Influence of Socioeconomic Status in the Age at the of Menarche and Duration of Menstrual Bleeding

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ORIGINAL PAPER

SUMMARY

Purpose: The study of the relationship ,between the age at menarche and socioeconomic status in a rural area in Sudan. **Work method:** This was a cross-sectional descriptive study conducted in Altadamon and Eldubha areas in the northern state of Sudan during year 2006. It included 182 girls of age between 13 to 18 years in elementary and secondary school. **Work results:** The mean age at menarche for girls in Northern Sudan in this study was 13.93 ± 1.29 year, the mean menarcheal age in these girls are amongst the lowest values presented for African countries. The mean duration of menstrual bleeding among girls in the Northern Sudan in this study was 4.8 ± 1.22 days. We also found statistically significant differences in age at menarche between girls whose parents had a higher educational level and those with a lower educational level and also according to the economic status and size of the family. **Conclusion:** Between the girls whose parents were living together and girls whose parents separated there was a significant difference of 1.02 day.
Key words: socioeconomic status, age at menarche, Sudanese girls.

1. INTRODUCTION

Menarche, the first menstruation, is an important transition event in the female life cycle. It represents a concrete symbol of a shift from a girl to women. Unlike other gradual pubertal changes, such as breast development and pubic hair growth, menarche usually occurs suddenly and without precise predictability (1). Studies across variety of cultures on women's emotional reactions to menarche have yielded mixed results. Although some women recall feeling more mature, grown up, proud, and excited, others report having various negative experiences, such as being scared, worried, anxious, moody, and embarrassed with the onset of menstruation (2). Age at menarche, is an important maturity indictor to assess the developmental status of a pubertal female (1).

Age at menarche

In Western Europe where the data for a nearly, last 200 years is available, the mean age at menarche can be observed to have decreased from 17 years to 12.8 years (3). In urban India, the age of menarche was shown to be 12.6 years, which is similar to the age of menarche in the developed world (4). In countries, such as China and Senegal, from where large amount of data is available, the mean age of menarche in rural areas is still, as high as 16.1 years (5).

African mean Menarcheal age that reported by Pasquet et al. (6) in the girls of the rural Cameroon (14.3±1.65). In central Sudan, Attallah et al. (7) found that the mean age at menarche among Sudanese girls was found to be 13.89±0.15.

In rural Egypt Attallah (8) reported that the mean age at menarche for girls in rural Egypt was 13.89±0.18. In Zaire the mean Menarcheal age was (15.67±0.08) (9). Simodon et al. (10) reported that the mean age at menarche among girls in Senegal was 16.0±2.0.

Recent reviews of published studies on the variability of age at menarche throughout the world, he found that the factors that best explained the variation in age at menarche were adult illiteracy rate and vegetable caloric consumption. Now, almost all industrialized countries did not show any statistically significant differences in mean age at menarche for different social classes (11). On the other hand, large differences among social class have been reported from the third world countries in Asia and Africa, where the gap between rich and poor is very much greater (12). Due to improvements in the general pattern of living conditions, especially the ones concerning health care system and nutrition, age at menarche in Europe, North America and other developed countries has shown a general downward trend (13).

Age at menarche is a complex trait that is determined by multiple environmental factors, including nutrition, exercise, socio-economic conditions, psychosocial stimuli, childhood experience, general health and genetic factors. (14). Taken together these data highlight the crucial role of socio-economic and nutritional conditions on the timing of puberty or menarche.

Duration of menstrual bleeding

Data from multicenter contraceptive trials have revealed striking regional differences in the duration of menstrual bleeding in both adolescent girls and adult women. For example, Mexican and Latin–American women bleed for a mean of 4.5 days compared with a mean of 5.9 days for European women (15). Cleckner-Smith et al, (16) found that in 94.7% of the girls from their adolescent samples had menstrual flow between 4 and 8 days. Padez and Rocha (17) found that about 59% of the girls had bleeding duration of 3-5 days. These data indicate the existence of substantial variation between populations, at least on a global scale. However, none of the multicenter studies of regional differences include African women, and in the United States, longitudinal menstrual diary studies have not examined ethnic differences in bleeding patterns (18). The role that host and environmental factors may play in explaining these regional differences in bleeding duration is largely unknown (15). A few studies have suggested that duration of menstrual bleeding may be influenced by age, altitude, history of exposure to diethylstilbestrol, and weight. Recently, factors known to influence ovarian function and menstrual cycle length, including low weight for height, dieting, and exercise, were found affect the duration of bleeding within a sample of college women. However, since the sample was relatively small and consisted predominantly of European–American women, the generalizability of these findings to other populations is unclear. As is true for menstrual cycle length bleed duration and bleed amount in adolescence may be important risk factors for the occurrence of menstrual dysfunction later in reproductive life (18).

2. GOAL

The aim of the study was to to study the relationship between age at menarche and socioeconomic status in a rural area in Sudan.

3. METHODS

- Study area: Elementary and secondary schools at Altadamon and Eldubha areas in Northren Sudan were the study areas.
- Study design: This study was a descriptive cross sectional study.
- Study subjects: Included Sudanese girls, age from 13 to 18 years in the elementary and secondary schools at Altadamon and Eldubha areas in Northern Sudan.
- Sample size: Equation

The simplest equation relating the precision and sample size is $n* = Z2œ/2 \times S2 \div e + Z2œ/2 \times S2 \div N$

Where: $n*$= sample size. e = precision "margin error". S = standard deviation.

N = population size.

- To estimate "S" variance:

Because nothing is available we guess the variance, according to hypothesized distribution. In our study we believe the population to be normal distributed so we estimated "S" by range/4 or range/6, because approximately 95% values.

Range = difference between high and low age of menarche in population

$18 - 13 = 5$
$S = range \div 4 = 1.25$
$n* = ?$
$Z œ/2 = 1.96$
$e = 0.03$
$N = 2300$
By calculation $n* = 182$

The total number of girls between 13 to 18 years of age in Altadamon and Eldubha areas elementary and secondary schools was 2300 girls (from the Ministry of Education, Northern State). Stratified random sampling method was used in this study, and sample size was statistically determined. It was 182 girls.

3.1. Procedures

Data analysis methods

Statistically, the obtained data were analyzed by using statistical program for social sciences (SPSS.14). Descriptive statistics like frequency distributions for categorical variables and the means, standard deviations are used to describe the characteristics of the study population. Data were represented as mean ± STD, the variables in correlation to age at menarche is considered significance if the probability is less than 0.05.

4. RESULTS

The participants in this study are 13 - 18 year old girls from elementary and secondary in Altadamon and Eldubha areas in Northern Sudan participated in this study. Table 1 shows distribution of sample according to age.

Age of menarche distribution

Frequency distribution of girls according to menarcheal status is shown in Table 2. In this sample menarcheal age ranges from 11 to 18 years. Majority of the girls attained their menarche at the age of 13 years (30.3%) followed by 14 (24.9%) and 15 (11.4%) years of old. The frequency of girls experiencing menarche before 12 years (7.6%) and after 15 years (13.0%). the mean age at menarche found to be 13.93 ± 1.29 year (range, 11 – 18 year). Figure 1 shows distribution of sample according to age at menarche.

Duration of menstrual flow

Bleed duration ranged from 3 to 9 days (mean 4.8±1.19 days) (Table 7). 21.7% of the participants reported having a bleed length more than 5 days and 31.9% of participants reported a bleed length less than 5 days. Figure 2 shows distribution of sample according to duration of menstrual bleeding.

Age	13	14	15	16	17	18	Total
Frequency	26	38	34	26	19	39	182
Percentage	14.3 %	20.9 %	18.7 %	14.3 %	10.4 %	21.4 %	100 %

Table 1. Distribution of sample according to age.

Std. Deviation	Mean	Maximum	Minimum	N	
1.29	13.93	18	11	161	Age at menarche

Table 2. The mean and standard deviation of age at menarche

Age at menarche	11	12	13	14	15	16	17	18	Total
Frequency	2	12	56	46	21	19	4	1	161
Percent (%)	1.1	6.5	30.3	24.9	11.4	10.3	2.2	0.55	87.0

Table 3. Distribution of girls according to menarcheal status.

Social data

The analysis of parents' education level has showed that; 63.2% of the fathers and 61.1% of the mothers had completed the elementary school; 21.6% of the fathers and 20.5% of the mothers completed the secondary school level; and 7.0% of the fathers and 6.5% of mothers have reached a university level (Table (4)).

Concerning the parents status, 86.3% living together, 5.8% separated, and 7% death.

We also found that 48.6% of the girls in our sample belong to large families (more than 6 siblings), and 45.9% belong to small families (below 5 siblings).

Economic status

Figure 3 illustrate economic status. 18.5% of the study participants had high family income, 74.1% had medium family income, and 7.4% had low family income.

Correlation and relationship between age of menarche and education level of parents:

Education level of parents was highly correlated at (p<0.01) with age at menarche (Table 5). In this study, the mean menarcheal age in girls according to education level of parents was 14.12 ± 1.33 for girls whose parents' only reached elementary school and 13.33 ± 1.15 for girls whose parents completed secondary level or reached university education level. The probability of the correlation between age at menarche and education level of parents was 0.001(mother) and 0.037 (father), and the correlation coefficient was 0.272 (mother) and 0.170 (father) (Table 6).

Correlation and relation between age of menarche and economic status:

Economic status was highly correlated at (p<0.01) with age at menarche (Table 5). Figure 4 shows the correlation between age of menarche and economic status.
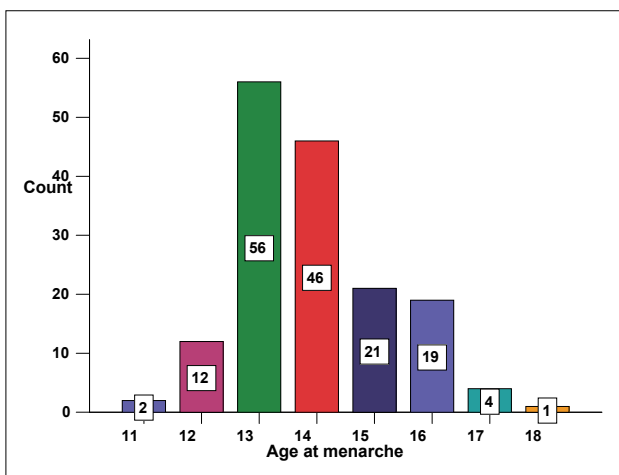

Figure 1. Distribution of sample according to age of menarche.

Table 7 shows the relationship between mean menarcheal age and economic status. Girls belonging to high economic status group were found to be attaining sexual maturity 13.16 ± 1.15 earlier than those of middle14.01 ± 1.16 and low 15.14 ± 1.70. The probability of the correlation between age at menarche and economic status was 0.000, and the correlation coefficient was 0.327.

Correlation and relationship between age at menarche and size of the family:

There was found to be a significance correlation between size of the family and age of menarche at (p<0.01) (table 5).

Table 8 shows the relationship between mean menarcheal

	Father's education			Mother's education		
	Elementary school	Secondary school	University	Elementary school	Secondary school	University
frequency	117	40	13	113	38	12
Percentage (%)	63.2	21.6	7	61.1	20.5	6.5

Table 4. Parent's education.in our sample

Size of the family	Education level of father	Education level of mother	Economic status	
0.260*	0.170*	0.272*	0.327*	Person correlation
0.01*	0.037*	0.001*	0.000*	P value
*Correlation is significant at the 0.01 level (2- tailed)				

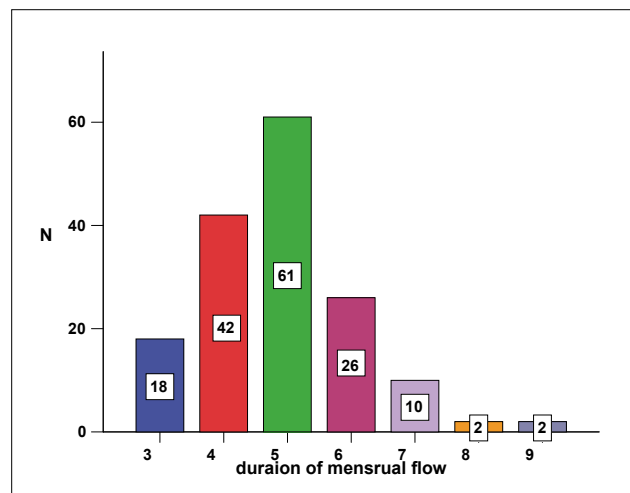Table 5. Correlation between age of menarche and socioeconomic data.

Figure 2. Distribution of sample according to duration of menstrual bleeding.

Education level of parents	Age at menarche	
	Mean (x)	Std. Deviation (± SD)
Elementary school	14.12	1.33
Secondary school and university	13.33	1.15

Table 6. Comparison between mean age of menarche and education level of parents

age and size of the family. Girls from large families also showed a higher age at menarche (14.36 ± 1.36) than girls from small families (13.46 ± 1.08). The probability of the correlation was 0.01, and the correlation coefficient was 0.260.
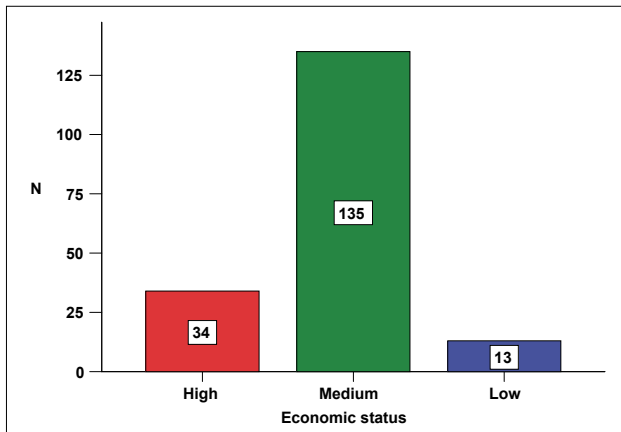
Figure 3. Distribution of sample according to economic status.

Relationship between age of menarche and birth order: Effect of birth order on menarcheal age is found to be positive. Age of menarche of the girls born first to be somewhat earlier 13.79 ± 1.36 compared to those born later 14.04 ± 1.22.

Relationship between duration of menstrual flow and parent's status: In this study, the mean duration of menstrual flow in girls according to parent's status was found to be 4.87 ± 1.16 for girls whose parent's living together, 5.89 ± 1.36 for girls whose parent's separated, and 4.36 ± 1.12 for girls whose parent's death.

Table 10 illustrated relation between duration of menstrual flow and parent's status.

Age at menarche		Economic status
Std. Deviation (± SD)	Mean (x)	
1.15	13.16	High
1.16	14.01	Medium
1.70	15.14	Low

Table 7. Comparison between age of menarche and economic status.

Size of the family (siblings)	Age at menarche	
	Mean (x)	Std. Deviation (± SD)
Large ≥6	14.36	1.36
Small ≤5	13.46	1.08

Table 8. Comparison between age of menarche and size of the family.

Birth order	Age at menarche	
	Mean (x)	Std. Deviation (± SD)
First	13.79	1.36
Later	14.04	1.22

Table 9. Comparison between age of menarche and birth order.

Duration of menstrual flow		Parents status
Std. Deviation	Mean	
1.16	4.87	Living together
1.36	5.89	Separated
1.12	4.36	Death
1.19	4.80	Total

Table 10. Relation between duration of menstrual flow and parent's status

5. DISCUSSION

Menarche is an important transition event in the female life cycle. It represents a concrete symbol of a shift from a girl to women. Unlike other gradual pubertal changes, such as breast development and pubic hair growth, menarche usually occurs suddenly and without precise predictability. The age of menarche varies in different part of the world and is known to be influenced by socio-economic status, environmental conditions, and body status.
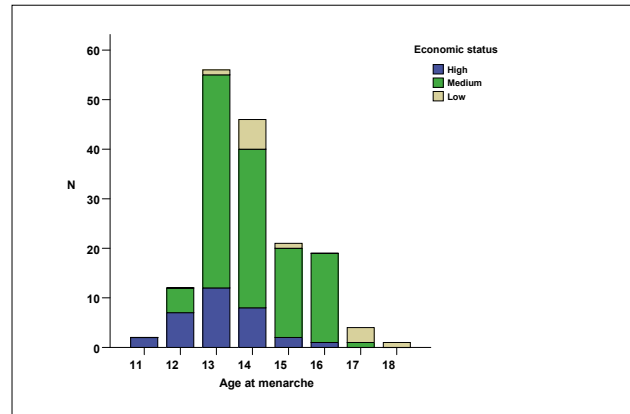

Figure 4. Correlation between age of menarche and economic status.

Age at menarche

The results revealed that among the 13 to 18-year-old girls in our sample (n= 182) few had not experienced menarche yet. The mean age at menarche in Altadamon and Eldubha areas in Northern Sudan girls in this study, calculated by recall and probit analysis was 13.93±1.29 years. It is difficult to compare these data with African countries due to different methodologies and the different time of the surveys.

However, we were able to compare our data with studies that followed the same methodology that took place in the 1980s or later.

he mean age at menarche in our sample was so close to what was obtained in central Sudan by Attallah et al. (7) they found that the mean age at menarche among Sudanese girls was found to be 13.89±0.15. The mean Menarcheal age in this study was so close to the mean age at menarche that obtained in rural Egypt 13.89±0.18 (8). However, it is lower than African mean Menarcheal age that reported by Pasquet et al. (6) in the girls of the rural Cameroon (14.3±1.65), and also lowers than mean Menarcheal age that obtained by Ekisawa et al. (9) in Zaire (15.67±0.08).

Also the result in the present study is lower than mean Menarcheal age obtained by Simodon et al. (10), they reported that the mean age at menarche among girls in Senegal was 16.0±2.0. The reduction in mean Menarcheal age in present study compared to other African studies may be explained by the general improvement in living conditions that occurred in north Sudan after the 1990.

Duration of menstrual bleeding

The mean duration of menstrual bleeding among girls in the northern Sudan in this study was 4.80±19 days. It is

difficult to make comparisons among populations because each author defines his own methodology. Other authors Harlow and Ephross (15), Cleckner-Smith et al. (16) found that in 94.7% of the girls from their adolescent samples had menstrual flow between 4 and 8 days. Padez and Rocha (17) were found that about 59% of the girls had bleeding duration of 3-5 days.

Socioeconomic data

We also found statistically significant differences in age at menarche between girls whose parents had a high educational level and those with a low educational level and also according to the economic status and size of the family. In fact, the economic status showed the highest influence in mean age at menarche in this sample, this may explained by differences in body dimensions and maturity status. The present study agreed with that found in other studies conducted in other African countries.

Relation between bleeding length and parents' status:

In this study, girls in Northern Sudan showed a significant different in their mean duration of menstrual flow value according to their parent's status. The mean duration of menstrual flow for girls whose parents are living together was 4.87 ± 1.16 days, for girls whose parents are dead was 4.46 ± 1.33 and for girls whose parents separated was 5.89 ± 1.36 days.

Between girls whose parent's living together and girls whose parent's separated there was a significant difference of 1.02 day. This difference was statistically significant; this can be explained by psychological factors in girls whose parents are separated.

6. CONCLUSION

In Western Europe where the data for nearly last 200 years is available, the mean age at menarche can be observed to have decreased from 17 years to 12.8 years (3). In urban India the age of menarche was shown to be 12.6 years, which is similar to the age of menarche in the developed world (4). In countries such as China and Senegal from where large data is available, the mean age of menarche in rural areas is still as high as 16.1 years (5).

The mean age at menarche for girls in Northern Sudan in this study was 13.93 ± 1.29 year, the mean menarcheal age in these girls are amongst the lowest values presented for African countries. The mean duration of menstrual bleeding among girls in the Northern Sudan in this study was 4.8 ± 1.22 days.

We also found statistically significant differences in age at menarche between girls whose parents had a higher educational level and those with a lower educational level and also according to the economic status and size of the family.

Between girls whose parent's living together and girls whose parents separated there was a significant difference of 1.02 day.

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