Original Article

A Study of Prevalence of Urological Abnormalities Among Elementary and Secondary School Boys

Shoaib Rafique[1], Ahmad Bilal[2], Imran Hyder[2], Ammaar Rafique[3], Asif Hameed[1] and Muhammad Ayyaz Bilal[1]

ABSTRACT

Objective: To screen male school children to determine the prevalence of various urological abnormalities and offer appropriate advice to the parents of children in whom abnormalities would be detected.

Study Design: Descriptive / observational study.

Place and Duration of Study: This study was conducted at the Departments of Urology, Multan Institute of Kidney Diseases, Multan and NMCH, Multan from January 2014 to December 2017.

Materials and Methods: We studied 129 boys, aged 6 to 17 years, in four public sector elementary and secondary schools of the city. In addition to physical examination, all boys had ultrasonography of abdomen and pelvis done for detection of urological abnormalities.

Results: The mean age of boys was 13.12±2.017 years. Urological abnormalities were identified in 84 (68.9%) boys. The most common abnormalities included varicoceles in 26%, inguinal hernia 7.75%, undescended testis 6.97%, hydrocele 3.87%, epididymal cysts 3.87% and urolithiasis 3.87%. Other abnormalities identified included: unilateral renal agenesis, ectopic kidney, ureteropelvic junction obstruction, unilateral small sized kidneys, micropenis and hypospadiasis. None of the parents of these children were aware of identified abnormalities.

Conclusion: The present study has identified that a significant number of school boys have urological abnormalities. Three most common abnormalities were varicoceles, inguinal hernias and undescended testes. The renal abnormalities were identified in 9.3% boys. Careful screening of school children is necessary to avoid later complications.

Key Words: Congenital Anomalies of the Kidney and Urinary Tract (Cakuts), Cryptorchidism, Inguinal Hernia, Hydrocele, Varicocele, External Genitalia, Children

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INTRODUCTION

The urological abnormalities in school going boys are common and many remain undiagnosed. Timely diagnosis and treatment of these abnormalities is essential to prevent subsequent morbidity. The congenital urological abnormities are common and may involve either upper renal tract (kidney or ureter), lower urinary tract (bladder or urethra) or genitalia.

[1.] Department of Urology, Medical Officer, Multan Institute of Kidney Diseases, Multan.
[2.] Department of Urology, Nishtar Medical College and Hospital, Multan.
[3.] Department of Urology, Bahawal Victoria Hospital, Bahawalpur.

Correspondence: Shoaib Rafique, Medical Officer, Urology, Multan Institute of Kidney Diseases, Multan.
Contact No: 0334-6050564
Email: shoaib_rafique@hotmail.com

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In addition to congenital abnormalities, some acquired diseases like renal tract stones may develop, which also require appropriate timely management. Among the congenital abnormalities, inguinal hernia and hydrocele are common. The major complication of untreated inguinal hernia is incarceration. This condition requires an emergency surgery and can also lead to intestinal gangrene and gonadal atrophy[1]. In majority of hernias, concomitant hydrocele may be present. Most (60%) of the new hydroceles which appear after birth and before puberty are associated with a patent process vaginalis (i.e. communicating hydrocele). Hydroceles which appear during and after puberty are more commonly non-communicating. Cryptorchidism or undescended testis is a common congenital abnormality. Cryptorchidism is associated with subfertility in adulthood and 2 to 5 times higher risk of testicular germ cell tumors, however, this risk is positively correlated with age at surgery. It represents a failure of testicular descent which is dependent on the growth and hormonal function of the developing testis, its regulation of growth and function of gubernaculum[2]. Although most cases are isolated or non-syndromic, cryptorchidism may be associated with many other syndromes. Majority (75% to 80%) of undescended

testes are palpable and 60% to 70% are unilateral and are more often seen on right side[3]. Micropenis is a more common anomaly and a penis smaller than 2 SD (standard deviation) from the norm is considered as micropenis [4]. Micropenis has been attributed to a testosterone deficiency that result in poor growth of organs that are targets of this hormone. The varicoceles are common among adolescents. Because of progressive nature of disease, its prevalence increases with puberty. Akbay et al [5] investigated the prevalence of varicoceles in boys aged 2-19 years and reported that prevalence at age 2-10 years, 11-14 years, and 15-19 years was <1%, 7.8% and 14.1% respectively. Varicoceles may contribute significantly to the risk of subfertility in adulthood. The majority of varicoceles in children and adolescents are identified incidentally by medical practitioner or by patient on self-examination. Small number of adolescents (2-11%) present with scrotal discomfort [6]. Uncorrected varicoceles may result in testicular hypotrophy and adulthood subfertility. Recent studies report an increase in the incidence of congenital anomalies of the kidney and urinary tract (CAKUTs) and they are significantly associated with male sex[7]. Such abnormalities are present at birth, however, they may not become apparent until later in life. Renal stones in children are associated with significant morbidity. An increase in the incidence of urolithiasis in children and adolescents has been observed during last three decades[8]. Timely diagnosis and/or treatment of above mentioned conditions is important to avoid complications. Unfortunately, there is no health check system in Pakistan for the detection of these urological abnormalities in school children either before admission or during their school years.

MATERIALS AND METHODS

A team of urology departments of two hospitals of city visited four public sector elementary and secondary schools of the city. For the purpose of study one public sector elementary and three secondary schools of city were chosen. The public sector schools were chosen for the study as most children in such schools belong to low socioeconomic background and do not usually get medical checkup by qualified medical practitioners. The permission from the Institution's ethics committee and school authorities was obtained. One week before the visit of urology team to any particular school, one member of the team visited the in-charge of each school and briefed him about the purpose of study. The school in-charge was requested to nominate those classes which could easily be included in the present study without affecting the school examination schedule. Each school in-charge was handed over 100 formal consent forms and he was requested to distribute these to the students for obtaining formal permission from their parents for examination of their children by the urology team. Parents were also requested to provide information about the previous illness of their child. In addition, the school in-charge allowed the parents of children to visit school on the study day if they wanted to accompany their child during examination. Only those boys who brought written duly signed consent form from their parents were considered suitable for examination. The examination was conducted in a room which was specially prepared for this purpose. Each child was examined in turn by two qualified urologists under the observation of one professor of urology who had initiated the concept of the present study. History of any previous illness or any surgical intervention was obtained. A careful physical examination focusing on abdomen, groin, scrotum and penis of each participant was carried out. For detection of hernia, the boys were examined in supine and erect position both before and after straining (cough reflex). For identification of varicoceles, the boys were also examined in an erect position using Valsalva maneuver. The penile length and testicular volume was recorded. All findings were recorded in a specially designed proforma and any positive or suspicious cases were re-examined by the assistant professor of urology. After physical examination, each student underwent abdominal ultrasonography. The GE-Logic 200MD, ultrasound machine with convex probe frequency 3.5 Hz was utilized for examination. The findings were recorded in proforma. The parents of boys in whom urological abnormalities were identified were contacted and an appropriate advice on further investigations and treatment in each case was given. The data was analyzed using SPSS software.

RESULTS

Out of 350 children, the written permission from parents of 129 boys was received and only these boys were considered suitable for present study. The mean age of boys was 13.12±2.017 years (range 6 to 17 years). Abnormalities were identified in 84 (68.99%) of boys. The three most prevalent abnormalities were varicoceles, inguinal hernias and undescended testes [Table 1]. Varicocele was the most common abnormality identified in 34 (26.35 %) boys. Grade II and III left sided varicoceles were identified in 12 and 19 boys respectively and 3 boys had bilateral varicoceles. All boys with varicocele were asymptomatic. The mean age of boys with varicocele was 14.09±1.16years. Inguinal hernias were identified in 10 boys and they were equally distributed on left and right side. Nine boys had undescended testes. Their mean age was 11.33±2.87 years. Eight boys had unilateral undescended testis, while one boy had bilateral undescended testes. In one boy a unilateral small atrophic testis in scrotum was identified. Two boys had rather smaller sized testis. Hydrocele was present in 5 boys and they were mostly on left side. Epididymal cysts were observed in 5 boys and were

predominantly on right side. One boy had multiple scrotal sebaceous cysts and in one boy coronal hypospadiasis was present. Decrease in penile size greater than 2SD was identified in 4 boys.

Various abnormalities which were identified on ultrasonography of abdomen and pelvis included unilateral renal agenesis (2 boys), ectopic kidney in pelvis (1 boy), ureteropelvic junction obstruction (1 boy), unilateral rather small sized kidneys (2 boys), renal stones (4 boys), vesical stone (1 boy) and a solid renal mass in one boy.

Table No.1: Urological abnormalities identified in school boys

Total number of school boys N=129	
Abnormality identified	Number (%)
Varicocele Grade III left varicocele 19 Grade II left varicocele 12 Bilateral Varicocele 03	34 (26.35%)
Cryptorchidism Right side 07 Left side 01 Bilateral 01	09 (6.9%)
Unilateral Atrophic testis	01 (0.77%)
Decreased testes size	02 (1.55%)
Inguinal Hernia Right inguinal hernia 05 Left Inguinal hernia 05	10 (7.75%)
Hydrocele Right hydrocele 01 Left hydrocele 04	05 (3.87%)
Epididymal cysts Right epididymal cysts 04 Left epididymal cysts 01	05 (3.87%)
Scrotal sebaceous cysts	01 (0.77%)
Coronal hypospadiasis	01 (0.77%)
Decreased penile size (more than 2SD)	04 (3.1%)
Unilateral renal agenesis	02 (1.55%)
Ectopic kidney (pelvic location)	01 (0.77%)
Smaller size of kidney	02 (1.55%)
Ureteropelvic junction obstruction	01 (0.77%)
Unilateral Renal mass	01 (0.77%)
Urolithiasis Renal stones 04 Vesical stones 01	05 (3.87%)

DISCUSSION

The Inguinal hernias develop in 1% to 5% of children. They are more common in boys and have propensity for the right side[9]. A positive family history is an important risk factor for inguinal hernia development and recent studies indicate genetic predisposition with autosomal dominance to developing inguinal hernias [10]. In the present study the prevalence of inguinal hernias in boys was7.75%. Other studies [11,12,13] reported figures between 1.36% and 13. 44%. In the present study hydrocele was identified in 3.87% of boys. This figure is higher than those reported by other authors [13, 14, 15] which ranged from 0.23% to 1.5%. Approximately 1-9% of all male are born with at least one cryptorchid testis. Most of these cases will descend spontaneously and at one year of age approximately 1% of all male will remain cryptorchid [16]. In the present study the prevalence of cryptorchidism was 6.9% which is much higher than other published studies. O Adekanye et al [11] from Nigeria reported cryptorchidism in 0.9% of primary school boys. Studies from Iran [12] and Southern Jordan [13] reported prevalence of inguinal hernias in 1.12% and 2.12% boys respectively.

The prevalence of hypospadiasis has been estimated to be between 0.8 and 8.2 per 1000 live births [17]. In the present study one boy was found to have coronal hypospadiasis. Micropenis is defined as “a penis which is smaller than 2 SD (standard deviation) from the norm” [4]. Micropenis has been attributed to a testosterone deficiency that results in poor growth of organs that are the targets of this hormone. Nelson et al [18] reported that in the USA, the incidence of micropenis in male children born between 1997 and 2000 was as 1.5 in 10 000 male children.

In adults, the prevalence of varicocele is about 15% and the reported prevalence of clinically diagnosed varicocele in adolescents is 8% to 16% [19]. The varicoceles are predominantly left sided and it is thought to be due to a unique anatomy of left testicular vein. However, the identification of right sided varicoceles in boys is increasing. Kumnov et al [19] reported that most varicoceles appear after 10 years of age, progress through puberty, and peak at Tanner stage 3. The varicocele progression is thought to be related to the continuous or spontaneously induced spermatic vein pressure. Varicoceles may contribute significantly to the risk of subfertility in adulthood, however, their effects on paternity are unclear as population based studies indicate that 85% of men with varicocele have fathered children. Unilateral renal agenesis (URA) is more common than bilateral agenesis. The ultrasound screening of 280,000 school children in Taipie by Sheih et al [20] showed the incidence of URA to be 1 in 1200. A systematic review[21] estimated that the general incidence of URA is 1 in 2000. Usually it is an isolated event, however, it may be associated with other developmental defects. In the present study the prevalence of unilateral renal was 1.5%, however, no other abnormalities were identified in these boys. The kidney may fail to ascend in fetal life and may remain in an ectopic location. The ectopic kidney may be associated with other urological anomalies, most commonly vesicoureteric reflux[22]. Sheih et al [20] found renal ectopia in approximately 1 in 4000 school children. In the present study one boy

(0.77%) was identified to have an ectopic kidney located in pelvis. Ureteropelvic junction obstruction (UPJO) is a common abnormality in children and adolescents and is caused either by an intrinsic narrowing or extrinsic compression by lower pole vessel. UPJO has a reported incidence of 1 in 500 live births more commonly in males than females and more frequently found on the left side [23]. UPJO may be associated with other congenital malformations. Nearly 1/3rd of affected children will need surgical intervention[24]. In the present study, UPJO was identified in one patient. Renal stone disease in children is associated with significant morbidity, due to its recurrent nature and presence of underlying abnormalities. A true frequency of urolithiasis in children is not known, however, the studies indicate an increasing trend [8]. The characteristics of renal stone disease show a wide geographical variation. Delayed diagnosis can cause risks to kidney function. There is high prevalence of renal stones in Pakistan and prevalence of stone disease in children is not much known. In the present study, urolithiasis was identified in 5 (3.87%) boys. Four boys had renal stones and in one boy had vesical stone.

From review of published literature it appears that the prevalence of different urological anomalies in school children in various regions of the world varies. Many studies have focused on the abnormalities of external genitalia. In the present study the authors not only focused on the abnormalities of external genitalia but also utilized abdominal ultrasonography for detection of upper and lower renal tract anomalies and other conditions. The study revealed urological abnormalities in a large number of school boys. In addition, nearly all parents were unaware of their child's urological abnormalities which raises the need for better education in the community. The parents of all those boys in whom urological abnormalities were detected were contacted and were advised either follow-up, further investigations or treatment as was deemed necessary in each case.

CONCLUSION

The present study has identified that a significant number of school boys have urological abnormalities. Three most common abnormalities were varicoceles, inguinal hernias and undescended testes. The renal abnormalities were identified in 12 (9.3%) boys. Careful screening of school children for detection of urological abnormalities and periodic examination during the school years is necessary to avoid later complications. In addition, there is need for the better education and awareness in community for timely diagnosis and treatment of urological abnormalities.

Author's Contribution:

Concept & Design of Study:	Shoaib Rafique
Drafting:	Ahmad Bilal, Imran Hyder
Data Analysis:	Ammaar Rafique, Asif Hameed, Muhammad Ayyaz Bilal
Revisiting Critically:	Shoaib Rafiquem, Ahmad Bilal
Final Approval of version:	Shoaib Rafique

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