

Age at Menarche among Indonesia Boarding School Students

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ABSTRACT

Background: Menarche is a crucial indicator of a female's sexual development because of the interaction of the hypothalamus-pituitary-ovarian axis with the reproductive and endocrine systems. The timing of menarche appears to have shifted to younger ages over the past century. A risk factor for early menarche is a lifestyle change, notably the frequency with which fatty meals and junk food are consumed. This study aimed to determine the mean age at menarche in Indonesian adolescents, especially boarding school students in Surabaya. **Method:** This cross-sectional research included Alif Laam Miim Islamic Boarding School students in Surabaya. The students' menarche ages were obtained via direct interviews, and their height and weight were assessed using conventional anthropometry. SPSS was used to do the statistical analysis. Mean, standard deviation, frequency, and percentage were used to represent descriptive data. **Results:** This study included 45 girls with a mean age of 13.72 + 0.72 years old. The mean age of menarche was 11.45 + 0.99, and 3 (6.66%) of our subjects had not had menstruation yet. One student (2.22%) experienced menarche at the age of 9. We found no statistically significant correlation between the mean age of menarche with nutritional status ($p = 0.308$; $r = -0.155$). **Conclusions:** Our study taken on Boarding school students found that the mean age of menarche was 10.66 + 3.03 and it was relatively younger than other studies taken in Indonesia.

Keywords: age at menarche; adolescents; boarding school students

INTRODUCTION

Menarche, the first menstrual blood flow, is a crucial indicator of a female's sexual development (1). The development and interaction of the hypothalamus-pituitary-ovarian axis with the reproductive and endocrine systems is what triggers the onset of menarche. It's the final phase of pubertal development in adolescents, following telarche, adrenarche, and the growth spurt (2).

The onset of menarche varies widely among countries. According to a study conducted in the United States of America (US), menarcheal age can vary even within the same country. This study determined that the mean age at menarche for US females in the 2000s was 12.34 years, with racial differences (3). Menarche ages vary according to genetic variables, race, and several environmental situations such as early-life experiences, current body weight and height, health, nutritional consumption, physical activity, family size and structure, level of educational attainment, and altitude (1; 4).

The timing of menarche appears to have shifted to younger ages over the past century (1). Since the middle of the 19th century, the average age at menarche has decreased in the United States, Europe, and most Asian nations (5). Possible causes of early puberty onset include improvements in the economy, public health, nutrition, and living conditions.

Furthermore, child obesity, a problematic family relationship, caregiver education, and exposure to endocrine disruptors may all contribute to early puberty (3, 5). Multiple studies have revealed a link between an earlier age of menarche and a higher risk of developing reproductive cancers such as breast cancer, endometrial cancer, and ovarian cancer. An earlier age of menarche is also associated with an increased risk of obesity, poor glucose tolerance, and an unhealthy lipid profile, culminating in an increased risk of cardiovascular disease and type 2 diabetes (2; 6). Furthermore, early puberty is associated with decreased bone mineral density, an increased risk of fractures, and osteoarthritis. It's also associated with mental health issues such as depression and social anxiety among adolescents (7).

The age of menarche is such an essential predictor of women's physiological development that it has been suggested in the literature that it should be used as an important global health indicator. Indonesia is a middle-income country with a wide range of socioeconomic levels and educational, sociocultural, and environmental backgrounds. Surabaya, as the second biggest country in Indonesia had a massive influence on a lifestyle due to the growth of unstoppable communication and technologies around the world. A risk factor for early menarche is a lifestyle change, notably the frequency with which fatty meals and junk food are consumed.

This study aimed to determine the mean age at menarche in Indonesian adolescents, especially boarding school students in Surabaya.

METHOD

This cross-sectional study was conducted at Alif Laam Miim Islamic Boarding School Surabaya in May 2023. A total of 45 girls in 7th and 8th grades were included after obtaining written informed consent. This study was approved by the Faculty of Medicine Health Research and Ethics Committee with ethical clearance number 251/EC/KEPK/FKUA/2023.

Data Collection

Demographic characteristics, as well as education level, and menarcheal age, were collected from direct interviews with the respondents. Each respondent was given 20 minutes for the interview, and they may ask the researcher any questions they have regarding the items. Gynecological age is defined as an interval time between chronological age and age at menarche. We assessed the subjects' height and weight using standard anthropometry. Body weight was measured to the closest 0.1kg on a solid, level surface using an Onemed digital weighing scale, with participants wearing light clothes and no shoes. Body height was measured to the closest 0.1 cm using a wall-mounted tape measure, with the responder barefoot, standing erect, and facing straight ahead. Body mass index (BMI) was determined using the weight (kg)/Height² (m²) formula, then plotted against the CDC growth chart based on sex and age. BMI was categorized as underweight (<5th percentile), norm weight (5th-85th percentile), overweight (P85th-<95th), and obese (≥P95th) based on CDC criteria (8).

Statistical Analysis

The data was statistically analysed using SPSS version 1. The following descriptive statistics were provided: mean, standard deviation, frequency, and percentage. Given that the sample size for our research was 50, we used the Shapiro-Wilk normality test to ensure that the data were distributed normally. Correlations between the age of menarche and other contributing factors were analyzed using the Spearman or Pearson correlation test. *p* values below 0.05 were regarded as statistically significant.

RESULT

There were 45 subjects included in our study with a mean age were 13.72 ± 0.72. The mean of BMI was 21.88 ± 3.55 and most of them were on normal BMI criteria, as can be seen in **Table 1**.

TABLE 1: Demographic characteristics of subjects.

Characteristics	
Age (year), (mean ± SD)	13.72 ± 0.72
Weight (kg)	51.42 ± 9.25
Height (cm)	153.06 ± 4.62
Nutritional Status (n, %)	
Underweight	2 (4.4%)
Normal	24 (53.3%)
Obese	14 (31.1%)
Overweight	5 (11.1%)
Mother's Occupation	
Housewife	20 (44.4%)
Employed	25 (55.6%)
Age at menarche (year)	11.45 ± 0.99
Gynecological Year	2.26 ± 1.25

Most subjects had menarche at the age of 12 (44.44%), and 3 (6.66%) of our subjects had not had menstruation yet.

One student (2.22%) experienced menarche at the age of 9 (**Figure 1**). We found no statistically significant correlation between mean age of menarche with nutritional status (*p* = 0.308; *r*= -0.155) and parent's occupation (*p* = 0.161; *r*=0.212)

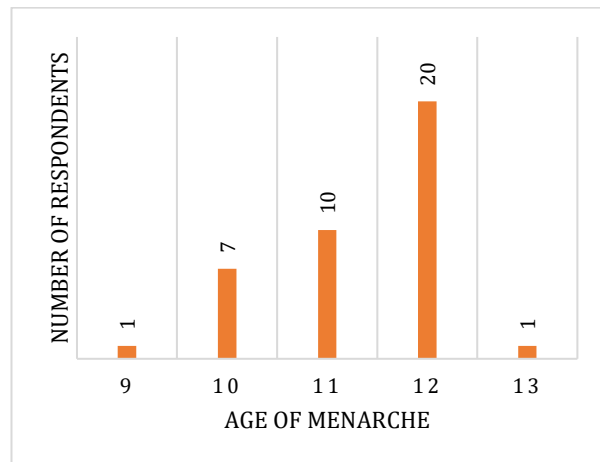


FIGURE 1: Distribution of The Age of Menarche.

DISCUSSION

Our study found that the mean age of menarche among Indonesian boarding school students was 11.45 ± 0.99 years. It was relatively younger than the result from other studies taken in Indonesia. The study from Moelyo in 2019 found that the mean age of menarche in healthy female adolescents in Surakarta was 12.0 ± 1.1 years (9). Another study from Batubara with a large multicenter survey in Indonesia found that the mean age of menarche was 12.96 (10). A study conducted in Jatinangor also discovered that the trend of mean age of menarche was earlier when compared to prior generations, with the current generation having the youngest mean age of menarche (12.28) (11). Our result was also different from the study from Sohn in Indonesian females born before 1990 with the mean age of menarche was 13.18 years (4).

The younger mean age of menarche in our study if compared to other studies in Indonesia might be because the subject of our study was boarding school students who had stringent restrictions on their school. Apart from genetic factors, the age of menarche was also influenced by environmental factors (1). As boarding school students, the subject of our study had restricted access to the Internet and social connection with other peers outside the boarding school, thus the influence of an outside lifestyle was relatively limited. Other environmental factors that may influence the age of menarche is parental education (7). Children with positive family relationships and good paternal involvement tend to have a relatively later menarcheal onset and an earlier age of menarche was seen in children with a family conflict (9). Adolescents from boarding schools spend more time with their peers and teachers and thus have less time with their parents (12).

Out of 45 students, three of them had not menstruated and were between the ages of 13 to 14 years. However, they already experienced breast development (thelarche) as in Tanner stage 3. A 13-year delay in breast development, a 4-year gap between thelarche and the end of puberty, or a 16-year gap in menarche are all considered signs of delayed puberty (13). One student experienced menarche at the age of 9 and was overweight in BMI criteria. Numerous studies classified it as an early menarche since it occurred before 10 years of age. Having an overweight or obese BMI also has been linked to early menarche in several studies (14).

Nevertheless, our study found that BMI status was not significantly correlated with the age of menarche (15).

According to our knowledge, this is the first study to examine the age of menarche among boarding school students. Our study uses the retrospective method that had a potential memory bias. However, the gynecological age in our research is relatively small (2.26 ± 1.25), and measuring the age of menarche by recalling the event near the onset of menarche has a high level of accuracy (3). The limitation of our study is the amount of subjects that are relatively small. Further studies with bigger data taken in multiple boarding schools were needed to represent the trend of age of menarche in boarding school students more accurately.

CONCLUSION

The mean age of menarche in our study was 11.45 ± 0.99 and it was relatively younger than other studies taken Indonesia. Environmental and cultural differences since our subject lives in a boarding school might be the reason of this finding.

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