2007 Feb; 105(2):75-8.
9. Khadgawat R, Marwaha RK, Mehan N, Surana V, Dabas A, Sreenivas V, *et al*. Age of Onset of Puberty in Apparently Healthy School Girls from Northern India. *Indian Pediatr.* 2016 May 8;53(5):383-7.
10. Lee LK, Chen PCY, Lee KK, Kaur J. Menstruation among adolescent girls in Malaysia: a cross-sectional school survey. *Singapore Med J.* 2006 Oct;47(10):869-74.

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