

Original Article

PUBERTAL CHANGES IN ADOLESCENT GIRLS: A COMMUNITY BASED CROSS -SECTIONAL STUDY

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ABSTRACT

Background: Adolescence is a process – a series of varied, rapid and extensive changes as well as period of life. The timing of maturational events varied within healthy children primarily because of genetic factors. Even among healthy youth, there is marked variation in the timing of these maturational changes.**Materials and Methods:** A cross sectional study was carried out in slum areas adopted under Urban health Training Centre of Department of Community Medicine, KIMSU, Karad. Maharashtra from November 2007 to October 2009, Adolescent girls between 10 to 19 years who were residents of the area adopted for at least five years before inception of study were included. There were 251 adolescent girls of which 200 formed the study group. The study participants were interviewed and examined by house to house survey using pretested structured questionnaire with prior informed consent of parent. Sexual maturity was assessed using Tanner's Sexual Maturity Score. Analysis was done using SPSS 16 software**Results:** In present study mean age at commencement of breast, pubic hair, axillary hair and mean age at menarche have been 10.4±0.6, 10.6±0.7, 12.2±0.7 and 13.4±1.34 years respectively. Breast stage appears earlier than the pubic stage. Time period required for full breast and pubic hair development was 7.3 years and 7.9 years respectively.**Conclusion:** Timing of sexual maturity indicators could be useful for giving health education regarding hygiene during menstruation and family life education.**Key words:** Adolescent, Puberty, Menarche, hygiene, menstruation

INTRODUCTION

The origin of the word Adolescence is from Greek Latin word, 'Adolescere' which means to grow or to grow to maturity¹ Adolescence is a process- a series of varied, rapid and extensive changes as well as period of life.²

Today approximately 1/5th of world's population is constituted by adolescents (10-19 years) out of which more than 4/5th residing in developing countries.³ Adolescents represents 22.8 % of population of India.⁴

The timing of maturational events varied within healthy children primarily because of genetic factors. Even among healthy youth, there is marked variation in the timing of these maturational changes. So growth evaluation based on chronological age may be inaccurate or misleading.

Knowledge of the age of menarche of our population is important for the study of adolescent sterility interval. It is also essential factor in any study on growth of

adolescents. A correct appraisal of the age at menarche of our girls is a pressing need, without which no social law, especially those related to marriage can be made. A shift in the age of menarche signifies a concurrent change in the factors associated with it⁵

Current study was undertaken with the objective of studying the physiological events occurring during adolescence and the timings of these events

MATERIAL AND METHODS

A cross sectional study was carried out in slum areas adopted under Urban Health Training Centre of Department of Community Medicine, KIMSU, Karad, from November 2007 to October 2009. Adolescent girls between 10 to 19 years who were residents of the area adopted for at least five years before inception of study were included. There were 251 adolescent girls of which 200 formed the study group. The study participants were interviewed and examined by house to

house survey using pretested structured questionnaire with prior informed consent of parent. Sexual maturity was assessed using Tanner's Sexual Maturity Score. Analysis was done using SPSS 16 software.

Tanner's Sexual Maturity Score-Sexual Maturation Rating (SMR), also known as Tanner Staging, is based upon a scale of secondary sexual characteristics that permits health professionals to gauge the degree of pubertal maturation that has occurred among adolescents, regardless of chronological age. SMR is based on the appearance of pubic hair, the development of breasts, and the occurrence of menarche among females; and on the degree of testicular and penile development and the appearance of pubic hair among males. SMR stage 1 corresponds with prepubertal growth and development, while stages 2-5 indicate the progression of puberty. By SMR stage 5, sexual maturation has been completed. Sexual maturation correlates remarkably well with linear growth, changes in weight and body composition, and hormonal changes.⁶

RESULTS

A total 200 adolescent girls, from community adopted under Urban Health Training Centre, Department of Community Medicine, KIMS, Karad, were studied.

Among the 200 adolescent girls, 110 (55%) belonged to early adolescence (10-14 years) and 90 to late adolescent (15-19 years) age group. Total 31(16%) were married of which 23 were married before 18 years of age. Distribution of Adolescent girls according to religion showed that, 120 (60%) were Hindus, 69(34.5%) were Muslims and 11(5.5%) were Sikh and Buddhist. Majority of Adolescent girls 162(81%) belonged to nuclear family. However 9(1.5%) belonged to broken family. Out of 200 Adolescent girls majority, 103 (51.5%) of them were involved in household work, 61(30.5%) were students.

When examined for pubertal changes i.e breast stage, pubic stage, following results were obtained.

Table 1:-Distribution of adolescent girls according to Breast Stage

Age in completed years	Breast stage					Total
	B1	B2	B3	B4	B5	
10	28 (80.0)	7 (20.0)	0	0	0	35
11	12 (42.9)	15 (53.6)	1 (3.6)	0	0	28
12	3 (20.0)	7 (46.7)	5 (33.3)	0	0	15
13	0	7 (43.8)	8 (50.0)	1 (6.2)	0	16
14	0	1 (6.2)	7 (43.8)	8 (50.0)	0	16
15	0	0	4 (33.3)	7 (58.3)	1 (8.3)	12
16	0	0	8 (42.1)	9 (47.4)	2 (10.5)	19
17	0	0	3 (21.4)	10 (71.4)	1 (7.1)	14
18	0	0	1 (2.9)	18 (51.4)	16 (45.7)	35
19	0	0	0	8 (80.0)	2 (20.0)	10
Total	43 (21.5)	37 (18.5)	37 (18.5)	61 (30.5)	22 (11.0)	200

Figure in the parenthesis indicate percentage

Table 2: Distribution of adolescent girls according to Pubic Stage

Age in completed years	Pubic stage					Total
	Ph1	Ph2	Ph3	Ph4	Ph5	
10	28 (80.0)	7 (20.0)	0	0	0	35
11	21 (75.0)	4 (14.3)	3 (3.6)	0	0	28
12	5 (33.3)	10 (66.7)	0 (33.3)	0	0	15
13	1 (6.2)	8 (50.0)	3 (50.0)	4 (25.0)	0	16
14	0	5 (31.2)	10 (43.8)	1 (6.2)	0	16
15	0	1 (8.3)	6 (33.3)	5 (41.7)	0	12
16	0	0	11 (42.1)	8 (42.1)	0	19
17	0	0	5 (21.4)	8 (57.1)	1 (7.1)	14
18	0	0	4 (2.9)	29 (82.9)	2 (5.7)	35
19	0	0	0	4 (40.0)	6 (60.0)	10
Total	55 (27.5)	35 (17.5)	42 (21.0)	59 (29.5)	9 (4.5)	200

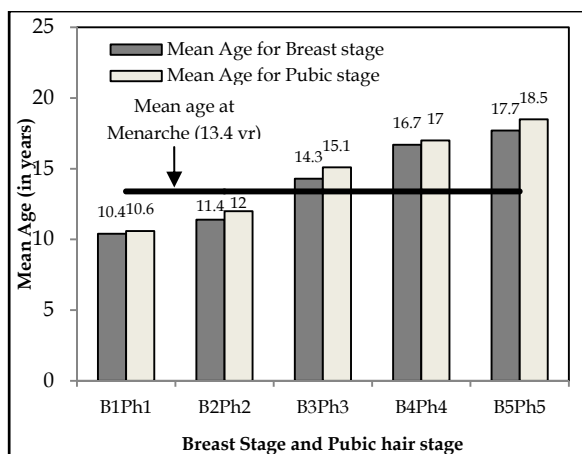
Figure in the parenthesis indicate percentage

None of the girls had precocious puberty and stage II development did not start in any of the girls before the age of 9.5 years.

Time period required for full breast development i.e. from Breast stage I to Breast stage V, was 7.3 years and for full pubic hair development i.e. from pubic stage I to pubic stage V, was 7.9 years.

Table 3: Mean ages with S.D. at commencement of sexual maturity indicators.

Sexual Maturity Indicator	Mean Age(Year)	Confidence Interval
Breast stage 1	10.4	9.8 to 11
Pubic hair stage 1	11.3	9.9 to 11.3
Axillary hair stage 1	11.5	11.5 to 12.9



Graph 1: Association of Indicators of sexual maturity with mean age at menarche.

Table 4 - Mean age with S.D. for Breast stage and Pubic hair stage

	Mean age (in completed years)	S.D.
Breast stage		
I	10.4	0.6
II	11.4	1.0
III	14.3	1.76
IV	16.7	1.68
V	17.7	0.9
Pubic hair stage		
I	10.6	0.7
II	12.0	1.42
III	15.1	1.82
IV	17.0	1.58
V	18.5	0.72

Out of 200 adolescent girls 116 (58.0%) had attained menarche and 84 (42.0%) had not attained menarche.

The above Graph(1) depicts that major proportion of non-menstruating adolescent girls belonged to Breast Stage I and II and to pubic stage I and II and major proportion of menstruating adolescent girls belonged to Breast Stage III, IV and V and to pubic stage III and IV.

Statistically significant association between Breast stage of sexual maturity scoring and pubic stage of sexual maturity scoring was found. ($\chi^2=2.46$, d.f.=16, $p<0.001$)

In the present study breast stage appears earlier than the pubic stage.

DISCUSSION

In the present study the mean age at commencement of breast, pubic hair, axillary hair and mean age at menarche have been 10.4 ± 0.6 , 10.6 ± 0.7 , 12.2 ± 0.7 and 13.4 ± 1.34 years respectively.

Ghosh et al⁷ studied secondary sex characters in menstruating girls. It has been observed that breast bud has appeared between the ages of 8-15 years, with an average of 12.2years, pubic hair between 9-16 years, with an average of 12.4 years.

Bhargava SK et al,⁸found that earliest sign of puberty in girls has been the appearance of pubic hairs, 9.4 ± 2.1 years .Followed by the development of breast, axillary hair and menarche at the mean age of 9.7 ± 2.1 years, 10.6 ± 2.1 years and 11.5 ± 2.0 years respectively.

Agarwal D.K.et al,⁹ studied secondary sex characters in menstruating girls. He found that mean age at appearance has been 13.6 ± 0.03 years and 12.6 ± 0.04 years for pubic hair and menarche respectively.

Joseph et al¹⁰ studied 190 adolescent girls in north Tamilnadu from different socioeconomic status. He has found pubertal spurts between 13-14 years.

The use of timing of these sexual maturity indicators could be made for giving health education to adolescence regarding menarche, menstruation, hygiene during menstruation and family life education .Good nutrition during this growth spurt could prevent stunting by catch up growth, thereby increasing adult height .So that future problems associated with pregnancy and child birth would be reduced.

The mean age at menarche in the present study is 13.4 years (SD=1.34). Durge P.M. et al¹¹ studied 200 rural adolescent girls during 1993 and observed mean age at menarche to be13.5 years. Jolly R et al, ¹²studied adolescent girls from rural Tamilnadu during 2000 and found the mean age at menarche to be 13.59 ± 1.03 years. In another study¹³ the mean age at menarche has been 13.6 years. Kokiwar PR et al¹⁴ studied adolescent girls during 2007 and observed the mean age at menarche to be 12.8 years. Another study ¹⁵ observed that the mean age at menarche has been 13.6 years. The studies by Singh A¹⁶ et al in New Delhi, India and Zeyege DT et al¹⁷ in Ethiopia observed the mean age of menarche as 12.5 years and 14.8 years respectively. Our findings are well within the range of these values slightly on the higher side.

There are many factors influencing the age at menarche besides genetic makeup of an individual ,like nutritional status ,socioeconomic status ,climate etc .which determine the age at menarche. It is a known fact that poor socio economic status and associated malnutrition delay menarche¹⁸.In the present study majority adolescent girls(91.5%) have been in lower socio economic status and have poor nutritional status ,that might be the reason for delay in the age at menarche.

Menarche is a landmark event in the development of a female adolescent. Menarche marriage interval, menarche-breast, pubic hair, axillary hair development, menarche-first pregnancy interval are some of the important parameters related to study of an adolescent girl.

CONCLUSION

The use of timing of these sexual maturity indicators could be made for giving health education to adolescence regarding menarche, menstruation, hygiene during menstruation and family life education

REFERENCES

1. Sathyavathi K. and Agarwal K.N.: Adolescent Growth Studies- Part A. Physiological aspects and environmental factors. *Indian Paediatrics* 1979;16(2):197-205.
2. World Health Organization, Health problems of adolescence, report of a W.H.O. expert committee. Technical Report Series No.308, W.H.O.(1965), pg.no.3.
3. World Health Organization, Programming for adolescent health and development. Report of WHO/UNFPA/UNICEF/ study group on programming for adolescent health. Technical Report Series; No.886;Geneva WHO 1999.pg.no.2
4. Ghai O.P.: Essential paediatrics, 6th edition place of publication CBS publishers.2004 pg.no.66.
5. Banerjee D. and Mukharjee S.P.: The menarche in Bengalee Hindu girls. *Journal of Indian Medical Association*, 1961;37(6):261-270.
6. Gong EJ, Heald FP. Diet, nutrition and adolescence. In: Shils ME, Olson JA, Shike M, eds. *Modern nutrition in health and disease*. Philadelphia: Lea & Febiger; 1994;759-769.
7. Ghosh D., Kochar K., Khan S.D.: The study of puberty and after in 557 Indian school girls at Poona. *Journal of Obs. and Gyn. of India*, 1973;vol.23,717-721.
8. Bhargava S.K., Shashi Duggal, Chaudhary et al.: Pubertal changes and their interrelationship in Indian girls. *Indian Paediatrics*, 1980;17,657-665.
9. Agarwal D.K. Physical and sexual growth pattern of affluent Indian children from 5-18 years of age. *Indian Paediatrics*, 1992;29,1203-1284.
10. Joseph G.A.: General and reproductive health of adolescent girls in rural South India. *Indian Paediatrics*, March 1997;34,242-245.
11. Durge PM and Waradpande U.: Impact assessment of health education in adolescent girls. *Journal of Obstetrics and Gynecology of India*, 1993; 43(5), 768-772.
12. Jolly R, Asokan JS, Jonathan Paul et al.: Prevalence of Anaemia among adolescent girls of rural Tamilnadu. *Indian Paediatrics*, May 2000;37;532-535.
13. Nair P, Grover V, Kannan A, Awareness and practices of menstruation and pubertal changes among unmarried female adolescents in a rural area of east Delhi. *Letter to editor. Indian Journal of community medicine*, 2007;32(2);156 -57.
14. Kokiwar PR, Saiprasad GS. Anaemia among adolescent girls. *Indian Journal of Public Health*; October-December 2007;51(4).
15. Singh J, Singh J.V, Shrivastava A.K., Suryakant :- Health status of adolescent girls in slums of Lucknow, *Indian Journal of community Medicine* April-June 2006; 31(2)102-103.
16. Desalegn Tegabu Zegeye, Berihun Megabiaw and Abay Mulu; Age at menarche and the menstrual pattern of secondary school adolescents in northwest Ethiopia; *BMC Women's Health* 2009;9:29.
17. Singh A, Kiran D, Singh H, Nel B, Singh P, Tiwari P; Prevalence and severity of dysmenorrhea: a problem related to menstruation, among first and second year female medical students. *Indian J Physiol Pharmacol*. 2008;5:389-97.
18. Nutritional anemia: Report of a scientific group. WHO (1968) Technical Report Series No.405.