

# Prevalence of urogenital disease in male adolescent outpatient visits. A descriptive, cross-sectional study

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## ABSTRACT

**Introduction.** The male genital exam is a simple and quick assessment to look for urogenital disease. Data on the prevalence of urogenital disease in male adolescents are limited. Our objective was to describe the prevalence of urogenital disease in male adolescents.

**Population and methods.** Descriptive, cross-sectional study conducted at the Department of Adolescence of a public hospital in the City of Buenos Aires. The medical records of male patients aged 9 to 20 years seen between 2008 and 2018 were retrospectively reviewed; all those with a genital exam were included. Data on age, pubertal stage, orchidometry, and urogenital disease before adolescence and at the time of consultation were recorded. The prevalence was described as percentage and 95% confidence interval (CI). As per estimations, 1167 medical records had to be included to establish the population sample.

**Results.** A total of 2129 medical records were assessed and 1429 were included. No genital exam had been conducted in 686 cases. The median age of the population was 12 years (interquartile range: 11–14 years). Urogenital disease before adolescence was detected in 72 boys (5.7%; 95% CI: 4.5–7.2). Urogenital disease was found in 272 adolescents (14.8%; 95% CI: 13.1–16.7); the most common conditions were balanopreputial adhesions in 5.3% (95% CI: 4.2–6.6), varicocele in 2.7% (95% CI: 2–3.7), and phimosis in 1.8% (95% CI: 1.2–2.6).

**Conclusions.** A genital exam allowed to detect that 14.8% of adolescent boys had a urogenital disease. The most common conditions were balanopreputial adhesions, varicocele, and phimosis.

**Keywords:** adolescent; urogenital abnormalities; foreskin; varicocele; phimosis.

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## INTRODUCTION

A genital exam in adolescent boys allows to assess pubertal development and detect any urogenital problem, both during regular health checkups and in the presence of symptoms. Health care providers should be familiar with the physiology of male sexual development and most common urogenital problems in order to recognize, treat, and, if appropriate, refer patients to specialists.<sup>1–4</sup>

During adolescence, findings in the genital exam include both unresolved childhood conditions—such as phimosis, hydrocele, inguinal hernia, hypospadias, and cryptorchidism—<sup>5</sup> and other characteristics of adolescence, such as varicocele, orchiepididymitis, spermatocele, and acute scrotum.<sup>6–8</sup>

To provide quality health care, it is critical to know the profile of health conditions in the assisted population. Original publications on the prevalence of urogenital disease in adolescents are scarce. Our primary objective was to describe the prevalence of urogenital disease in our population and our secondary objective was to describe the characteristics of pubertal development in male adolescents with positive findings.

## POPULATION AND METHODS

### Design

This was a descriptive, cross-sectional, and retrospective study conducted at the Department of Adolescence of a public hospital in the City of Buenos Aires that provides care to individuals aged 9 to 20 years. Data corresponded to outpatient consultations, both scheduled and walk-ins, for the 2008–2018 period and were obtained retrospectively from the department's medical records (single electronic medical records have been used in all public health care facilities since 2019). Visits to the hospital emergency room were not included. The study was approved by the Institutional Ethics and Research Committee.

**Inclusion criteria:** medical records of male adolescents aged 9 to 20 years who had a genital exam, regardless of the reason for consultation (including visits due to urogenital symptoms and physical examination findings).

**Exclusion criteria:** medical records with missing data (date, age, genital exam) or illegible.

### Variables

Age in years. Pubertal development was classified as per Tanner stages and, if available,

testicular volume (mL) was measured using the Prader orchidometer. Urogenital disease: the history of urogenital disease suffered during infancy or childhood was evaluated, as well as the pathology found during the first genital exam performed during the consultation at the Adolescence Service, regardless of its severity.

### Data analysis

Categorical variables were expressed as frequency and percentages and 95% confidence interval (CI), and compared using the  $\chi^2$  test. Continuous variables were described as median and interquartile range (IQR) due to non-Gaussian data distribution (Kolmogorov-Smirnov test) and compared with non-parametric tests. *P* values lower than 0.05 were considered statistically significant. The prevalence of urogenital disease was estimated, which was defined as the number of cases at the time of the genital exam. The SPSS software, version 21 (SPSS Inc., Chicago, United States, 2012) was used.

### Sample size

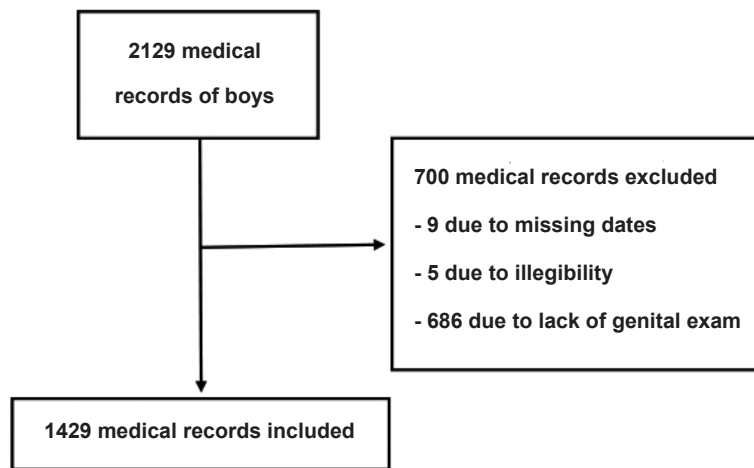
The sample size was estimated based on a confidence interval for a proportion. It was estimated based on varicocele, a urogenital disease typical of adolescence. Its lower prevalence ( $\approx 1\%$ ) takes place at 10 years of age.<sup>9</sup> Considering an estimated population of 5000 medical records, an expected proportion of 1% (minimum: 0.5%, maximum: 1.5%), a 95% confidence level, and a precision of 1%, 1167 medical records of male adolescents were required. A consecutive non-probabilistic sampling was performed, and the first genital exam done in each patient was recorded.

## RESULTS

A total of 2129 boys had a visit with the Department of Adolescence during the study period. The medical records of 1429 male adolescents who had a genital exam were included (*Figure 1*); visits corresponded to scheduled appointments or walk-ins.

A history of infant or childhood urogenital disease was observed in 72 patients (5.7%, 95% CI: 4.5–7.2): inguinal hernia (22), phimosis (11), cryptorchidism (10), torsion of the testis or testicular appendages (7), hydrocele (5).

The genital exam helped to find a urogenital disease in 212 patients (14.8%, 95% CI: 13.1–16.7); foreskin problems and varicocele were prevalent (*Table 1*). Of the 39 cases of varicocele,

**FIGURE 1. Flow chart for the assessment of medical records of male adolescents**

grade (grade 1: 2, grade 2: 12, and grade 3: 14) and side (left side) were recorded in 28. *Table 2* shows data for age and pubertal development of the study population; and *Table 3* shows a comparison of the 3 most common urogenital conditions.

## DISCUSSION

A genital exam in male adolescents is critical for the assessment of pubertal development and the detection of urogenital disease during the medical consultation.<sup>3,4</sup> This procedure should be adapted to the age and developmental level of each patient and include Tanner staging, the Prader orchidometry, and the search for problems by area (penis, scrotal contents, inguinal and

perineal region).<sup>2-4</sup>

The bibliography on the prevalence of urogenital disease during adolescence is scarce. Most studies were carried out by surgical and urological teams, in specific populations or conditions.<sup>6,8,10,11</sup> In this study, we describe the prevalence of urogenital disease in male adolescents seen as outpatients in the public health system of the City of Buenos Aires.

The median age of the study population was 12 years, although the Department of Adolescence sees patients up to 20 years of age. It is known that male adolescents have fewer health examinations as their age increases;<sup>12</sup> this could result in a clinical population where early and middle adolescents predominate, with a lower

**TABLE 1. Prevalence of urogenital disease in 1429 male adolescents**

Urogenital disease	Frequency (%)	95% CI
Balanopreputial adhesions	76 (5.3)	4.2–6.6
Varicocele	39 (2.7)	2–3.7
Phimosis	26 (1.8)	1.2–2.6
Spermatocele	13 (0.9)	0.5–1.5
Retractile testis	12 (0.8)	0.5–1.4
Monorchism	8 (0.6)	0.3–1.1
Delayed puberty/hypogonadism	8 (0.6)	0.3–1.1
Inguinal hernia	7 (0.5)	0.2–1
STI	7 (0.5)	0.2–1
Cryptorchidism	7 (0.5)	0.2–1
Hydrocele	4 (0.3)	0.1–0.7
Other	12 (0.8)	0.5–1.4

CI: confidence interval. STI: sexually transmitted infections.

"Other" encompasses varying conditions observed in less than 3 patients. A total of 219 urogenital conditions were observed in 212 male adolescents.

**TABLE 2. Age, testicular volume, and pubertal stage of adolescents with and without urogenital disease**

	Total (n = 1429)	No UGD (n = 1217)	UGD (n = 212)	p value*
<b>Age (years)</b>				
Median (IQR)	12 (11–14)	12 (11–14)	12 (12–13)	0.115
<b>Right TV (mL)</b>				
Median (IQR)	10 (4–15)	10 (4–15)	5 (3–12)	< 0.001
<b>Left TV (mL)</b>				
Median (IQR)	8 (4–15)	10 (4–15)	6 (3–10)	< 0.001
<b>Tanner stage</b>	<b>Total</b>	<b>No UGD</b>	<b>UGD</b>	<b>p value**</b>
G1	358 (26.9%)	293 (25.9%)	65 (32.6%)	0.141
G2	286 (21.6%)	238 (21.1%)	48 (24.1%)	
G3	277 (20.8%)	244 (21.6%)	33 (16.6%)	
G4	226 (17.0%)	198 (17.5%)	28 (14.1%)	
G5	182 (13.7%)	157 (13.9%)	25 (12.6%)	

UGD: urogenital disease. TV: testicular volume. IQR: interquartile range. G: genital stage.

Comparison between adolescents with and without UGD: \*Kruskal-Wallis test for independent samples (median);

\*\* $\chi^2$  test (frequency).

**TABLE 3. Comparison between adolescents without urogenital disease and those with adhesions, varicocele, phimosis**

	No UGD (n = 1217)	BPA (n = 76)	p value**	Varicocele (n = 39)	p value**	Phimosis (n = 26)	p value**
<b>Age (years)*</b>	12 (11–14)	11 (10–12)	< 0.001	12 (12–13.5)	0.287	12 (11–13)	0.265
<b>Tanner stage</b>	<b>No UGD</b>	<b>BPA</b>	<b>p value***</b>	<b>Varicocele</b>	<b>p value***</b>	<b>Phimosis</b>	<b>p value***</b>
G1	293 (25.9%)	28 (37.8%)	< 0.001	3 (8.1%)	0.015	3 (8.1%)	0.350
G2	238 (21.1%)	29 (39.2%)		4 (10.8%)		4 (10.8%)	
G3	244 (21.6%)	10 (13.5%)		13 (35.1%)		13 (35.1%)	
G4	198 (17.5%)	6 (8.1%)		11 (29.7%)		11 (29.7%)	
G5	157 (13.9%)	1 (1.4%)		6 (16.2%)		6 (16.2%)	

BPA: balanopreputial adhesions. TV: testicular volume.

\*Median (interquartile range).

\*\*Kruskal-Wallis test for independent samples (median).

\*\*\* $\chi^2$  test (frequency).

proportion of late adolescents.

One third of reviewed medical records did not include a genital exam; this is a missed opportunity in the context of regular health checkups. Male adolescents tend to access the healthcare system less frequently compared to female adolescents. It is therefore important that, when they do, a complete physical examination is performed to diagnose, advise, and provide appropriate treatment for urogenital conditions.<sup>12,13</sup> Although it is not included in this study's objectives, we speculate on the reasons for not conducting this practice. In our experience, the genital exam is sometimes postponed for later consultations when faced with unrelated acute conditions (fever, bronchospasm), but then it is

not carried out. In addition, many boys initially reject the genital exam out of shyness. This last aspect is a common difficulty and should be considered in adolescents who attend health checkups and not exclusively due to urogenital symptoms.<sup>14</sup>

Approximately 5.7% of patients had a urogenital disease before adolescence. The most frequent conditions were inguinal hernia, phimosis, cryptorchidism, which is consistent with the bibliography.<sup>5</sup> A total of 14.8% of the adolescents had a urogenital disease at the time of the consultation. The most prevalent findings were foreskin problems and varicocele. It is worth noting the low prevalence of sexually transmitted infections (most often diagnosed by laboratory

tests) and surgical conditions (usually treated at the emergency department).

The age and pubertal development of boys with urogenital disease were similar to those of boys with a normal genital exam, although their testicular size was smaller. This is probably because many conditions negatively influenced testicular growth (monorchism, varicocele, hypogonadism, cryptorchidism, testicular atrophy).

Regarding the problems of non-retractile foreskin and preputial adhesions, their natural history was documented in the mid-20<sup>th</sup> century by Gairdner (1949) and Oster (1968): phimosis is more prevalent in infancy and childhood, while preputial adhesions are more prevalent in childhood and adolescence. Most boys will have retractile foreskin by adolescence and approximately 3% will have persistent adhesions.<sup>15</sup>

According to a recent systematic review,<sup>16</sup> the prevalence of phimosis after 18 years of age is 0.5–13% and different diagnostic criteria contribute to the wide range of prevalence, even at similar ages.

The study by Yang et al.<sup>10</sup> on preputial development conducted a cross-sectional assessment of 10 421 Chinese boys aged 0 to 18 years. In the 11–18 years age group, they found that the prevalence of phimosis was 6.8% and that of other urogenital conditions, 4.1%. A cross-sectional study conducted in 1968, in Chile, on the natural evolution of the foreskin of boys aged 0–21 years<sup>17</sup> found that preputial adhesions were the most common morphology in preschool (3–5 years) and schoolchildren (6–12 years), followed by phimosis. Both decreased progressively with age, so that 95% of boys aged 18–21 years had an adult-type foreskin, without narrowing or adhesions. Considered together, these observations suggest that phimosis should not be treated early unless it presents with symptoms (recurrent balanitis, balanitis xerotica obliterans).<sup>18,19</sup>

In our population, balanopreputial adhesions (5%) and phimosis (1.8%) also predominated, although in different proportions. Consistent with their natural history,<sup>15</sup> boys with preputial adhesions were younger and had a lower pubertal development than those without urogenital disease, because they account for a smaller group of adolescents and adhesions decrease, in many cases spontaneously, as adolescence

progresses. In addition, boys with phimosis had a similar age and pubertal development than boys without urogenital disease, probably because cases that reach adolescence do not resolve if they do not receive an adequate treatment.

Unlike the conditions mentioned above, the prevalence of varicocele is very low in prepubertal boys (< 1%) and increases during puberty until reaching a prevalence close to 15%, similar to that observed in adults.<sup>9,20</sup> Most of these boys have no symptoms and are identified on physical examination or self-examination.<sup>18</sup> In Bulgaria, Kumanov et al. conducted a cross-sectional study in 6200 boys aged 0–19 years and found a prevalence of varicocele of 7.9% in the group of adolescents aged 10–19 years.<sup>21</sup> In our population, varicocele was the second most common finding, with a prevalence of 3%, lower than that reported in the bibliography. Boys with varicocele had a similar age to the group without urogenital disease, but with a greater pubertal development. It is assumed that such difference is due to the fact that varicocele is a condition typical of middle puberty;<sup>9,18,19</sup> in contrast to the group of boys without urogenital disease, which included a higher proportion of early and prepubertal adolescents.

The treatment of varicocele in children and adolescents raises some controversies. There is moderate evidence of its results in terms of testicular volume and sperm concentration. Current data do not demonstrate the superiority of any surgical technique in terms of treatment success. Long-term outcomes, including paternity and fertility, are still unknown.<sup>22</sup> Finally, a multicenter study conducted in Italy in 4897 boys aged 18 and 19 years found andrological disease in 31.7% of cases:<sup>23</sup> varicocele (17.5%), mobile testes (4.1%), short frenulum (3.2%), testicular volume < 12 mL (1.2%), spermatocoele (1.1%), and phimosis (1%).

Overall, the different reports evidence that the prevalence of urogenital disease in adolescents varies depending on the country, study population, age, and, probably, pubertal development.

### Implications for practice

A genital exam associated with Tanner staging and the Prader orchidometry are essential practices during outpatient medical care of male children and adolescents because a non-negligible percentage present some urogenital disease.



## Limitations

Given the retrospective nature of this study, it is not possible to rule out any selection or information bias. It was also not possible to estimate the variability between different observers when diagnosing the different conditions. All findings recorded in the medical records were included, regardless of their severity. Some mild conditions, such as pearly penile papules, minimal preputial adhesions or grade 1 varicocele, are likely to be under-represented in medical records. The study population corresponds to boys seen as outpatients at the Department of Adolescence of the public health system; it is not possible to know whether these findings are representative of the general adolescent population, so large-scale, longitudinal studies are required to more accurately characterize urogenital disease during adolescence.

## CONCLUSIONS

In this sample of outpatient male adolescents, the genital exam allowed to find a urogenital disease in 14.8% of patients; varicocele and foreskin problems, such as adhesions and phimosis, prevailed. ■

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