

Assessment of Sexual Maturation among Boys in Special Schools of Tehran, Iran

Asieh Mosallanejad¹, Kambiz Eftekhari², *Hosein Shabani Mirzaee³, Ali Rabbani⁴, Aria Setoudeh⁵, Farzaneh Abbasi⁶, Fatemeh Sayarifard⁶, Vahid Ziaee⁷, Amir hossein Memari⁸, Seyed Javad Sayedi⁹

¹Assistant Professor of Pediatric Endocrinology, Pediatric Endocrinology Department, Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ²Assistant Professor of Pediatric Gastroenterology, Pediatric Gastroenterology Department, Bahrami Children's Hospital, Tehran University of Medical Sciences, Tehran, Iran. ³Assistant Professor of Pediatric Endocrinology, Pediatric Endocrinology Department, Bahrami Children's Hospital, Tehran University of Medical Sciences, Tehran, Iran. ⁴Professor of Pediatric Endocrinology, Pediatric Endocrinology Department, Children's Medical Center Hospital, Tehran University of Medical Sciences, Tehran, Iran. ⁵Associated Professor of Pediatric Endocrinology, Pediatric Endocrinology Department, Children's Medical Center Hospital, Tehran University of Medical Sciences, Tehran, Iran. ⁶Assistant Professor of Pediatric Endocrinology, Pediatric Endocrinology Department, Children's Medical Center Hospital, Tehran University of Medical Sciences, Tehran, Iran. ⁷Professor of Pediatric Rheumatology, Children's Medical Center, Pediatrics Center of Excellence, Tehran University of Medical Sciences, Tehran, Iran. ⁸Neuroscience Institute, Sport Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran. ⁹Assistant Professor of Pediatrics Pulmonologist, Department of Pediatrics, Dr. Sheikh Pediatrics Hospital, Mashhad University of Medical Sciences, Mashhad, Iran.

Abstract

Background: Due to lack of detailed standards of sexual maturity in individuals with Intellectual, sensory and motor disability in Iran and the importance of timing of onset of puberty in these individuals, a study is necessary. By knowing the onset of puberty, physiologic and behavioral changes can be traced in these people, as well as the potential impact of the puberty on the underlying disease can be considered. The aim of the study was to investigate of sexual maturation among boys of special schools of Tehran. **Materials and Methods:** Cross-sectional study was performed on children and adolescents male students in special school in Tehran at 2013. A random, multistage sample of 895 boy students of special schools was taken from 25 special schools in five districts of Tehran city. In this study, symptoms and stages of puberty were identified. Pubertal stages were assessed by visual inspection and palpation based on the rating scales of Tanner. In addition, demographic data such as age, height, weight were collected. Then the data were analyzed and mean age of onset of puberty was determined. **Results:** The mean age of onset of puberty in boys (Genitalia stage 2) was 13.12 ± 1.84 years and sexual maturation was completed at 16.57 ± 1.34 years. The average height at the onset of puberty (Genitalia stage 2) was 151.1 ± 9.91 cm and the average weight was 48.47 ± 10.14 kg. The mean BMI for puberty onset was 20.89 ± 5.43 . **Conclusion:** In our study, the mean age of puberty onset in boys with disabilities was 13.12 ± 1.84 years. Compared to the data from healthy boys, our findings indicate that the mean age of pubertal onset in boys with disabilities in special school is higher than that of their healthy counterparts.

Key Words: Disability, Iran, Sexual maturation, Student.

*Please cite this article as: Mosallanejad A, Eftekhari K, Shabani Mirzaee H, Rabbani A, Setoudeh A, Abbasi F, et al. Assessment of Sexual Maturation among Boys in Special Schools of Tehran, Iran. Int J Pediatr 2017; 5(1): 4145-50. DOI: [10.22038/ijp.2016.7799](https://doi.org/10.22038/ijp.2016.7799)

* Corresponding Author:

Hosein Shabani Mirzaee, MD, Mailing address: Department of Pediatric Endocrinology, Bahrami children hospital, Kiaee Street, Damavand Street, Tehran, Iran. Fax: +982177568809

E-mail: dr.hosein_shabani@yahoo.com

Received date Nov.11, 2016; Accepted date: Sep. 22, 2016

1- INTRODUCTION

There are varied causes of motor, sensory and mental disabilities in children, including chromosomal abnormalities, congenital infections, teratogens and genetic defects. The origin is attributed to the environment, such as brain damage, accidents, acquired infections and preterm birth. Genetic background, geographical location, nutritional status, environmental factors and disease play a crucial role in the growth and maturation of children and adolescents (1).

Puberty is the biologic transition from childhood to adulthood. Pubertal changes include the appearance of the secondary sexual characteristics, increase in height, change in body composition and development of reproductive system (2).

In males, growth of the testes (≥ 4 mL in volume or 2.5 cm in longest diameter), and thinning of the scrotum are the first signs of puberty (11-12 years). These are followed by pigmentation of the scrotum and growth of the penis. Appearance of axillary hair usually occurs in midpuberty. In males acceleration of growth begins after puberty is well under way and is maximal at genital stages 4-5 (typically between 13 and 14 years of age).

In females, the breast bud (thelarche) is usually the first sign of puberty (10-11 years of age), followed by the appearance of pubic hair (pubarche) 6-12 month later. The interval to the onset of menstrual activity (menarche) is usually 2-2.5 years, but may be as long as 6 years. Peak height velocity occurs early (at breast stages 2-3, typically between 11 and 12 years of age) in girls and always precedes menarche. The mean age of menarche is approximately 12.75 years. There are, however, wide variations in the sequence of changes involving growth spurt, breast bud, pubic hair, and maturation of the internal and external genitalia (3). In the studies that have been conducted in various countries in Europe and Asia, the

average age of puberty onset in healthy boys within age 10 to 12 years has been reported (4-6). In a study on 190 healthy Iranian boys by Rabbani et al. (2013), the average age of onset of puberty was 11.4 years (7). A study in 2010 by Monyeki and colleagues in South Africa on 129 mentally retarded boys, depicted that puberty begins later in these children (8).

This study aimed to investigate of sexual maturation in boy students of special schools of Tehran, Iran. This can help to provide a standard for evaluation of sexual maturation in this group of patients. 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.

2- MATERIALS AND METHODS

2-1. Study design and population

This is a cross-sectional study which evaluates onset of puberty and pubertal maturity in male children and adolescent students in special school in Tehran at 2013.

2-2. Methods

The multi-stage random sampling performed to collect special school boy children and adolescent students aged from 6 to 18 years, between January, 2013 and June, 2013. This study was approved by ethics committee of the Tehran University of Medical Sciences. In collaboration with Sports Medicine Research Center of Tehran University of Medical Sciences and the Department of Education of Tehran, 25 schools from 5 regions of North, South, East, West and Central Tehran were selected and, the number of students from each school was selected randomly. Based on previous studies and confidence interval (CI) 95% by using the formula, sample size was calculated as 671

students. Sample size was estimated according to following formula:

$$n = Z^2 P (1-P) / D^2 = 671$$

To assume having more accurate 30%, so the sample size (n) was increased to 671+201=872, and finally we considered 895 children for the study.

2-3. Measuring tools and measurement

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). Body mass index (BMI) was calculated using the following formula: (weight) kg/ (height) m² (9, 10).

The onset of symptoms and stages of puberty were determined by observation and clinical examination and data were collected on the form. Determination of pubertal maturation process was carried out by a single male physician. The Tanner scaling classification was used to determine the pubertal stages (5, 11). In males, the first visible sign of puberty is testicular enlargement (≥ 4 ml in volume or 2.5cm in longest diameter); this is equivalent with Genitalia stage 2 (G2) in Tanner classification system, followed by the development of pubic hair. This is followed by penile growth during G3. Peak growth occurs during G4, and adult size genitalia and physically maturation occur in G5.

2-4. Ethical consideration

Approval was obtained from the ethics committee of the Tehran University of Medical Sciences. The aim of the study was presented for parents and the informed consent was enrolled.

2-5. Inclusion criteria

The inclusion criteria were male children and adolescents between 6 and 18 years old with physical-motor, sensory, or intellectual disabilities.

2-6. Exclusion criteria

The exclusion criteria were children who were not Iranians or showed sexual ambiguity.

2-7. Data analysis

Analyses of data were performed using the Statistical Package for Social Sciences software (SPSS, version 16.0). Quantitative data were presented as mean \pm standard deviation (SD). P-value less than 0.05 were significant.

2- RESULTS

In this study, the sexual maturity of 895 boy students from special schools was examined. Of the 895 cases, 155 (17.3%) participants were excluded due to lack of cooperation. At the end, 740 (82.7%) six to 18 year old boys completed the study.

The mean age of onset of puberty in boys (Genitalia stage 2) was at 13.12 ± 1.84 years. The mean age for Genitalia stage 3 was at 15.05 ± 1.74 years, and the mean age for Genitalia stage 4 was at 16 ± 1.61 years. Puberty maturation completed (Genitalia stage 5) at mean age of 16.57 ± 1.34 years. Average age at subsequent stages of puberty maturity are presented in **Table.1**.

The average height at start of puberty (Genitalia stage 2) was 151.10 ± 9.91 cm. The average height for Genitalia stage 3 was 163.15 ± 8.74 cm and the average height for Genitalia stage 4 was 166.52 ± 11.32 cm. In the boys who had been in full pubertal maturity (Genitalia stage 5) the average height was 166.59 ± 11.01 cm.

The average weight at start of puberty (Genitalia stage 2) was 48.47 ± 10.4 kg. The average weight for Genitalia stage 3

was 57.10 ± 10.14 kg and the average weight for Genitalia stage 4 was 60.38 ± 10.73 kg. In the boys who had been in full pubertal maturity (Genitalia stage 5) the average weight was 71.15 ± 12.06 kg.

The mean BMI for puberty onset (Genitalia stage 2) was 20.89 ± 5.43 . The mean BMI for Genitalia stage 3 was 21.30

± 4.54 and mean BMI for Genitalia stage 4 was 21.89 ± 4.49 . In the boys who had been in full pubertal maturity (Genitalia stage 5) the mean BMI was 22.95 ± 8.01 (**Table.2**).

Figure.1 show the average age of puberty in boys in this study according to genitalia growth stages.

Table-1: Average age of boys at different stages of puberty maturity

Genitalia stages development	No (%)	Mean \pm SD	95% CI
Genitalia 1	412 (46)	10.52 ± 2.03	10.3-10.74
Genitalia 2	70 (7.8)	13.12 ± 1.84	12.66-13.58
Genitalia 3	107 (12)	15.05 ± 1.74	14.71-15.39
Genitalia 4	88 (9.8)	16 ± 1.61	15.66-16.34
Genitalia 5	63 (7.0)	16.57 ± 1.34	16.23-16.91

SD: Standard deviation; CI: Confidence interval.

Table-2: The average height, weight and BMI at different stages of puberty maturity

Genitalia stages development	Height (cm) \pm SD	Weight (kg) \pm SD	BMI \pm SD
Genitalia 1	134.54 ± 10.78	35.97 ± 11.31	20.67 ± 7.91
Genitalia 2	151.10 ± 9.91	48.47 ± 10.14	20.89 ± 5.43
Genitalia 3	163.15 ± 8.74	57.10 ± 8.52	21.30 ± 4.54
Genitalia 4	166.52 ± 11.32	60.38 ± 10.73	21.89 ± 4.49
Genitalia 5	166.59 ± 11.01	71.15 ± 12.06	22.95 ± 8.01

BMI: Body Mass Index; SD: Standard Deviation.

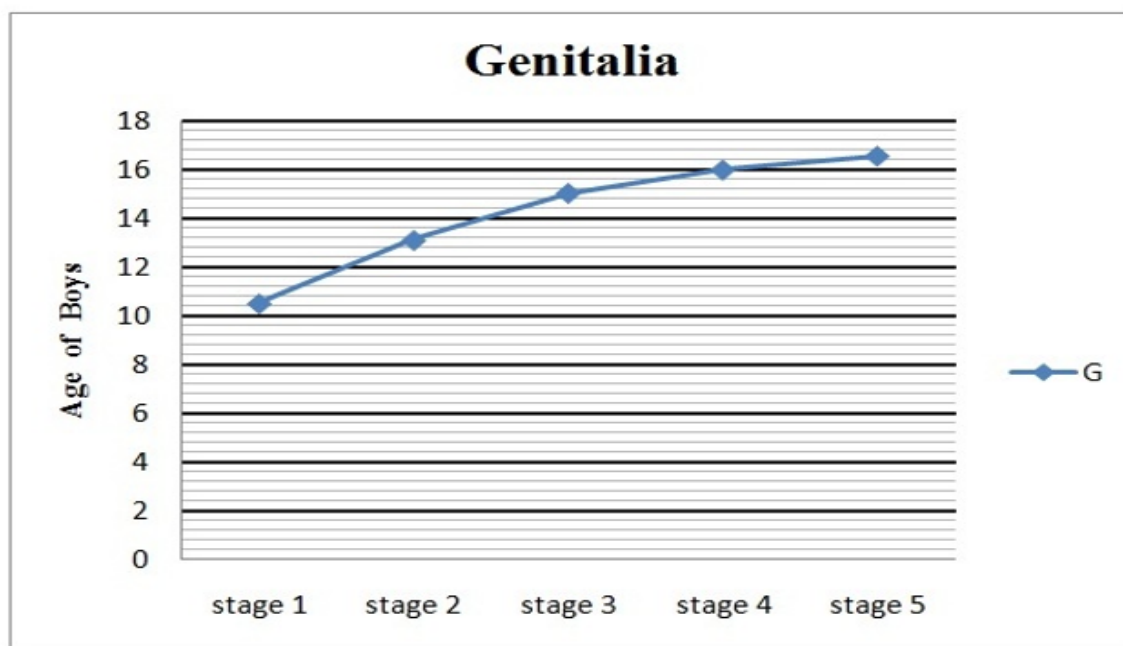


Fig.1: The average age of puberty among boys according to genitalia growth stages

4- DISCUSSION

The development of secondary sexual characteristics in adolescents is a sign of normal physiological development. Therefore, evaluation of the onset and progression of the early sign of sexual development and maturation are important in the assessment of individual health (12). In the present study which included 740 male students with intellectual, sensory or physical disabilities in Tehran, the average age for the onset of puberty was 13.12 ± 1.84 years (Table.1). This finding show a delay in puberty compared to the age reported in healthy boys.

In the studies that have been conducted in various countries in Europe and Asia, the average age of puberty onset in healthy boys within age 10 to 12 years has been reported (4-6). In Iran, in a study on 190 healthy Iranian boys by Rabbani et al in 2013, the average age of onset of puberty was 11.4 years (7). A study in 2010 by Monyeki and colleagues in South Africa on 129 mentally retarded boys, depicted that puberty begins later in these children (8). Van Gelderen evaluated 467 children 9 to 17 years old with mental retardation and observed that the onset of puberty was normal in most cases, but delayed puberty was common (13). Kuperminc et al. compared a total of 20 children aged 6 to 18 years with cerebral palsy for 3 years with a 63-member group of healthy children and there was no significant difference between both groups regarding the process of puberty (14).

It is important to note that motor, sensory and mental disabilities, with respect to the underlying problem, can effect on sexual maturation. For example, some endocrine diseases such as hypothyroidism and hormonal disorders affect the maturation and process of puberty. Causes of impaired puberty maturation sometimes are genetic or constitutional (gene mutations involving the hypothalamus and the pituitary or various syndromic cases) (15). Organic

brain damage should be added to this list, which some of them can cause pubertal disturbances. In addition to these factors, malnutrition as well as adverse effects of medications commonly seen in children can affect the puberty maturation process. Puberty is initiated in the hypothalamus by an increase in Gonadotropin Releasing Hormone (GnRH) pulse and the subsequent development of the neuroendocrine system and specific neurotransmitters (i.e.: kisspeptin) (16). Generally, in some mental disabilities, central nervous system neuroendocrine mechanism impairment can affect the GnRH producing neuron development and cause delayed gonadal maturation.

4-1. Limitations of the study

The present study had some shortcomings. For example, due to lack of access to the medical records of children, we could not divide our participants based on the type of underlying disease (chromosomal or genetic abnormality, cerebral palsy, etc.); there for, 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- CONCLUSION

In our study, the mean age of puberty onset in boys with disabilities was 13.12 ± 1.84 years. Compared to the data from healthy boys, our findings indicate that the mean age of pubertal onset in boys with disabilities in special school is higher than that of their healthy counterparts. Finally, completion of sexual maturity -in the same proportion as the delayed start -took place later.

6- CONFLICT OF INTEREST: None.

7- ACKNOWLEDGMENT

We would like to grateful from students, their families and Department of

Education of Tehran for their collaboration in this study.

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