Study of Anthropometric Characteristic Pre-menarcheal and Post-menarcheal Girls of West Medinipur, India

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Abstract

Background: Menarche is defined as the first menstrual period. It is considered to be the most obvious sign of puberty in girls. It has been regarded in many cultures as a transitional step to womanhood. Nutrients are needed in varying amounts depending on one's stage of growth.

Objectives: Compare Anthropometric variation of Pre-menarcheal and post-menarcheal girls, Effect of body fat on menarcheal status.

Study design: This study is done on adolescent counselling centre named anwesha clinic Anthrometric measurement are taken for this study.

Method: Subjects: Adolescent school girls aged 10-19 years of Salboni Block of Paschim Medinipur which is the study area of Salboni Block is 25 km away from Medinipur town. Subjects are 10-19 years adolescent girls, the study was done on 1009 girls. Age at menarche of each girl was obtained by 'status-quo' method; with this method it is possible to collect menarche data for large representative samples of girls within a comparatively short periods.

Results: By comparison of Anthropometric variable it shows that post-menarcheal is higher anthropometric status. Mean difference in height, weight, MUAC, Triceps, Biceps, Fat Mass, Fat Free Mass, Body Mass Index, per cent body fat are 8.73, 3.69. 3.75, 1.56, 9.2.5.2, 4.99, 2.96, 2.41; they are significant; comparison of pre-menache and post-menacheal anthropometric shows that post-menarcheal girls' anthropometric status is high. Higher per cent body fat girls experience early menarche

Conclusion: Delayed menarche may be a sign of malnutrition since nutritional status improves; will be the attainment of menarche is lowered. Attainment of menarche decreases when BMI increases. There is a correlation between BMI and attainment of menarche and also, there is a correlation between early obesity and early onset of menarche. Girls with early onset of menarche had higher BMI than those with late onset of menarche.

Introduction

Menarche is the most important event of girls' adolescence period, it is sign of fertility of a girl. Menarche initiated by initiation of hormone like estrogen, and growth occurs in uterus and endometrium, according to Tanner growth menarche occurs after thelarche; in this period adolescence growth spurt occurs, to complete growth of adolescence need sufficient nutrition which help adolescence effects to reach adult stage, not only nutrition genetic, geography which effect on growth and menarche, age at menarche differ with ethnicity, heredity, even family structure, socio-economic status. 17% body fat is necessary in to onset of menarche, some chronic disease; malnutrition causes behind delayed menarche; study shows that Indo-Iranian including Indian north American girls shown first bleeding around 12.5 44 days decreased in mean age at menarche by 5 year birth cohort which varies UK in 18 days and 58 days in Germany. At mid adolescence period growth rate increases and reach peak height velocity; adolescence reached highest pubertal height stage there is no significant difference to the duration of pubertal growth irrespective of the timing of the onset of puberty Early menarche may happens due to single nucleotide polymorphism of LIN28B (Karapanou and Papadimitriou).

Due to lack of knowledge about nutrition supplement, adolescent suffers from malnutrition and experienced stunted growth which effects mean age at menarche; in rural area girls walk in bare foot and go for open defecation; this causes worm infestation which causes anaemia and it delayed their menarche, early age marriage causes early

conception before adolescent reach physically matured stage they give birth low weight child and they become under nutrient adolescent. After experiencing menarche, there will be some other changes that support reproductive function, such as breast growth. Median age at menarche still has decreased significantly, but with a slower pace of period approximately about one month per decade to 13.05 years in 2009. Median menarcheal age in girls of Turkish (12.50 years) and Moroccan (12.60 years) descent was 3.6 months earlier in 2009 than in 1997, a decrease of approximately three months in a decade suggesting a secular trend. In the same period the difference in median age at menarche between Dutch girls and girls from Turkish and Moroccan descent has increased with 2.4 months to 6.6 months and 5.4 months, respectively. De has found that post menarcheal girls have higher body composition compared to pre-menarcheal and mean age at menarche is 11.88 years In this it shows that menarcheal girls have higher Anthropometry [1]. Bhadra **et al.** demonstrated that the post-menarcheal Bengali girls had significantly greater amount of total body

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fat mass than their pre-menarcheal counterparts. Anthropometry is a tool to measure growth pattern in period of adolescence stage. Banik presents age at menarche and prevalence of undernutrition and poor health status appraised by Rohrer Index among girls (n=238) in Purulia district of West Bengal Joseph et al. in a study on adolescent girls in rural India, observed the mean age at menarche was to be 13.9 years and Nair et al. in study on unmarried females in rural area of Delhi, observed the mean age at menarche was to be at 13.6 years, which were almost similar to the mean age at menarche (13.19 years) of rural school girls. Acharya et al in study on adolescent girls in South Delhi, observed that the mean age at menarche was 13.34 (1.26) years, which was almost similar to the mean age at menarche in urban school girls 12.67 (1.4) years. Mean age at menarche is 12.19 years (1.03). Age at 12 years early menarche slow down when increase in height shown in tapai city girls of Taiwan (suhuchan 2000). Sachen etal (2012) found mean age at menarche is 12.84 years in north Indian district school girls.

Materials and Methods

The study area of Salboni Block is 25 km away from Medinipur town. Subjects were 10-19 years adolescent girls. The study had been done on 1009 girls. For this study different types of anthropometric measurements were taken like weight, height. Height is measured through Anthropometric rod; Weight was taken by weighing machine. Biceps skinfolds and Triceps skinfolds measurements were taken by skinfold Calliper. Height was measured to the nearest 0.1 cm and weight to the nearest 0.5 kg. Each subject was weighed with minimum clothing and no footwear. Structured questionnaires were followed to know details of socio-economic status of studied adolescent. Stature was measured to the nearest 0.1 cm in bare feet with participants standing upright against a wall-mounted stadiometer. Body mass was measured to the nearest 0.5 kg with participants lightly dressed (using a portal digital scale (Tanita HD 309, Creative Health Products, MI

USA). BMI was calculated from the ratio of body mass index.

Statistical analysis

Data were entered in Microsoft excel 2007 and was analysed using SPSS 19.0. Descriptive statistics and chi square test were used wherever required, to test statistical significance. Statistical significance was set at $p < 0$

Results and Discussion

Results

This study shows median age of menarche is 12 years and age range of menarche is 9-17 years, 34.2% experience menarche at age of 12 years. Tables 1 and 2 represent those girls who have higher BMI (kg/sqm) experience menarche. Among study group 136 girls are under nutrient. Table 3 shows mean differences of different anthropometric variables.

Among study group total 244 girls are under nutrient among these 41 are grade III under nutrient, By comparison of a anthropometric variable, it shows that post-menarcheal are higher anthropometric variables in mean difference in height, weight, MUAC, Triceps, Biceps, Fat Mass, Fat Free Mass, Body Mass Index, Per cent body fat are 8.73, 3.69. 3.75.1.56, 0.97, 2.52, 4.99, 2.96, 2.41 respectively, they are significant in Tables 4 and 5. Since there were significant differences in overall adiposity.

(BMI) between PMG and MG, multivariate regression analyses were undertaken which was tested for the effect of menarcheal status on PBF, FM, FFM, and FMI. Result denotes mean age at menarche had significant relation. It revealed that attainment of menarcheal status had significant impact on all four (PBF $P < 0.0001$; FM: $P < 0.0001$; FFM: $P < 0.0001$; FMI: attainment of menarche has a significant ($P < 0.001$) effect on all anthropometric characteristics except the two indices

Menarcheal Status	Nutritional Status					Total
	CEDIII	CEDII	CEDI	Normal	Overweight	
Pre-menarcheal status	2	1	136	740	3	882
Post-menarcheal	28	36	28	21	0	113
Total	30	37	164	761	3	995

Table 1: Menarche and Nutritional Status of studied Adolescent girls.

Nutritional status	Mean	N	Std. Deviation
CEDIII	1.9512	41	.21808
CEDII	1.9487	39	.22346
CEDI	1.1707	164	.37743
Normal	1.0276	761	.16392
overweight	1.0000	4	0.00000
Total	1.1239	1009	.32961

Table 2: Mean and SD of nutritional status of Adolescent girls.

Variable	Post-menarche	Pre-menarche	Mean difference	t value
weight(kg)	45.64(4.18)	36.90(4.14)	8.73	21.86
Height(cm)	151.48(4.64)	147.79(4.76)	3.69	8.29
MUAC(cm)	22.17(2.52)	18.42(2.89)	3.75	15.92
Triceps Skinfold	9.17(1.99)	7.60(1.71)	1.56	8.35
Biceps skinfold	6.25(1.54)	5.27(1.27)	0.97	6.75
Fat Mass(kg)	9.96(1.89)	7.13(1.39)	2.52	14.39
Fat Free mass(kg)	34.84(4.11)	29.84(3.36)	4.99	12.96
Body Mass Index(kg/sq m)	19.86(1.42)	16.89(1.73)	2.96	21.23
Percent body fat	21.66(2.98)	19.24(2.68)	2.41	8.56

Table 3: Anthropometric and body composition characteristics of the subjects.

Dependent	B	Beta	SEB	t	Adjusted R
Per cent Body Fat	0.135	0.234	0.018	7.63	0.054
Fat Mass(kg)	0.469	0.538	0.023	20.24	0.289
Fat Free Mass(kg)	0.246	0.609	0.01	24.34	0.37
Fat Mass Index(kg/sqm)	1.265	0.547	0.061	20.72	0.298

Table 4: Multivariate Regression Analysis of different Anthropometric measurement of studied girls.

Community	Per cent Body fat
Wang and Bachrach (USA) Asian	2.8
Black	6.8
Hispanic	5.1
White	0.6
Sampei et al. (Brazil) Japanese	7.5
Caucasian	5.5
Present study (India) Bengalee	2.4

Table 5: Differences in mean PBF between MG and PMG girls in different ethnic groups Study Ethnic group Difference (%) in mean PBF between MG and PMG girls.

of central fat distribution (WHR and CI). Test of significant (t-test) demonstrated that attainment of menarche had a significant effect on height, weight, BMI, WC, HC.

Discussion

Nutritional deficiency and inadequate iron consumption can delay menarche. BMI reflects only relative overweight, and not actual body fat mass. Adiposity can be estimated by body fat and BMI. It can be concluded that difference in mean PBF between Bengalee MG and PMG girls (7.7%) was most similar to the Wang and Balcharch (USA), Asian. It can be evaluated by height, weight, skinfolds, different circumferences, apanes girls (7.5%) In Brazil, it is followed by African-Americans (6.8%) in the USA. In conclusion, these studies clearly indicate that, in general, there exist higher adiposity levels among MG girls compared with PMG girls. Several earlier studies have indicated that differences existed in body fat between pubertal females and those that have not reached puberty. The results presented in this research work provide further support. From the result, the mean BMI for pubertal females was 19.86 while that for prepubertal females was 16.89. The difference between these two means is very statistically significant (P<0.05). This research also gives a document that the difference between menarcheal females mean BMI as compared to the mean BMI of premenarcheal females was significant (P<0.05).In this study per cent body fat represents higher in post menarcher girls onset of menarche. Per cent body fat has positive correlation with mean age at menarche; it indicates per cent body fat which influences mean age at menarche. The median age at menarche for bania girls in present study was found to be 12.3 years. This is in close agreement with menarcheal ages as reported by earlier studies conducted on adolescent girls [2-7].

Conclusion

Delayed menarche may be a sign of malnutrition as nutritional status improves; the attainment of menarche is lowered. Attainment of menarche decreases when BMI increases. There is a correlation between BMI and attainment of menarche and also, there is a correlation between early obesity and early onset of menarche. Girls with early onset of menarche had higher BMI than those with late onset of menarche.

Acknowledgement

Conflicts of Interest

There are no conflicts of interest.

Ethical Approval

To complete this study verbal consent of subjects are taken, this study does not harm other.

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