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Assessment of Sexual Maturation Pattern of Adolescent Boys in Rural Central India.

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ABSTRACT

There is wide individual variation in pubescence and the rate of acquisition of pubertal changes. Since the information regarding these aspects is scanty, this clinical survey was conducted to study the sexual maturation pattern of adolescent school children (boys) in rural central India. The present community based cross sectional study was conducted in rural school of Nagpur. 413 adolescent boys in the age group of 10-18 years studying in Mahadula School were assessed for sexual maturation, and grading was done as per Tanner's scale. On analysis, it was observed that in boys, the first pubertal sign to appear was genital development (G2), median age of it being 10.66 years; the last to appear was pubic hair growth (PH5), median age 16.61 years. Thus it took 5.95 years for complete sexual maturation in boys. We conclude that although puberty set in late in boys, but took lesser time for complete maturation.

Introduction

Adolescence comprises a period in the life cycle between childhood and adulthood. It is a time for change, the time for metamorphosis. Biological, psychological, social, environmental, and legal changes influence the definitive onset and termination of adolescence.[1] The rapid changes during the adolescence include increase in body dimensions, i.e. growth, and progressive attainment of adult status, i.e. maturation.

Although puberty is only one component of adolescent development, it generally is considered to define the onset of adolescence and certainly is the most visible and tangible of all of the developmental changes occurring during this period.[2] Not all children experience puberty at the same time, nor do they complete it at the same time. There is wide individual variation in the time of onset and the rate of acquisition of these changes, and accordingly, an individual may mature rapidly, slowly, early or late.[3] Chronological age does not always correlate with biologic maturity. In spite of much pioneer work done on adolescent growth, there is lack of knowledge on different aspects of adolescence especially on the development of secondary sex characters. In many countries even basic information is scanty or non-existent. There is pressing need for studies of adolescents on this aspect. Since such studies have remained limited in central India, we have attempted to study sexual maturation of adolescent school children (boys) in Nagpur.

Material and Methods:

This cross sectional community based study was conducted among school children of Sevanand High school, Mahadula, Nagpur. The school is 16 km away from Indira Gandhi Government Medical College, Nagpur. There are six census towns in Nagpur district, of which Mahadula has maximum population of schedule caste and schedule tribe as per 2001 census (Census town is that town where three-fourth of the male working population is engaged in non-agricultural pursuits, density of the population is expected to reach the figure of 400/sq.km. and minimum population of the area is 5000). There are three schools in Mahadula, of which one, i.e. Sevanand High School, was selected randomly for this study. The study was approved by Institutional Ethics Committee.

There were 739 students in 5th to 10th standard. Those temporarily absent in the classes were included at subsequent visits since the school was taken up for a period enabling inclusion of all students in the age group 10-18 years. Four students who were absent for long periods were excluded; hence the total sample studied was 735 students. Information regarding age and socio-demographic characteristics was recorded in predesigned pretested proforma. Gonadal examination and sexual maturity assessment was done in a separate room, ensuring privacy. Findings of 413 boys have been presented in this paper.

Sexual maturity assessment was done as per Tanner's scale.[4] Sexual maturity rating (SMR) stages, as described by Tanner and Marshall; provide a more accurate assessment of the developmental stage of the adolescent. These SMR stages provide a classification to monitor the normal events of puberty from pre-pubertal (SMR1) to adult (SMR5) stage. The rating for boys is based on pubic hair (PH1 to PH5) and genitalia (G1 to G5) development, and axillary hair development (AH1 to AH3). Statistical tests like median and standard error along with 95% CI were calculated by means of statistical software OpenEpi Info version 2.3 year 2009. P values less than 0.05 were considered as statistically significant.

Results and Discussion:

Students from 5th to 10th standard covered were in the age-group 10 to 17 years. 98% students belonged to middle socio-economic stratum. The number and percentage of boys who attained various stages of sexual characteristic at different ages is shown in tables 1 to 3. The results of probit analysis giving the median ages at which the different sexual characteristics appear are shown in table 4.

The first sexual characteristic that appeared was stage 2 of genital development (10.66 years), and the last to appear was stage 5 of pubic hair development (16.87 years). Thus it took 5.95 years to complete sexual maturation in boys. Marshall and Tanner; [5,6] who reported that boys take 3.05 years for complete sexual maturation, but the time taken is longer in our population. Kaul et al[7, 8] reported longer time taken by boys (6.64 years). Transition from stage 3 to stage 4 took the longest time in boys. This is in contrast to that reported by Kaul et al. It appears from this study that although puberty set in late in boys, but took short time for complete maturation. But this being a cross-sectional study, this statement may have to be taken with caution. Hence it is recommended that longitudinal studies in this aspect should be undertaken to estimate the actual period of development of various sexual characters in Indian children.

Table 1: Genital development in boys

Age (years)	N	Stages of genital development				
		G1	G2	G3	G4	G5

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10-11	61	42 (68.9)	19 (31.2)	-	-	-
11-12	60	8 (13.3)	40 (66.7)	12 (20.0)	-	-
12-13	58	6 (10.3)	26 (44.8)	22 (37.9)	4 (6.9)	-
13-14	72	3 (4.2)	18 (25.0)	36 (50.0)	8 (11.1)	7 (9.7)
14-15	52	-	6 (11.5)	22 (42.3)	16 (30.8)	8 (15.4)
15-16	46	-	1 (2.2)	14 (30.4)	19 (41.3)	12 (26.1)
16-17	44	-	-	6 (13.6)	19 (43.2)	19 (43.2)
17-18	20	-	-	1(5.0)	8 (40.0)	11 (55.0)
Total	413	59 (14.3)	110 (26.6)	113 (27.4)	74 (17.9)	57 (13.8)

Figures in parentheses indicate percentage

Table 2: Pubic hair development in boys

Age (years)	N	Stages of pubic hair development				
		PH1	PH 2	PH 3	PH 4	PH 5
10-11	61	46 (75.4)	14 (22.6)	1 (1.6)	-	-
11-12	60	32 (53.3)	26 (43.3)	2 (3.3)	-	-
12-13	58	15 (25.9)	31 (53.5)	12 (20.7)	-	-
13-14	72	12 (16.7)	42 (58.3)	18 (25.0)	-	-
14-15	52	1 (1.9)	21 (40.4)	15 (28.9)	8 (15.4)	7 (13.5)
15-16	46	-	8 (17.4)	13 (28.3)	18 (39.1)	7 (15.2)
16-17	44	-	2 (4.5)	10 (22.7)	22 (50.0)	10 (22.7)
17-18	20	-	-	4 (20.0)	10 (50.0)	6 (30.0)
Total	413	106 (25.7)	144 (34.9)	75 (18.1)	58 (14.0)	30 (7.3)

Figures in parentheses indicate percentage

Table 3: Axillary hair development in boys

Age (years)	N	Stages of axillary hair development		
		AH1	AH 2	AH 3
10-11	61	58 (95.1)	3 (4.9)	-
11-12	60	56 (93.3)	4 (6.7)	-
12-13	58	53 (91.4)	5 (8.6)	-
13-14	72	46 (63.9)	16 (22.2)	10 (13.9)
14-15	52	22 (42.3)	22 (42.3)	8 (15.4)
15-16	46	7 (15.2)	25 (54.3)	14 (30.4)
16-17	44	-	26 (59.1)	18 (40.9)
17-18	20	-	8 (40)	12 (60.0)
Total	413	242 (58.6)	109 (26.4)	62 (15.0)

Figures in parentheses indicate percentage

Table 4: Median age for different stages of sexual maturation in boys

Sexual characteristic	Stage	Median age	SE	95%CI
Genital growth	G2	10.7	0.29	10.1-11.2
	G3	12.8	0.98	10.9-14.7
	G4	15.0	0.62	13.8-16.2
	G5	15.9	0.42	15.1-16.8
Pubic Hair	PH2	10.9	0.70	9.1-12.3
	PH3	13.7	0.82	12.1-15.3
	PH4	16.1	0.21	15.7-16.5
	PH5	16.6	0.37	15.3-16.7
Axillary Hair	AH2	13.7	0.40	12.9-14.5
	AH3	14.6	0.85	12.9-16.2

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