Factors Causing Variation in Age at Menarche

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ABSTRACT

BACKGROUND: Menarche is an important phase of female reproductive life, which with passage of time is getting earlier worldwide. Early menarche has several psychosocial and behavioral effects on a girl's teenage life, besides it increases the risk of breast cancer, therefore it is important to determine the underlying causes of this change.

OBJECTIVE: To assess the extent of and factors responsible for variation in age at menarche in females of Sindh.

STUDY DESIGN: Cross-sectional, questionnaire based.

METHODOLOGY: The study was conducted by department of physiology on 600 sexually healthy females, belongs to interior Sindh, Hyderabad and Karachi. Informed written consent was obtained, data about menarcheal age and relevant factor was collected using questionnaires containing close-ended questions. Volunteers were divided into three groups, each of 200, based upon their birth year, Group 1 included ladies who were born in 1970s or before, Group 2 consists those who born in 1980s while volunteer from Group 3 were the youngest generation born during 1990's and onwards.

RESULTS: Mean age at menarche for Group 1 was 13.6 yrs (Std. Dev ± 1.3), Group 2, 13.3 yrs (Std. Dev ± 1.0) and for Group 3 it was 12.3 yrs (Std. Dev ± 1.1). Pearson Correlation between age at menarche and menarcheal age of sister for all three groups was significant (P = 0.01). Twenty-three percent volunteers in Group 1, 37% in Group 2 (P = 0.01) and 48% in Group 3 (P = 0.02) had awareness about menstruation at their time of menarche.

CONCLUSION: Menarcheal age, over time is decreasing, among girls of Sindh, Pakistan. This may be due to pre-menarcheal awareness and hereditary influence.

KEYWORDS: Menarche, early menarche, puberty, girls, breastfeeding, pre-menarcheal awareness.

INTRODUCTION

Puberty refers to the onset of sexual maturation coupled with hormonal, psychological, physical and behavioral changes[1,2]. Pubertal changes consist of three phases: Thelarche, adrenarche & menarche[3]. Menarche is the onset of menstruation or the occurrence of first menstrual period and it is a fairly late indicator of female puberty[4,5]. According to various scientific records, age at menarche is decreasing worldwide due to several factors like genetics, height, weight and socioeconomic status of the family[6]. Over the past 15 decades, a decline of about four to five years has been reported in menarcheal age of girls in different regions throughout the world[7]. Early menarche is an alarming issue for female health care organizations and educational institutions because lack of awareness and improper counseling results in depression, confusion, irritability, abnormal sexual behavior and several other psychosocial changes in teenage girls[1,6]. Early menarche is also a risk factor for various diseases such as diabetes, ischemic heart disease, stroke, adult obesity and hormone related cancers e.g. breast cancer and endometrial cancer[6,8,9]. The purpose of current study was to document change in menarcheal age that may have occurred in previous 4 to 5 decades in Sindh, Pakistan and to determine factors underlying this change if any.

METHODOLOGY

The study was cross-sectional, both questionnaire based and physical measurement surveys were conducted. A total of 753 healthy volunteers (from least possible to maximum possible age), having awareness about menarche, participated in the study. It was asserted that all the included volunteers were physically healthy at their time of menarche and those who had suffered from any kind of endocrine disease were excluded. To ensure the presence of participants belonging to all socioeconomic levels, surveys were performed in government schools, private colleges, medical universities and at homes by arriving at doorstep in different areas of Sindh. The data was collected between January 2014 and August 2014. The importance and key concepts of the study like age at menarche, breast feeding, role of media etc. were explained to the volunteers in local language. Consent

was obtained, height was measured and the questionnaire having close ended questions about date of birth, current age in years, age at menarche, number of elder siblings, breast feeding, mother's menarcheal age and sister's age at menarche was provided to the subjects. Out of seven hundred and fifty-three, 153 incompletely filled questionnaires were excluded from data analysis.

Data Analysis

Based upon birth years, all volunteers were divided into three groups each of 200, Group 1 with ladies born in 1970's or earlier, Group 2 born in 1980's and Group 3, the generation of 1990s and onwards. Data was entered and analyzed on the IBM SPSS Statistics version 21; Pearson correlation test of significance was applied to see association between variables. Level of significance was set as $P < 0.05$.

RESULT

It was found that mean age at menarche for Group 1 was 13.6 ± 1.3 years, Group 2, 13.3 ± 1.0 years, and for Group 3, it was 12.3 ± 1.1 years (Table 1). Pearson Correlation between age at menarche and menarcheal age of sister for all three groups was significant ($P < 0.01$). Twenty-three percent volunteers in Group 1, 37% in Group 2 ($P = 0.01$) and 48% in Group 3 ($P = 0.02$) had awareness about menstruation before the attainment of menarche. Pearson significance test showed no correlation between sib-ship size and menarche for all three groups ($P > 0.05$). Pearson correlation for height came out to be non-significant for all three groups ($P > 0.05$). Pearson cor-

TABLE I: AVERAGE AGE AT MENARCHE

		Group 1	Group 2	Group 3
N	Valid	200	200	200
	Missing	0	0	0
Mean		13.6600	13.3950	12.3700
Std. Deviation		1.32786	1.00700	1.17900

relation between menarcheal age and the breastfeeding of the volunteers during their infancy was significant for group 2 ($P = 0.008$).

DISCUSSION

The results of this study showed that the mean menarcheal age has decreased from 13.6 years in Group 1 to 12.3 years in Group 3 over the past 50 years among females of urban and rural areas of Sindh, Pakistan. Studies conducted in developed and developing countries attribute this change to various environmental factors and to increased health status over past 150 years[10,11]. Girls who were aware of menstruation prior to attainment of menarche experienced early menarche ($P < 0.05$). This finding may be attributed to the fact that media is playing an important role in propagating awareness, predisposing to earlier onset of menstruation through television advertisements, magazines etc. and the internet[12]. Evidence suggests that genetics also plays its role in early menarche i.e; Menarcheal age of daughter is similar to mother's age at menarche[7,8]. To assess this factor obliquely, menarcheal age of sister was asked as most girls had no idea about their mother's menarche. Sister's age at menarche came out to be an important determinant of the menarcheal age ($P < 0.01$) which can either be due to genetic predisposition or pre-menarcheal awareness. Some studies suggest that the presence of elder brothers delays the onset of menstruation in girls[13] and some also report an important relationship between the number of siblings and the age at menarche[14], but these researches are not consistent with the current study ($P > 0.05$). Height is considered an important contributing factor to the onset of menstruation, which implies that early menarche most frequently occurs in shorter girls[15], but no significant correlation was found between height and menarche ($P > 0.05$). Present study also reports that breastfed girls experience late menarche than those who were not, which is consistent with British literature published in 2010[14].

FIGURE I: PERCENTAGE OF VOLUNTEERS WHO HAD AWARENESS OF MENSTRUATION AMONG GROUPS 1, 2 & 3
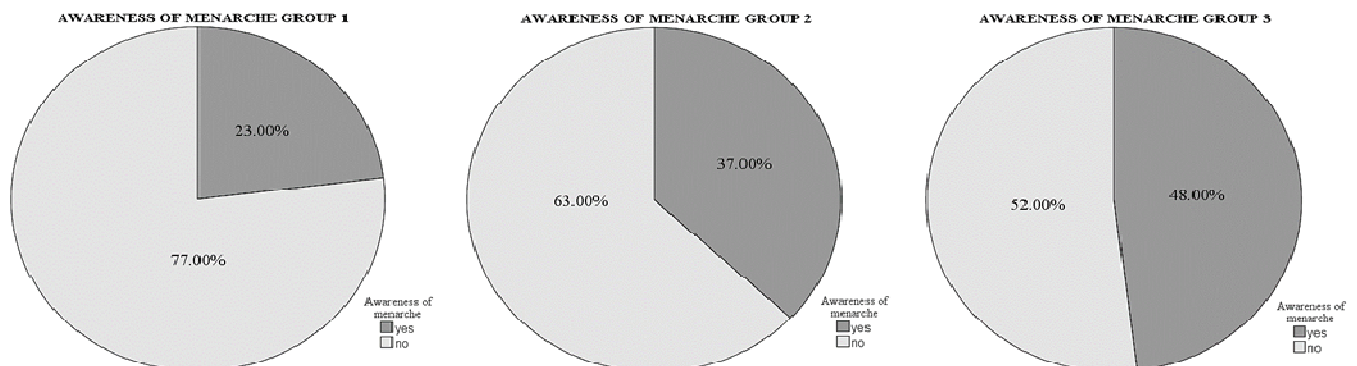
CONCLUSION

This study documented that menarcheal age is decreasing over time in girls of Sindh, Pakistan, probablydue to factors such as pre-menarcheal awareness, hereditary influence and breastfeeding in infancy. Extended research should be conducted to deduce other reasons behind this modification. Important measures should be taken by the government and social service organizations for awareness of school going girls and their parents so that they consider it as a normal and natural phenomenon rather than getting worried about their daughter experiencing this change at an earlier age.

REFERENCES

1. Copeland W, Shanahan L, Miller S, Costello EJ, Angold A, Maughan B. Outcomes of Early Pubertal Timing in Young Women: A Prospective Population-Based Study. Am J Psychiatry. 2010;167(10):1218-25.
2. Ojeda SR & Bilger M.(2000). Neuroendocrine regulation of Puberty. Neuroendocrinology in Physiology and Medicine. ed. Conn P.M. & Freeman M.E. New Jersey: Humana Press, p. 212.
3. Muir A: Precocious Puberty. Pediatr Rev. 2006;27(10):373-81.
4. Ali TS, Rizvi SN. Menstrual Knowledge and Practices of Female Adolescents in Urban Karachi, Pakistan. J Adolesc. 2010;33(4):531-41.
5. Parent AS, Teilmann G, Juul A, Skakkebaek NE, Toppari J, Bourguignon JP. The Timing of Normal Puberty and the Age Limits of Sexual Precocity: Variations around the World, Secular Trends, and Changes after Migration. Endocr Rev. 2003;24(5):668-93.
6. Karapanou O, Papadimitriou A. Determinants of menarche. Reprod Biol Endocrinol. 2010;8:115.
7. Al-Sahab B, Ardern CI, Hamadeh MJ, Tamim H. Age at menarche in Canada: Results from the National Longitudinal Survey of Children & Youth. BMC Public Health. 2010;10:736.
8. Mishra GD, Cooper R, Tom SE, Kuh D. Early life circumstances and their impact on Menarche and Menopause. Womens Health(Lond Engl). 2009;5(2):175-190.
9. Oh CM, Oh IH, Choi KS, Choe BK, Yoon TY, Choi JM. Relationship between Body Mass Index and Early Menarche of Adolescent Girls in Seoul. J Prev Med Public Health. 2012;45(4):227-34.
10. Herman-Giddens ME, Slora EJ, Wasserman RC, Bourdony CJ, Bhapkar MV, Koch GG, et al. Secondary Sexual Characteristics and Menses in Young Girls Seen in Office Practice: A Study from the Pediatric Research in Office Settings Network. Pediatrics. 1997;99(4):505-12.
11. Gluckman PD, Hanson MA. Evolution, development and timing of puberty. Trends Endocrinol Metab. 2006;17(1):7-12.
12. Bellis MA, Downing J, Ashton JR. Adults at 12? Trends in puberty and their public health consequences. J Epidemiol Community Health. 2006;60(11): 910–11.
13. Milne FH, Judge DS. Brothers delay menarche and the onset of sexual activity in their sisters. Proc Biol Sci. 2011;278(1704):417-23.
14. Morris DH, Jones ME, Schoemaker MJ, Ashworth A, Swerdlow AJ. Determinants of age at menarche in the UK: Analyses from the Breakthrough Generations Study. Br J Cancer. 2010;103(11):1760-4.
15. Koprowski C, Ross RK, Mack WJ, Henderson BE, Bernstein L. Diet, body size and menarche in a multiethnic cohort. Br J Cancer. 1999;79(11/12):1907-11.

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