
Age at menarche and its relationship to body mass index and waist circumference among adolescent Bengali girls of Tripura, North East India

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ABSTRACT:

Menarche is the first menstrual bleeding in the life of a female and represents a major landmark event in the life of an adolescent girl. It usually start sometime between ages 11 and 14 years, but it can happen as early as age 9 or as later as 15 years. This study was carried out to determine the age, weight, height, body mass index and waist circumference at menarche among 352 Bengali school girls of North and Dhalai District of Tripura. This study was a descriptive survey with non-probability sampling techniques. Data on age at menarche have been collected using retrospective method of recall. Results from this study revealed that the mean menarche age is 12.57 ± 1.01 , mean weight 40.94 ± 4.72 , mean body mass index 18.96 ± 2.56 and mean waist circumference 0.64 ± 0.05 . The coefficient of variation was highest for weight (11.53%) and least for height (3.80%). The coefficients of variations of age are 8.02%, body mass index 13.45% and waist circumference 8.48%. The findings of the present study indicated little change in the weight, body mass index and waist circumference of subjects from one age group to another during menarche.

KEYWORDS: *Menarche, Body mass index, Waist circumference, Bengali school girls, Tripura.*

INTRODUCTION:

Menarche is the onset of menstruation and is one of the milestones in women's lives. Unlike other pubertal changes that are gradual & continuous; menarche is a distinct event with a sudden and dramatic onset. Age at menarche is an important factor in health planning and it is known to be influenced by genetic factors, environmental condition, body stature, family size, body mass index, socioeconomic status and level of education (Chumlea, 2003). Overweight and increased body mass index have been among the major changes in girls, is most likely affect the menarche age (Demerath *et al.*, 2004). Adolescent girls constitute a vulnerable group, particularly in India where female child is neglected one. Menarche is a part of the complex process of growing up. The age of onset of menstruation varies from 9 to 18 years with the average age in United States being about 12 years and 8 months, whereas in India it is slightly lower and has been reported to be around 12 years (Khadilkar *et al* 2006, Chumlea *et al* 2003). Few studies in North East India have been reported varying mean age at menarche in different population variation (Das, 1967; Deb, 2009, 2011; Srivastava and Gowsami 1968; Saha and Sil, 2015) and in different parts of India, ranging from 12.3 years in Bengali girls (Banerjee *et al* 2007) to 15.4 years in lower socio-economic group of western India (Rao *et al* 1998). Though age at menarche has been reported in many Indian

subpopulations, but no information is available on the Bengali population of Tripura. Hence this study is aimed to determining the effects of physical development on the onset of menarche in rural Bengali girls of Tripura.

MATERIALS AND METHODS:

A cross-sectional study was carried out over a six week period from October to November 2014, in different schools of North and Dhalai District of Tripura. Age at menarche was obtained from each subject using the retrospective method. The questions asked were directed to a sample of 352 Bengali school girls who attained their menarche stage within the duration of the study on different occasions. Respondent participated with an assurance of confidentiality and anonymity. Data were collected after obtaining the necessary approval from the school authorities and written consent was obtained from each subject. One –in-one interview was conducted and other physical measurements were also taken using standard techniques (Weiner and Lourie, 1981) and body mass index (BMI) was also calculated. Height of the children was recorded to the nearest 0.1 cm with the help of an anthropometric rod with the head held in the Frankfort horizontal plane. The weight of the children was taken using a portable weighing scale to the nearest 0.1kg wearing minimum possible clothing and without any footwear. The student’s waist circumference was measured using tailors tape rule to the nearest 0.1 cm. The data collected were subjected to statistical tools like mean, standard deviation, Students t-test, analysis of variance etc. to obtain the results.

RESULT AND DISCUSSION:

Table 1: The frequency distribution and mean age at menarche of Bengali school girls of Tripura.

Age range (Years)	frequency	% of menstruating girls
9	4	1.13
10	20	5.68
11	68	19.32
12	159	45.17
13	85	24.15
14	11	3.13
15	5	1.42
Total	352	100

Mean ± S.E. = 12.57 ± 1.01

Frequency distribution of girls according to menarcheal status is shown in Table 1. The age of the respondents was between 9-15 years. 1.13% respondents were 9 years old, 5.68% were 10 years old, 19.32% for 11 years, 45.17% for 12 years, 24.15% for 13 years, 3.13% for 14 years and 1.42% for 15 years. It was inferred that the most common menarche age was 11-13 years old.

Table 2: The distribution of mean height, mean weight, mean body mass index and mean waist circumference with their standard deviations according to age of menarche

Age (years)	9		10		11		12		13		14		15	
Sample size	No	%	No	%	No	%	No	%	No	%	No	%	No	%
	4	1.13	20	5.68	68	19.32	159	45.17	85	24.15	11	3.13	5	1.42
Mean height	1.42±0.03		1.42±3.20		1.45±0.05		1.47±0.06		1.50±0.05		1.51±0.04		1.51±0.02	
Mean weight	42.7±2.97		40.5±4.06		41.2±4.88		40.4±5.26		41.5±3.92		40.2±2.30		39.2±2.57	
Mean BMI	21.13±0.78		20.09±2.38		19.70±2.91		18.78±2.84		18.57±1.49		17.55±0.92		17.13±1.53	
Mean WC	0.67±0.05		0.64±0.07		0.63±0.05		0.64±0.05		0.66±0.06		0.64±0.04		0.63±0.05	

In ages 10, 11, 12 and 14, menarche occurs at an invariant mean weight of about 40.4kg. Height at menarche in ages 11 through 15 are not significantly different. Late matures at age 15 are relatively taller compared to other groups; the difference was however not statistically significant.

The age group 9 years that reached menarche was of comparable height (1.42m) to other groups but had heavier weight than the other groups. The mean body mass index in all the groups was high except in group 15 years. In ages 10, 12 and 14 there mean circumference are significant. Age group 15 had the least mean waist circumference while age group 9 has the highest mean waist circumference.

The mean height of girls used for this study is 1.47± 0.06m. Height at menarche in ages 11 through 15 years are not significantly different. It was noticed that the age group 15 years were the tallest (1.51±0.02) followed by the age group 13 years (1.50±0.05). This result is in line with reports by Frisch 1972, that late menarche girls are significantly taller than girls with early menarche.

The mean menarche weight of this study is 40.94 ± 4.72 kg. It was found that the age group 9 years was the heaviest compared with other age groups. Ages 10 through 14 years had similar mean weight with the menarche weight while age 15 years had the lowest mean weight. The mean body mass index of the study is 18.96±2.56, it is concluded that those with early onset on menarche had higher BMI compared with those who started their menarche late. Age group 9 years had a mean BMI of 21.13±0.78 while age group 15 years had BMI 17.13±1.53.

The mean menarche waist circumference of this study is 0.64± 0.05 m. Age groups 9 and 13 years had 0.67±0.05 m and 0.66±0.06 m. This shows that age groups 9 and 13 years had higher mean waist circumferences at menarche. Age groups 10 through 12 and age group 14, 15 years had a significant mean waist circumference with the overall mean waist circumference of this study.

CONCLUSION:

The result of the present study showed that the age at menarche of Bengali girls of Tripura is 12.57 ± 1.01 years, mean height 1.47 ± 0.06 m, mean menarche weight 40.94 ± 4.72 kg, mean body mass index 18.96 ± 2.56 kg/m² and mean waist circumference 0.64 ± 0.05 m. Body mass index and waist circumference are also said to effect the age at menarche. There is a significant inverse relationship between age at menarche and obesity or overweight before and after adjusting for potential confounders. Further study in a larger population would help to evaluate and confirm the findings of the present study.

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