

Age, Weight, Height, Body Mass Index and Waist-Circumference at Menarche among Secondary School Girls in Otolo, Nnewi, South Eastern Nigeria

Chukwujekwu IE, Ezejindu DN, Olabisi O.J.¹

Abstract

The first menstrual period is known as menarche. It usually start sometime between ages 11 and 14years. 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 secondary school girls in Otolo, Nnewi ,Anambra South east Nigeria. This study was a descriptive survey with non-probability sampling techniques. One-on-one interviews were used to collect the data's. These data's were analyzed using frequency and presented in tables. Results from this study revealed that the mean menarche age is 13.49 ± 0.06 , mean weight 51.66 ± 8.33 kg, mean body mass index 20.14 ± 2.72 kg/m² and mean waist circumference 0.73 ± 0.06 m. The coefficient of variation was highest for weight (16.31%) and least for height (3.75). The coefficient variations of age are 7.04%, body mass index 13.51% and waist circumference 8.22%. The findings of this 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, Waist circumference, Body mass index, Height, Age, School girls.

¹ Department Of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.

Corresponding Authors E-mail: damianezejindu@gmail.com
Phone Number: +2348032715300

Introduction

Menarche is the onset of menstruation. It is the most striking event in the whole process of female puberty. From both social and medical perspectives, it is often considered the central event of female puberty as it signals the possibility of fertility^[1,2].

The 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. Overweight and increased body mass index have been among the major changes in girls, it is most likely that these factors affect the menarche age^[3].

The age at menarche shows the effectiveness of the female reproductive hormones, luteinizing hormone and follicle stimulating hormone^[4,5].

Girls experience menarche at different ages. The timing of menarche is influenced by female biology as well as genetic and environmental factors. The average age of menarche has declined over the last century but the magnitude of decline and the factors responsible remain subjects of contention. This biological event is the outcome of a number of social and biological factors, and the mean menarcheal age appears to be a sensitive indicator of the biosocial status of a population^[6,7,8,9,10].

The worldwide average age of menarche is very difficult to estimate accurately, and it varies significantly by geographical region, race, ethnicity and other

characteristics. Various estimates have placed it at 13.0^[11].

In the 19th century, factors that were thought to exert an influence on the physical menstruation of girls were climate, ethnic origin, social status, urban or rural residence, physical activity, education, sexual stimulation, housing, and health status^[12].

Studies carried out in the 20th century documented other factors associated with the age at menarche of season and with at birth, physique, position at the sib ship, family occupation, education of parents and family size^[12].

The relationship of physical growth to menarche age in humans continues to intrigue the researchers. Two principal hypotheses have been postulated. The first suggests a close correlation between rate of skeletal maturation and menarche age^[13,14,15,16].

Following this view, bone age has been chemically as the most appropriate general measure of developmental age in individuals which applies across human populations^[17,18].

The hypothesis postulates that the pre-menarche girl is growing towards an appropriate structural status to mitigate reproduction, and the age at which this status is attained is closely correlated with menarche age^[19].

The second view suggested that age at menarche might be related to attainment of appropriate skeletal status^[20].

Since the relationships of physical growth to menarche age in humans continue to be

subjects of contention, there is need to carry out this research. Hence this study is aimed at determining if age and physical developments have effects on the onset of menarche in young secondary school girls among the Igbo tribe of Otolu, Nnewi, Anambra State, Nigeria.

Materials and Method

Study Population

The population of the study involved 341 secondary school girls of Igbo origin between the ages of 9-17 years who reached menarche over a period of twelve months. The population comprises of students from 8 public schools and 33 private schools in Otolu Nnewi, Anambra State, Nigeria.

Instrument for Data Collection

The girls were called and interviewed on birth date, age, month of menarche and year of menarche and the data's recorded. Other instruments used in collection of data include scale balance, meter rule, and tailors tape-rule.

Method of Data Collection

The questions asked were directed to junior secondary school female students who have attained their menarche stage within the duration of the study on different occasions. Respondent participated with an assurance of confidentiality and anonymity. The data

was collected over a period of two weeks. One-in-one interview was conducted and other physical measurements were also taken as follows:

Height: The height of the students were measured with the girls standing erect, heels together, chin up, a horizontal ruler was made to rest on the head and the heights taken from the erect meter rule placed on a flat surface against the wall.

Weight: The students were weighed using a bathroom scale which was regularly checked against a standard scale. Each student was asked to remove everything they have in their pockets and hands. This was done so that no additional weight is added to their normal weight.

Waist Circumference: The students waist circumferences were measured using tailors tape rule. The zero end of the tape-rule was placed at the centre of the students umbilicus (navel) which the goes round the waist to meet the zero end of the tape rule. The point at which the tape-rule meets the zero ends is taken and recorded.

Methods of Data Analysis

The responses from the one-on-one interviews were analyzed manually. Results were tallied, put in frequency distribution tables so as to highlight the relative difference in frequency and percentage for each variable. The data were recorded in excel worksheet and analyzed using t-test, analysis of variance, and correlation test in the statistical package for social science (SPSS 16& 21). Level of significance is set at 95%

confidence limit or 5% level of significance.

Ethical Approval

The study was conducted after obtaining approval from the faculty of basic medical science ethical committee, college of health sciences, Nnamdi Azikiwe University.

Informed Consent

Informed consent was obtained from the principals and heads of administrations of the schools used. Privacy was also provided for respondents while explaining the procedure to answer the questions asked. Respondents were also told about their rights to decide whether to participate in the study or not.

Results

Table 1 showing respondents socio-demographic characteristics

Menarch Age (years)	Frequency (n=341)	Percentage (%)
11	3	0.9
12	39	11.4
13	140	41.1
14	114	33.4
15	37	10.8
16	7	2.1
17	1	0.3
Total	341	100

The age of the respondents was between 11-17years. 0.9% respondents were 11years old, 11.4% were 12years old, 41.1% for 13years, 33.4% for 14 years, 10.8% for 15 years, 2.1% for 16years and 0.3% for 17years. It was inferred that the most common menarche age was 12-15years old.

Table 2: Showing 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	11	12	13	14	15	16	17
Sample size	NO 3 % 0.9	NO 39 % 11.4	NO 140 % 41.1	NO 114 % 33.4	NO 37 % 10.8	NO 7 % 2.1	NO 1 % 0.3
Mean height	11.59 ± 0.06	1.60 ± 0.06	1.60 ± 0.06	1.59 ± 0.58	1.63 ± 0.06	1.67 ± 0.52	1.60
Mean weight	58.0 ± 9.50	51.1 ± 8.16	50.7 ± 7.98	51.5 ± 8.62	55.3 ± 8.57	53.7 ± 6.02	50.0
Mean/BM							

(Pag/M ²)	22.86 ± 2.54	19.84± 2.48	19.90±2.69	20.26±2.83	20.83±2.73	20.14±2.04	17.93
Mean WC	0.77 ± 0.11	0.73 ± 0.07	0.73 ± 0.06	0.73 ± 0.06	0.76 ± 0.06	0.69 ± 0.05	0.73

In ages 12, 13,14 and 17, menarche occurs at an invariant mean weight of about 51.5kg. Height at menarche in ages 12 through 15 and age 17 are not significantly different. Late natures at age 16 are relatively taller compared to other groups; the difference was however not statistically significant.

The age group 11 years that reached menarche was of comparable height (1.59m) to other groups but had heavier weight than the other groups. The mean body mass index in all the groups were high expect in group 17 having very low body mass index therefore making it underweight in ages 12,13,14and 17 there mean circumference are significant. Age group 16 had the least mean waist circumference while age group 11 has the highest mean waist circumference.

Discussion

341 secondary school girls between the ages 11 -17years participated in this research work. The mean menarche age of girls occurred most in ages 13 and 14years. This study is in line with study of 352 randomly selected secondary school girls in an urban population in South-western Nigeria which reported a mean menarche age of about 13.94 years with 76.8% of the girls attaining menarche between 13 and 15 years ^[21].

Another study conducted in Enugu, South-east was 13.54 ^[22], while a study on 322 secondary school girls in Ilorin concluded that the mean menarche age is 13.7 ± 1.10 years ^[23].

The mean height of girls used for this study is 1.60 ± 0.06m. It was noticed that the age group 16years were the tallest (1.67 ± 0.52m) followed by the age group 15 (1.63 ± 0.06m).

This result is in line with reports by [24] that late menarche girls are significantly taller than girls with early menarche. The

mean height attained in this study is significant to reported values of about 1.60-1 ± 62m for North American menarche height ^[25].

The mean menarche weight of this study is 51.66 ± 8.33kg. It was discovered that age group 11years were the heaviest compared with other age groups. Ages 12 through 14 years had similar mean weight with the menarche weight while age 17years had the lowest mean weight. In earlier studies, ^[23] reported that the mean weight of secondary school girls at Ilorin is 48.5kg which corresponds with ^[26] on the ambulatory patients.

The mean body mass index of this study is 20.14 ± 2.72kg/m². It is concluded that those with early onset on menarche had higher BMI compared with those who started their menarche late. Age group 11 years had a mean BMI of 22.86 ± 2.52 while age group 17 years had 17.93. This result is statistically in line with study conducted by ^[27] which shows that mean menarche BMI of girls in Sabzevar, and Iran is 21.27 ± 4.15 kg/m².

The mean menarche waist circumference of this study is $0.73 \pm 0.06\text{m}$. Age groups 11 and 15 years had 0.77 ± 0.11 and $0.76 \pm 0.06\text{m}$. This shows that age groups 11 and 15 years had higher mean waist circumferences at menarche. Age groups 12 through 14 and age group 17 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 in girls in Otolu, Nnewi, Anambra State had is 13.49 ± 0.95 years, mean height of $1.67 \pm 0.52\text{m}$, mean menarche weight of 51.66 ± 8.33 , mean menarche body mass index of $20.14 \pm 2.72 \text{kg/m}^2$ and mean menarche waist circumference of $0.73 \pm 0.06\text{m}$.

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