

Growth and sexual maturity pattern of girls with mental retardation

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ABSTRACT

Background: Growth of mentally retarded children differs from that of normal children. However, the adolescent growth and development of Indian mentally retarded children has not been studied. **Aim:** This study was conducted to evaluate the physical growth and sexual development of adolescent mentally retarded girls in North Indian population and to compare it with that of normal girls of same age group. **Materials and Methods:** One hundred mentally retarded (intelligence quotient (IQ) less than 70) and 100 normal girls between 10 and 20 years of age were categorized into 1-year age groups. Their height was measured and the sexual development was assessed based on breast development (BD) and pubic hair growth (PH) stages 1-5 on the basis of Tanner scale. The data was then compared between the two groups using Student's *t*-test. The mean age of menarche was calculated by applying Probit analysis. **Results:** The mean height of mentally retarded girls was significantly retarded as compared to normal girls at all ages; however, the mean height gain during 11-20 years was same in both the groups. The mentally retarded girls also showed significant retardation in PH growth at 15-17 years and in BD at 15-16 years of age. **Conclusions:** The physical growth and sexual development of adolescent mentally retarded girls was retarded as compared to the normal girls. The physical growth retardation occurred during early childhood (before 11 years), however the retardation in sexual maturity occurred during middle adolescence, between 15-17 years of age.

Key words: Growth, mentally retarded, sexual maturity

INTRODUCTION

Growth studies are a sensitive index of the health and nutritional status of the population. There is a need to investigate the growth and development trends in particular population groups. Such a study serves as a powerful tool to monitor the health and to identify deprived sections or groups of the population.^[1,2]

Children with mental retardation account for 3% of the pediatric population. We are accustomed to refer and compare

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a mentally retarded child's growth to Indian Council of Medical Research (ICMR) standard growth charts for normal children. This implies that the growth pattern of mentally retarded children is the same as normal children. Several studies conducted in the western world have however highlighted the differential growth pattern among mentally retarded and normal healthy children.^[3,4]

The years of adolescence are marked by obvious evidences of physical growth and sexual development. Growth and sexual maturation in adolescent children with mental retardation needs to be studied as it has not been established that growth proceeds differently in adolescents with mental retardation than in general population. Second, possible relationships between growth and sexual maturation also have not been studied in children with mental retardation.

The purpose of this study, therefore, is to evaluate the physical growth and sexual development of adolescent mentally retarded girls in north Indian population and to compare it with that of normal girls of same age group. This would also be a step towards obtaining reference data

which can be a valuable base line relating to an optimal health index for mentally retarded adolescent girls.

MATERIALS AND METHODS

The study was done on a total of 200 female children between 11 and 20 years of age. The exact age of the subjects was verified from birth certificates and school records.

Selection of sample

All the schools for intellectually disabled children in two cities of Punjab (Ludhiana and Patiala), Union Territory of Chandigarh, and one city of Haryana (Panchkula) were selected. A total of six schools were included and all female students present on the day of the visit were selected for the study. Intelligence quotient (IQ) for girls with intellectual disabilities was assessed by a clinical psychologist using age standardized cognitive ability tests like Wechsler Intelligence Scale for Children (WISC), Stanford-Binet Intelligence Scale (SB5), or Intelligence Scale for Indian Children (ISIC) by Malin. Girls having an IQ below 70 were selected as the case group.

The control group consisted of 100 normal adolescent female children studying in schools and colleges in north India. Informed consent from parents/guardians regarding the physical examination of the children/wards was obtained. The study was approved by the institutional ethics committee.

Criteria for exclusion

Children with gross morphological defect like absence of limb or severe orthopedic malformation or suffering from any chronic illnesses were excluded from the study. All subjects belonging to low socioeconomic status based on Prasad's Classification of 1970 per capita income were excluded.^[5]

Recording of anthropometric measurements

The height was recorded for each subject using standard equipment and standard techniques.^[6]

The sexual maturity staging was based on breast development (BD) and pubic hair (PH) growth and assigned on a scale of 1-5 on the basis of Tanner Scale of Sexual Maturation.^[7] The information regarding menarche was obtained from the parents/guardians of the subjects.

Statistical analysis

The case and control group of children were categorized on the basis of their age into 1-year age groups. Each parameter obtained from the study was treated as follows:

- The mean value and the standard deviation (SD) were calculated for each age group and the data for cases and controls were statistically compared using Student's *t*-test

- Mean age of menarche was calculated by applying Probit analysis.

RESULTS

A total of 200 girls in the age group between 11 and 20 years belonging to high socioeconomic status from north India were enrolled for the study. One hundred girls with mental retardation (IQ less than 70) from schools for special children and 100 normal girls from regular schools were categorized on the basis of their age into 1-year age groups.

Comparison of the mean height and SDs showed that the mentally retarded girls were shorter than the normal group at all ages and the difference was statistically significant at all age groups. The maximum height spurt in mentally retarded girls was earlier, that is, at 11-12 years as compared to the normal girls where it was at 13-14 years of age. The comparison of the mean height gain during 11-20 years in mentally retarded girls (21.7 cm) and in normal group (18.28 cm) was statistically insignificant [Table 1, Figure 1].

Comparison of the mean PH stages shows that from 11-13 years of age the mentally retarded girls had a higher value than the normal girls, the difference being significant at 11 years of age [Table 2, Figure 2]. After 14 years of age, the mentally retarded girls had a lower mean value of PH stage as compared to the normal group. This retardation in the PH stages amongst the mentally retarded group being significant at 15-17 years of age.

The mean BD stages in the mentally retarded girls were higher as compared to normal girls at 11-12 years of age, but not statistically significant [Table 2, Figure 3]. After 13 years of age the mentally retarded girls had a lower mean value of

Table 1: Comparison of mean height of mentally retarded and normal females

Age in years	Mean height (in cm)				P value (*significant **highly significant)
	Mentally retarded		Normal		
	n	Mean±SD	n	Mean±SD	
11	10	133.73±11.35	10	145.05±6.41	0.013*
12	10	139.06±11.67	10	149.85±7.22	0.025*
13	10	141.94±7.35	10	152.00±5.34	0.003**
14	10	145.50±3.53	10	157.31±4.65	<001**
15	10	147.32±2.62	10	160.99±6.08	<001**
16	10	149.01±7.84	10	157.07±5.99	0.019*
17	10	150.03±5.12	10	156.13±5.45	0.019*
18	10	150.13±5.55	10	159.52±8.13	0.007**
19	10	150.27±4.84	10	158.46±6.24	0.004**
20	10	154.33±4.00	10	160.33±8.72	0.063*
Height gain		20.60		15.28	

SD: Standard deviation

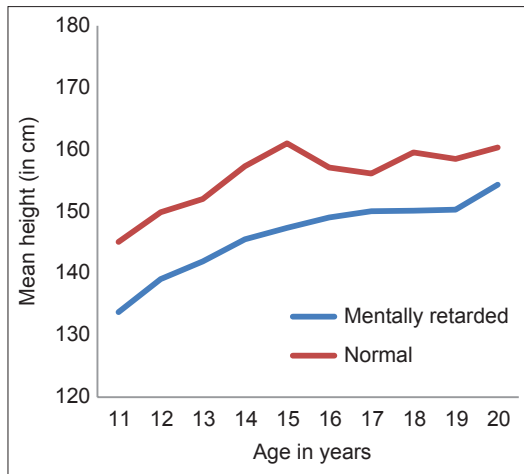


Figure 1: Comparison of mean height

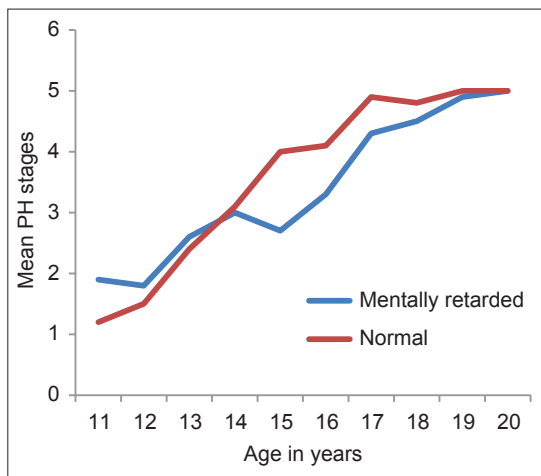


Figure 2: Comparison of mean pubic hair stages

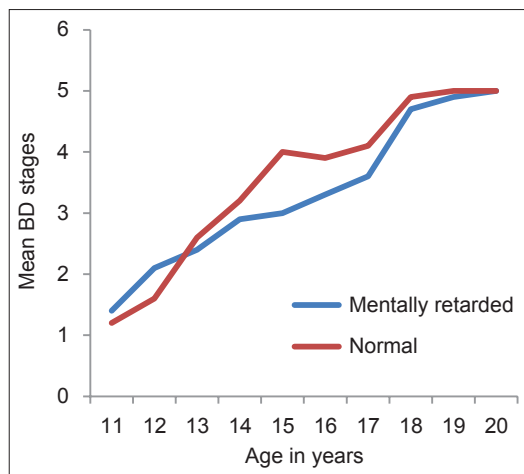


Figure 3: Comparison of breast development stages

BD stage as compared to the normal, the retardation being significant at 15-16 years of age.

A comparison of the median age of menarche of normal (12.88 years) and mentally retarded (13.42 years) girls shows

Table 2: Comparison of mean pubic hair growth stages and mean breast development stages of mentally retarded and normal females

Age in years	Pubic hair growth stages			Breast development stages		
	Mean±SD		P value	Mean±SD		P value
	MR	N		MR	N	
11	1.90±0.32	1.20±0.42	0.001*	1.40±0.52	1.20±0.42	0.355
12	1.80±0.42	1.50±0.70	0.264	2.10±0.88	1.60±0.70	0.175
13	2.60±0.52	2.40±0.85	0.530	2.40±0.85	2.60±0.52	0.530
14	3.00±0.66	3.10±0.57	0.572	2.90±0.74	3.20±0.42	0.279
15	2.70±0.68	4.00±0.00	<001**	3.00±0.47	4.00±0.00	<001**
16	3.30±0.95	4.10±0.32	0.021*	3.30±0.66	3.90±0.34	0.020*
17	4.30±0.68	4.90±0.32	0.020*	3.60±0.97	4.10±0.31	0.137
18	4.50±0.98	4.80±0.42	0.382	4.70±0.67	4.90±0.32	0.407
19	4.90±0.31	5.00±0.00	0.331	4.90±0.31	5.00±0.00	0.331
20	5.00±0.00	5.00±0.00	1.000	5.00±0.00	5.00±0.00	1.000

SD: Standard deviation; N: Normal; MR: Mentally retarded

that the mentally retarded girls attain menarche 6 months later than the normal.

DISCUSSION

The present study was done to assess the physical growth and development of pubertal changes in the mentally retarded adolescent girls. The etiology of mental retardation in these adolescents was of diverse origin as well as the severity of mental retardation was also variable. Their pubertal growth and development was compared with age matched normal adolescent girls. In the present study, the mentally retarded girls were significantly shorter than the normal group at all ages and their mean heights at all ages are one-two SDs below the mean height of normal girls. This is similar to height curves demonstrated by previous studies in different populations.^[8-10]

The age of adolescent height spurt in mentally retarded girls, occurred about 1-2 years earlier than the normal girls. This is consistent with findings of a study on children from Japan.^[11]

The height of mentally retarded subjects was retarded at all ages during adolescence, that is, from 11-20 years. However their age of adolescent growth spurt was earlier than the normal group and their mean increase in height and weight during this period did not vary from that of the normal group. This indicates that the retardation in physical growth in mentally retarded subjects occurred prior to 11 years of age. This finding is supported by results of previous studies.^[9,12,13]

All the subjects showed a similar sequence of development of secondary sex characters in this study. In both the groups, BD was the first sign of appearance of secondary sex characters followed by growth of pubic hair, and menarche was later than pubic hair growth (PH). This is similar to findings of an earlier study wherein the mentally retarded study group

displayed a normal sequential development of secondary sex characters.^[14]

The mentally retarded girls showed significantly earlier signs of onset of growth of pubic hair as compared to the normal girls in this study. The mentally retarded girls also showed changes of BD slightly earlier than the normal group of girls. This early onset of pubertal changes has earlier been documented in children with cerebral palsy,^[15] neurodevelopmental disorders,^[16] and myelodysplasias.^[17] However, the mentally retarded girls had a significant delay in BD (15-16 years) and PH (15-17 years) than the normal girls. The retardation in the secondary sexual developmental parameters in the mentally retarded girls during middle adolescence has been earlier documented in Chinese,^[18] Europeans,^[19] and Americans.^[20]

In the present study, the mentally retarded girls showed more variability in the age of menarche and as a whole achieved menarche 6 months later than the normal subjects. This is in accordance with previous studies.^[14,15,20,21] In the study of special school population in England, it was found that their subjects had a significantly earlier menarche than the normal girls.^[22] However, the girls in this study were blind, deaf, or physically handicapped rather than mentally handicapped; which accounts for the difference between their results and this study.

The mentally retarded girls show retardation in both physical growth and sexual development as compared to normal girls. Over the years, it has been postulated that such children are small because they are neglected and undernourished. There was no evidence of this in the present study as all children were belonging to higher socioeconomic class. The presence of a chronic disorder is often blamed for stunting of physical growth, so children with chronic debilitating illness were excluded from the study group and the growth retardation was still significant in the mentally retarded population.

This analysis makes it possible to hypothesize that some unknown factors which play a role in producing brain malfunction, and thus mental retardation also retard the physical growth and development of secondary sex characters. These growth retarding factors are affecting the physical growth during early childhood, that is, before 11 years of age; and the sexual development during middle adolescence, that is, between 15 and 17 years of age.

Further study is needed to investigate the association of this growth retardation with underlying cause of intellectual disabilities. The pathophysiology and clinical implications of this growth retardation requires additional investigation.

Longitudinal studies beginning early in life would provide more meaningful data for this problem.

CONCLUSIONS

The findings from this survey show that the physical growth and sexual development of adolescent mentally retarded girls was retarded as compared to the normal girls. The physical growth retardation occurred during early childhood (before 11 years); however, the retardation in sexual maturity occurred during middle adolescence, between 15-17 years of age.

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