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The testicular and penile sizes and rates of external genital organ anomalies in primary school boys in Samsun

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Summary

Aim: To measure the testicular and penile sizes to determine the standard values by age in primary school boys, to identify the rates of external genital anomalies and to inform patients' families about treatment options.

Material and Method: After approval of the Ethics Committee of Ondokuz Mayıs University, 977 male students with a mean age of 8.67±1.51 years from three primary schools which were selected by simple random sampling method in Samsun were included in the study. Testicular and penile sizes were measured. Observed abnormalities were recorded. Statistical analysis was performed using SPSS 15.0.

Results: Mean values for testicular size and penile length were calculated by age. In 44 students (4.5%), 52 genital abnormalities were detected. The most frequent anomalies were undescended testis (12; 1.2%) and inguinal hernia (8; 0.8%). The rate of untreated anomaly of external genital organs was found to be 3.9% in primary school children.

Conclusions: Recognizing the normal values for penile and testicular sizes in primary school children may contribute to better evaluation of external genitalia and detection of corresponding anomalies. Our study also revealed that the rates of external genital organ anomalies which had to be operated much earlier were fairly high. *(Turk Arch Ped 2011; 46: 151-5)*

Key words: Anomaly; external genital organ; prevalence

Introduction

Both congenital and acquired abnormalities of external genital organs are observed rather frequently. Although abnormalities of external genital organs are observed frequently in our country, appropriate and timely diagnosis and treatment are not provided in most of them. For a healthy generation timely diagnosis and treatment of abnormalities is significant.

Early diagnosis of abnormalities of penile lenght and testicular size is important in terms of both medical and psychological aspects. For instance, micropenis can sometimes be the most important early sign of hypothalamic or pitiutary hormonal failure (1). Knowledge of normal values of penile lenghts and testicular size by age in primary school children in our population will contribute to evaluation of external genital organs, diagnosis of developmental abnormalities and monitoring of treatment of underlying diseases which may affect the development of external genital organs.

Large field studies indicating the rates of abnormalities of external genital organs in our country in detail are regional and limited in number. In addition, as far as we know, no study related to measurements of testicular size and penile lenght in primary school children in our country has been conducted. Therefore, the figures we have generally belong to the studies performed in foreign countries. However, it is a fact that variations in different countries and even in different regions may exist in terms of these values. In this study, we aimed to determine the standard values by age by measuring testicular and penile sizes in primary school boys in the county town of Samsun, to find the frequency of external genital organ abnormalities which can be diagnosed by

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physical examination and to give the necessary information to families of children who are found to have abnormality.

Material and Method

Approval from the Ondokuz Mayıs University ethics committee was obtained to determine the standard values by age by measuring testicular and penile sizes of primary school boys in the age group of 6-11 years (mean 8.67±1.51 years) studying in the county town of Samsun and to find the frequency of external genital organ abnormalities. Formal approval from the provincal directorate for national education was also obtained and three primary schools were determined by simple randomized sampling method in the county town of Samsun between March 2009 and June 2009. Scool managers and counsellors were interviewed in the selected schools, information about the study was given and planning was performed. Classes were vizited in company with counsellors and the children were informed face to face. Informed consent forms were distributed to the children to deliver to their families. 977 boys whose families gave consent were included in the study.

The ages of the children were calculated using decimal age table. All children were examined by the same physician in an appropriate examination room prepared in their own schools at room temperature while standing. During genital examination, Tanner classification system (2) was used and boys with no pubic hairing and with testcular sizes below 4 cc were classified as prepubertal (Tanner 1) and the other boys were classified as pubertal. Testicular sizes were calculated using Prader orchidometry (3) (Picture 1) measuring the length from symphysis pubis to the end of glans stretching glans penis (Picture 2). During examination, it was searched if the testicles were in the scrotum or not and presence of hypospadias, hydrocele, recessed penis, inguinal hernia and phimosis was investigated. Children who were found to have undescended testicles and/or inguinal hernia were layed down, made to cough and confirmation was done with history. Children who were found to have hydrocele were checked by transillumination method in a dark room. Children who had been operated previously

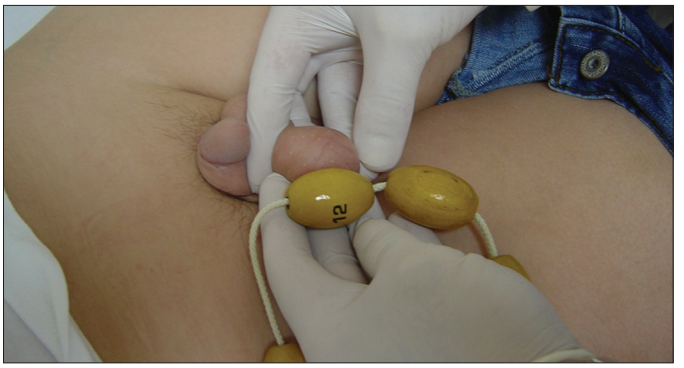

Figure 1: Measurement of the testicular volume by orchidometric method

Figure 2: Measurement of the penile lenght

Table 1: Testicular volumes and penile lengths in primary school children

Age	State of puberty	n	Testicular volume ±2 SS (cm^3)		Penile length ±2,5 SS (mm)
			Right testicle	Left testicle	
6.0-6.9	Prepubertal	84	2.50±1.10	2.49±1.10	53.5±6.6
	Pubertal	0	-	-	-
7.0-7.9	Prepubertal	143	2.84±0.74	2.83±0.74	56.6±17.1
	Pubertal	0	-	-	-
8.0-8.9	Prepubertal	119	2.86±0.79	2.89±0.63	57.9±16.7
	Pubertal	105	4.31±1.13	4.30±1.18	59.2±17.2
9.0-9.9	Prepubertal	59	2.94±0.61	2.98±0.28	59.9±18.9
	Pubertal	139	4.38±1.12	4.37±1.17	63.9±20.0
10.0-10.9	Prepubertal	29	2.96±0.38	3.00±0.00	61.5±23.7
	Pubertal	162	4.86±2.18	4.85±2.31	66.9±18.4
11.0-11.9	Prepubertal	1	3.00±0.00	3.00±0.00	55.0±0.0
	Pubertal	136	6.26±3.84	6.24±3.91	70.1±20.8

and had no pathology during the examination were also included when assessing the frequency of abnormality. Physical examination findings were recorded in the forms. At the end of the study, families of children who were found to have a pathology were informed about treatment. Those who referred for treatment were treated.

Statistical analysis was done using SPSS 15.0 program. Mean ± 2.5 standard deviation was used for penile length and mean ±2 standard deviation was used for testicular size.

Results

A total of 977 boys with an age range of 6 and 11 years were examined in the three primary schools included in the study. 785 (80.3%) of the children were found to be circumcised and 192 (19.7%) were found to be uncircumcised. Six of these children who had normal physical examination findings were interrogated about the incision found on examination and it was learned that they were operated previously. These children were included when assessing the frequency of abnormality (two orchiopexia, one varicocelectomy, one hypospadias correction and two inguinal hernia corrections).

Stretched penile lengths and testicular sizes of prepubertal and pubertal children by age groups are shown in Table 1.

52 abnormalities were found in 44 (4.5%) of 977 boys whose external genital organs were examined. The most common pathologies included undescended testicle which was found in 12 subjects (1.2%) and inguinal hernia which was found in 8 subjects (0.8%). Problems of external genital organs included five subjects with hydrocele (0.5%), five subjects with recessed penis (0.5%), four subjects with retractile testicle (0.4%), four subjects with hypospadias (0.4%), four subjects with varicocele (0.4%) and two subjects with high scrotal location (0.2%). The frequencies of external genital anomalies found by physical examination are shown in Table 2.

Discussion

In boys, measurement of testicular size is important in terms of evaluating normal pubertal development (4,5). Measurement of testicular size can be performed using different methods including orchidometers (3,6), caliper (7,8) and ultrasonography. The most common orchidometer among the ones used currently is the orchidometer developed by Prader. It is composed of a series of 12 consecutive testicular samples with a size ranging from 1 to 25 ml which are made of different materials including plastic or wood (3). When the size of the testicles are to be measured, the samples from the orchidometer and real testicles are put side by side, compared by naked eye and the testicular size is determined. When the testicular size measurements performed in Switzerland, Israel and Japan using Prader orchidometer were examined, marked ethnic differences were observed between countries (9-11).

Like testicular development, penile length is becoming important in endocrine diseases. In this age group, physicians are frequently faced with the question if the penile development of their child is normal or not. To answer this question we have to know the normal values in our population. However, limited number of studies including penile length measurement in adults in our country have been published (12-14). In a study about penile lengths in children performed in our country, children between the age group of 0-5 years were evaluated (15). As far as we know, no study related to measurements of testicular size and penile lenght in primary school children in our country has been conducted.

Table 2: Anomalies of the external genital organs and their prevalences in primary school boys

Morbidity	n	Prevalence (%)	Properties
Undescended testicle	12	1,2	4 right 3 left 5 bilateral
Retractile testicle	4	0,4	3 right 1 bilateral
Testicle with high scrotal localization	2	0,2	1 bilateral 1 right
Hypospadias	4	0.4	1 proximal 1 midshaft
Hydrocele	5	0,5	2 glandular 3 right 2 left
Buried penis	5	0,5	
Inguinal hernia	8	0,8	4 right 3 left 1 bilateral
Varicocele	4	0.4	4 left

The largest study indicating the external genital organ abnormalities in our country was conducted in 1996-1997 by Köroğlu et al.(16) in the whole of Turkey in children of 0-16- year-old age group including 50000 children (a screening study named "the frequency of chronic diseases in children"). However, only undescended testicle and hypospadias were investigated as external genital organ abnormalities and other genital abnormalities were not screened.

In screening studies performed in our country, the most commonly emphasized abnormality has been undescended testicle. In our study, the rate of undescended testicle was found to be 1.2%, the rate of retractile testcile was found to be 0.4% and the rate of testicle with high scrotal localization was found to be 0.2%. Since reliable information could not be obtained from patients in whom a pathology was found or from their families, no comment could be made on how many of them were congenital and how many of them were acquired. In the study performed by Köroğlu et al. (16), the rate of undescended testicle was reported to be 2.5%. This value is rather higher compared to the literature. The reason for this may be the fact that screening was not performed by a specialist physician as the authors noted. In a study performed by Remzi et al. (17) in 1980 in 1000 primary school boys in Ankara, the rate of undescended testicle was found to be 3.7%. However, the design of this study was not planned to reflect the whole population and children presenting to the outpatient pediatric clinic were also included in the study. Therefore, this high rate can not be explained only by regional variations. We think the fact that cases were selected had a greater role in this. This rate was found to be 1.85% in the study performed by Akay et al. (18) in Diyarbakır, 1.37% in the study performed by Altunoluk et al. (19) in Kahramanmaraş, 1.4% in the study performed by Şimşek et al. (20) in İzmit and these rates were again higher compared to the literature. The rate of undescended testicle was found to be 1.1% in the study performed by Kayıkçı et al. (21) in Düzce, 0.73% in the study performed by İnan et al. (22) in Edirne and 0.78% in the general health screening study performed by Semerciöz et al. (23) in İstanbul. We think that the variabilities in these studies are caused also by regional differences. The frequency of undescended testicle in the school age group ranges between 0.76% and 0.96% (24). However, this rate was found to be higher compared to the literature in almost all studies performed in primary school children in Turkey. This shows that variations in rates of undescended testicle may be present also between different countries.

Retractile testicle is term used for testicles which can be reduced to the scrotum, stay here for a time and escape toward the inguinal canal with constriction of the cramaster muscles. This abnormality is frequently described improperly and may be confused with undescended testicle. Therefore, the diagnosis and incidence of retractile testicle are unclear in spite of many studies. The frequency of retractile testicle in our country was found to be 0.22-3.9% (19,22,25). In our study, the frequency of retractile testicle was found to be 0,4% and the frequency of testicle with high scrotal localization was found to be 0.2%.

Hypospadias which is one of the congenital penile abnormalities has an incidence of 1 in 250-300 births (24). The rate of hypospadias in screenings performed in Turkey was found to be 0.2% in the study performed by Köroğlu et al. (16), 0.4% in the study performed by Remzi et al. (17), 0.45% in the study performed by Akay et al. (18), 1.45% in the study performed by Altunoluk et al. (19) and 0.39% in the study perforemed by Kayıkçı et al. (21). In our study, this rate was found to be 0.4%.

The frequency of hydrocele was found to be 0.7%, 0.40%, 1.11% and 0.19%, respectively in the studies performed by Remzi et al. (17), Akay et al. (18), Altunoluk et al. (19) and Kayıkçı et al. (21). In our study, this rate was found to be 0.5%.

Recessed penis is a condition which arises from different anatomic disorders including inappropriate skin junction in the penile root, scar following penile surgery and excessive obesity and which can be confused with micropenis especially by families. The actual incidence is not known. The only data about its incidence in our country which we could reach belonged to the study performed by Adayener et al. (26). In this study, the rate of recessed penis was reported to be 0.25% in adolescent boys of 13-15 years old. In our study, this rate was found to be 0.5%. In physical examination, obesity was found to be responsible for the etiology of recessed penis in these patients.

The rate of inguinal hernia was found to be 2.3%, 0.85%, 1.85%, 0.45% and 0.11%, respectively, by Remzi et al.(17), Akay et al. (18), Altunoluk et al. (19), Kayıkçı et al.(21) and Semerciöz et al. (23). In our study, this rate was found to be 0.8%.

Varicocele is enlargement of plexus pampiniformis in the spermatic chord. In regional studies performed in our country, the incidence of varicocele in primary school boys ranged between 0.15% and 3.22% (17,18,21,26). In our study, this rate was found to be 0.4%. The wide range of these rates may arise from variability of measures used for diagnosis.

Diagnosis and treatment of external genital organ abnormalities may be delayed in developing countries including our country. The fact that external genital organ abnormality was found with a rate of 3.9% in children who were not treated even in the primary school period in our study confirms this thesis.

Consequently, external genital organ abnormalities many of which should be diagnosed and treated before the primary school period were found with a high rate in our study. These findings indicate that a health control system is required to provide early diagnosis and treatment of external genital abnormalities. Considering that a simple and careful physical examination is enough

for the diagnosis, healthcare workers working in the primary care institutions and mainly pediatricians and obstetricians have a great role in directing families for treatment and for avoiding late complications. The community should be informed on these subjects, educators should be educated on the subject of health and all physicians should emphasize genital examination. Early diagnosis provides the chance of early treatment and is necessary for normal development of organs in children.

In addition, knowledge of normal values of penile lengths and testicular sizes by age in primary school children in our population will contribute to evaluation of external genital organs, diagnosis of developmental anomalies and treatment and monitoring of underlying diseases which may effect the development of external genital organs. We think detailed large field studies on this subject should be performed throughout the country.

Conflict of interest: None declared

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