

Assessment of Sexual Maturation Among Girls With Special Needs in Tehran, Iran

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Abstract

Background: There is limited data on sexual maturation among girls with intellectual, sensory, or physical disabilities.

Objectives: The present cross-sectional study was conducted to assess the sexual maturation of girls with these disabilities in special schools.

Methods: In this cross-sectional study, we evaluated the onset and progression of sexual maturation in 642 six to 18-year-old girls with intellectual, sensory, or physical disabilities from special schools in Tehran. The participants were selected by multi-stage random sampling. Pubertal stages were assessed by visual inspection and palpation based on the rating scales of Tanner. Stage two (breast budding and pubic hair growth) and stage five were considered the onset and end of puberty, respectively.

Results: The mean ages of onset of puberty indicated by breast budding (B2 stage) and by pubic hair growth (P2 stage) were 10.8 ± 1.48 and 10.79 ± 1.64 years, respectively. The process of puberty based on breast budding and pubic hair growth was completed at 15.58 ± 1.85 and 15.59 ± 1.8 years, respectively. The average height at the onset of puberty (stage B2) among participants was 128 ± 28.79 cm and the average weight was 8.31 ± 36.47 kg.

Conclusions: Among our patients, the mean ages of onset of puberty indicated by breast budding (B2 stage) and by pubic hair growth (P2 stage) were 10.8 ± 1.48 and 10.79 ± 1.64 years, respectively. Compared to the data from healthy Iranian girls, our findings indicate that the mean age of pubertal onset among schoolgirls with disabilities is slightly higher than that of their healthy counterparts.

Keywords: Sexual Maturation, Girls, Neurodevelopmental Disability, Iran

1. Background

Causes of mental disability or intellectual disability and sensory and physical-motor problems among children are very diverse. The most common known cause is chromosomal abnormalities. Birth and neonatal morbidities, preterm birth, and environmental factors are some other causes. In many cases, the cause remains unidentified (1, 2).

Genetic background, geographical location, nutritional status, environmental factors, and diseases play an important role in the growth and maturation of children and adolescents (3, 4). In several studies, differences in the age of the onset of puberty have been observed (5, 6). In a recent study, Rabbani et al. studied 7,493 healthy, six to 20-year-old females from Iran and observed that the average

age for the onset of puberty among Iranian females (mean 10.1 years) was similar to most other reported outcomes (4).

Maturity studies for children with mental disabilities and those with sensory and cognitive impairments are limited. In a study of 207 children with cerebral palsy disorder and moderate to severe motor impairment, Worley et al. indicated that the age of onset of breast development was similar to that of the general population, but the process takes longer to complete (7). In a study by Siddiqi et al. (8) between 1987 and 1997 on 15,719 patients with neurodevelopmental disabilities, the patients were at higher risk of precocious puberty than healthy children. In 2006, Cento et al. (9) reported the response of gonadotropins to injections of GnRH in 56 mentally retarded and 146 healthy girls and observed that FSH secretion was lower in the early stages of puberty in girls with intellectual disability.

In 2014, Baidwan et al. studied the pattern of growth and sexual maturation in 100 10 - 20-year-old mentally disabled patients and the same number of healthy females. In their study, pubic hair and breast development in patients happened earlier compared to healthy individuals, but sexual development was delayed during adolescence (15 - 17 years). Physical maturity was also delayed, and patients in all age groups had shorter stature (10).

A reliable estimation of the age of sexual maturity in patients with disabilities allows us to predict their physical and behavioral changes and prepare for the necessary measures in terms of their social relationships. With the knowledge of normal puberty age, we can define precocious or late puberty. The timely detection of early and late sexual maturity also helps in the treatment of these problems.

2. Objectives

As far as we know, there are no studies regarding the age of puberty in Iranian females with disabilities, so the present cross-sectional study was conducted in Tehran to evaluate the average age of sexual maturity in these patients. This will help establish a standard for the evaluation of sexual maturation in this group of patients.

3. Methods

This cross-sectional study was conducted from 2012 to 2013 on 756 individuals to evaluate the stages of puberty among six to 18-year-old females from Tehran special schools for children with intellectual, sensory, or physical disabilities. In Iran, special schools are categorized based on the form of disability: intellectual disabilities, physical-motor disabilities, behavioral disorders, sensory (hearing or visual) problems, and multi-faceted disabilities. This study was approved by the ethics committee of Tehran University of Medical Sciences. Multi-stage random sampling was conducted. In this study, 756 students from 12 schools distributed among five regions (north, south, east, west, and central Tehran) were included.

The inclusion criteria were female children and adolescents between six and 18 years old with physical-motor, sensory, or intellectual disabilities. The exclusion criteria were children who were not Iranians or showed sexual ambiguity.

The study was explained in a joint meeting of parents and children, and verbal consent was obtained for each patient. A registration form for each child was filed, which included demographic information from their educational files.

Weight was measured using a Seca scale (Germany), and height was measured with each patient lying on the

bed with legs straight and ankles in the anatomical position (0° of dorsiflexion).

BMI was calculated using the following formula: (weight) kg/ (height) m^2 . The signs of the onset of puberty and its stages were determined by a single female physician based on observation and examination. The Tanner classification system was used to determine the pubertal stages (11). According to this classification system, there are five stages in the course of female puberty. Breast bud growth (thelarche) is usually the first sign of puberty in females (3). In the present study, the B2 level in the Tanner classification was considered as the onset of puberty.

4. Results

Overall, 756 individuals were enrolled in the present study. Of the 756 cases, 114 participants were excluded due to lack of cooperation. At the end, 642 six to 18-year-old girls completed the study. The average ages at the onset of puberty in participants based on B2 and P2 levels in the Tanner classification were 10.8 ± 1.48 years and 10.79 ± 1.64 years, respectively.

The average ages for different stages of breast development based on the Tanner classification are presented in Table 1. The average age for the start of puberty in girls according to breast bud growth was 10.8 ± 1.48 years, and puberty was completed when participants reached a mean age of 15.58 ± 1.85 years.

The average ages for different stages of pubic hair growth based on the Tanner classification are presented in Table 2. The average age for the start of puberty in girls according to pubic hair growth was 10.79 ± 1.64 years, and puberty was completed when participants reached a mean age of 15.59 ± 1.80 years.

Figure 1 shows the average age of puberty among girls participating in the present study according to breast and pubic hair growth.

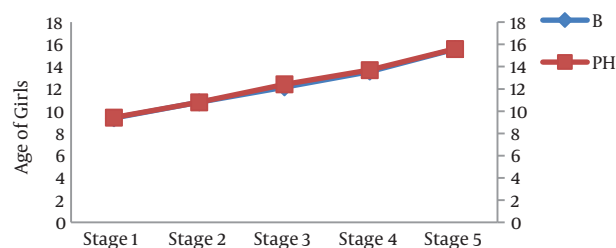


Figure 1. The Average Age of Puberty in Girls Participating in the Present Study According to Breast and Pubic Hair Growth

The average height at the onset of puberty (stage B2) in participants was 128.2 ± 8.79 cm and the average weight

Table 1. The Average age of Participants at Different Stages of Breast Bud Development

| Stages of Breast Development | No (%) | Mean \pm SD | 95% CI |
|------------------------------|------------|------------------|---------------|
| B1 | 125 (19.4) | 9.37 \pm 1.75 | 9.69 - 9.05 |
| B2 | 66 (10.3) | 10.8 \pm 1.48 | 11.16 - 10.44 |
| B3 | 80 (12.4) | 12.15 \pm 1.94 | 12.59 - 11.71 |
| B4 | 124 (19.3) | 13.56 \pm 1.84 | 13.9 - 13.22 |
| B5 | 247 (38.4) | 15.58 \pm 1.85 | 15.82 - 15.34 |

Table 2. The Average Age of Participants at Different Stages of Pubic Hair Growth

| Pubic Hair Growth | No. (%) | Mean \pm SD | 95% CI |
|-------------------|------------|------------------|---------------|
| P1 | 119 (18.5) | 9.42 \pm 1.65 | 9.72 - 9.12 |
| P2 | 87 (13.6) | 10.79 \pm 1.64 | 11.15 - 10.43 |
| P3 | 62 (9.7) | 12.40 \pm 2.30 | 12.98 - 11.82 |
| P4 | 140 (21.8) | 13.69 \pm 1.99 | 14.03 - 13.35 |
| P5 | 234 (36.4) | 15.59 \pm 1.80 | 15.83 - 15.35 |

was 36.47 ± 8.31 kg (Table 3).

5. Discussion

The development of secondary sexual characteristics in adolescents is a sign of normal physiological development (3, 5). Therefore, evaluating the onset and progression of the early signs of sexual development and sexual maturation are important in the assessment of individual health. In addition, with the knowledge of normal puberty age, we can define precocious or late puberty (5).

The age for the onset of puberty and secondary sexual characteristics, as well as factors affecting this process, have been discussed in different regions of the world. It has been proven that pubertal onset varies across different populations (5, 12). In addition, nutritional status, economic conditions, and disease have a significant impact on the timing of puberty events (13).

In Iran, several studies have been conducted to investigate the age of puberty onset among healthy children and adolescents (4, 5, 14). In a study on 7,493 healthy Iranian girls, Rabbani et al. (4) found that the mean ages for the start of maturity based on the B2 and P2 stages of maturity according to the Tanner classification were 10.1 and 9.38 years, respectively. In the present study which included 643 female students with intellectual, sensory, or physical disabilities from Tehran the average age for the onset of puberty was 10.8 years based on reaching the B2 stage and 10.79 years based on reaching the P2 stage. These find-

ings show a slight delay in puberty compared to the age reported by Rabbani et al. (4) for the healthy population.

Razzaghy et al. (5) have reported the mean age of the onset of puberty for healthy Iranian girls to be 9.74 years based on B2 and 10.49 years based on P2. According to their findings, our patients demonstrate delayed puberty onset compared to the healthy population (4). Similar to our findings, in 1975, Salerno et al. showed that females with intellectual disability show a delay in puberty compared to healthy individuals (15). A similar delay has been reported by Evans et al. (16) in mentally handicapped females.

The delay in puberty in this group of children might be related to eating disorders or the side effects of some medications such as corticosteroids and psychotropic drugs as well as a higher incidence of endocrine diseases (17-19). As a general rule in mental and motor disabilities with genetic and chromosomal origin, impaired development of the neuroendocrine system and the evolution of the GnRH-producing neurons causes a delay of gonadal development, which can cause a delay of puberty (20).

Cento et al. (9) have reported that FSH secretion in response to GnRH treatment in the early stages of puberty was impaired in females with intellectual disability. They concluded that the low sensitivity of cells secreting FSH may be due to dysfunction of catecholaminergic, opioid, or GABAergic routes

In this study, children in different age groups were shorter compared to the healthy peers reported on by Rabbani et al. (4) The average height in the Rabbani et al. study was reported to be 140.3 cm in the B2 stage, but it was only

Table 3. The Average Height, Weight, and BMI at Different Stages of Puberty

| Stages of Breast Development | Stages of Pubic Hair | Height (Cm) \pm SD | Weight (Kg) \pm SD | BMI \pm SD |
|------------------------------|----------------------|----------------------|----------------------|------------------|
| B1 | | 122.33 \pm 11.66 | 26.65 \pm 12.01 | 17.83 \pm 8.03 |
| P1 | | 123.59 \pm 11.56 | 27.94 \pm 10.76 | 18.40 \pm 6.66 |
| B2 | | 128.2 \pm 8.79 | 36.47 \pm 8.31 | 22.19 \pm 4.35 |
| P2 | | 129.59 \pm 10.97 | 32.08 \pm 13.13 | 19.11 \pm 7.29 |
| B3 | | 137.46 \pm 8.87 | 38.54 \pm 10.63 | 20.53 \pm 5.21 |
| P3 | | 137.91 \pm 8.87 | 38.45 \pm 13.12 | 20.11 \pm 6.10 |
| B4 | | 143.58 \pm 11.01 | 42.65 \pm 10.18 | 20.71 \pm 5.21 |
| P4 | | 145.59 \pm 11.05 | 43.55 \pm 13.68 | 20.56 \pm 5.53 |
| B5 | | 150.35 \pm 10.79 | 56.77 \pm 16.95 | 25.2 \pm 7.19 |
| P5 | | 151.44 \pm 10.90 | 58.38 \pm 16.76 | 25.52 \pm 7.24 |

128.2 cm among our participants. Previous studies on patients with intellectual disability in Tehran indicate similar findings (21). This is similar to a finding of Baidwan et al. (17) on patients with intellectual disability from India (10). Although eating disorders can be considered as the cause of this finding, associated endocrine disorders such as GH-IGF1 axis dysfunction, thyroid disorders, and other unknown conditions should be considered. This explains the fact that in the Baidwan et al. study, despite the elimination of eating disorders as a factor, short stature was still present. In 2009, Kuperminc et al. (17) studied 20 six to 18-year-old patients with cerebral palsy for three years and compared them to a group of 63 healthy children in terms of growth before and during puberty. Children with cerebral palsy were behind in all stages of their growth compared to healthy controls. This study indicated a defect in the GH-IGF1 axis among patients.

The present study had some shortcomings. For example, due to a lack of access to the medical records of children, we could not divide our participants based on the type of underlying disease (cerebral palsy, Down syndrome, etc.); therefore, the cause of intellectual disability was not identified. In addition, we had no control group in this study, which might limit the reliability of our results.

5.1. Conclusion

In our patients, the mean ages of onset of puberty indicated by breast budding (B2 stage) and by pubic hair growth (P2 stage) were 10.8 ± 1.48 years and 10.79 ± 1.64 years, respectively. Compared to the data from healthy Iranian girls, our findings indicate that the mean age of pubertal onset in schoolgirls with disabilities is slightly higher than that of their healthy counterparts.

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