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Prevalence of penile abnormalities in prepubertal children

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Abstract---Background: Common types of Congenital penile anomalies (CPA) in children are; Hypospadias, Penile chordee, Micropenis, Hidden penis, Ambigous genitalia, Apenia and Unspecified genital or penile anomalies. Aim & objectives: The goal of the work was to assess the prevalence of penile abnormalities in prepubertal children. Subjects & methods: research was carried out in outstudied case clinics of Al-Azher University hospitals, carried out on 1000 children. Results: Among studied children; 5% are diagnosed with penile abnormalities. The most frequent congenital anomalies are as following; 82% hidden penis and 12% hypospadias. One case is detected for each of the following; Chordae, hypospadias and chordae and micropenis there was statistically significant relation among presence of penile anomalies and age of the studied children with mean age of cases with anomalies is 4.76 years. Statistically significant association was not detected with body mass index (kg/m2) while a statistically significant association was detected among penile anomalies and the following parameters: residence, socio-economic status with more penile anomalies among cases with urban residence. Conclusion: In children, penile anomalies are commonly discovered. There are numerous potential explanations for them. The most common penile abnormalities, according to our estimation of the incidence of penile disorders in Egyptian children, are concealed penis and hypospadias. Since concealed penis and hypospadias have been found to happen more commonly in children born after ICSI, additional research on the presence of conventional in vitro

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fertilisation (IVF) & ICSI (intracytoplasmatic sperm injection) can be intriguing.

Keywords---prevalence, penile abnormalities, prepubertal children**.**

Introduction

Common types of Congenital penile anomalies (CPA) in children are; Hypospadias, Penile chordee, Penile curvature, Penile torsion, Epispadias, Micropenis, Hidden penis, Ambigous genitalia, Apenia and Unspecified genital or penile anomalies [1]. The medial borders of endodermal urethral folds fuse to form penile urethra [2]. At this time of the external genitalia development it is widely opened to effects of the maternal drug use and environmentally chemical disruptors. According to epidemiologic studies, the prevalence of CPA, particularly hypospadias, is rising. There is a worldwide rise in incidences in last 3 decades [3]. Many studies have attempted to find risk factors. The most frequently questioned and statistically significant are of the order: Vascular (low birth weight, prematurity, preeclampsia and placental insufficiency, twinning) [3]. Endocrine, especially endocrine disruptors [(3)] via dysregulation of lipid, carbohydrate and hormonal [4], especially drugs taken before (invitro fertilization [IVF]) and during pregnancy as clomiphene, follicle stimulating hormone (FSH), progesterone, diethylstilbestrol (DES) [5] and anti-inflammatory drugs non-steroidal fabrics (NSAIDs) [6]. Environmental [7] (smoking, alcoholism, presence of pesticides in water). Genetic [8], as shown by family history. Whatever their frequency and severity, these anomalies should retain the practitioner's attention because of their possible psychological impact. Each of them mainly affects one of the three building blocks of the penis: the sheath, the ureter and the erectile bodies [9]. Goal of work was to evaluate prevalence of penile abnormalities in prepubertal children.

Patients and Methods

Research was carried out in outstudied case clinics of Al-Azher University hospitals, carried out on 1000 children.

Inclusion Criteria

Age: up to 12 years.

Exclusion Criteria

preterm babies and patients with isolated scrotal or testicular abnormalities or mixed penis and testicular anomalies.

Methods

Data related to the Child:

- **History:** History of present illness, past medical history: Major medical illnesses and major surgical illnesses-list operations & dates, pregnancy

and birth history, family history, social history, socioeconomic status: socioeconomic status scale for health research in Egypt and any disease or medication

- **General examination: Vital signs** (heart rate, respiratory rate, temperature & blood pressure), **general & body mass index (BMI):** Physical examinations in the standing and lying positions were carried out. **Local genital examination:** External genitalia, hernias and Hydrocoeles, cryptorchidism **penile examination**
- **Inspection:** Hypospadias, Penile chordee, penile curvature, penile torsion, Epispadias, Micropenis, Hidden penis, Ambigous genitalia, Apenia.
- **Palpation:** A plastic tape measure was used to measure the penile parameters (baseline & extended penile length, penile circumference). At room temperature, testicular volumes were measured using a Prader orchidometer (mL). Pubo-penile junction (pubic ramus) of penis and tip of glans on dorsal surface were used to measure stretched penile length. With the penis at its fullest extension, prepubic fat pad was pushed all way to the bone while remaining flaccid. The middle of the shaft was used to gauge penile circumference. Linear distance along dorsal side of penis that runs from pubic skin level to tip of glans in flaccid condition was used to estimate baseline penile length. Medical records were consulted to determine the patient's age, height, weight, and medical history.
- **Anterior urethral meatus:** Check position of external urethral meatus the male external urethral orifice is normally located in midline at tip of glans. If it on ventral aspect of penis hypospedius is present if on dorsal surface of penis it is termed Epispedius.

Data management and Statistical Analysis

Using the statistical programme of special science SPSS version twenty two (SPSS Inc. Chicago, IL, U.S.A.), all data were gathered, tabulated, and statistically analysed as follows: editing, programming. Entering data on a computer, Quantitative data were expressed as mean, SD, median, and range for parametric and non-parametric data, respectively. Frequencies and relative percentages were used to express qualitative data. Using Shapiro-test, Wilk's the distribution of the data was checked for normality. The following suitable statistical tests of significance were used while handling the data: The difference in quantitative variables in two groups was calculated using independent t-tests and the Mann Whitney test. To compare 2 dependent groups of normally distributed variables, paired t-test was employed. Variations among qualitative variables was assessed using chi square test (2) and fisher exact. All statistical comparisons were two-tailed, with p-values 0.05 denoting a significant difference, p-value 0.001 denoting a highly significant difference, & p-value > 0.05 denoting no difference at all.

Results

The present study is cross sectional study that is carried out on 1000 pre-pubertal children to evaluate the prevalence of penile abnormalities collected from the outpatient clinics of Al-Azher University hospitals.

Table 1
Sociodemographic characteristics of the studied sample

	N=1000	%
Age/years Mean ± SD (Range)	8.34±1.86(1-12)	
Residence Rural Urban	 102 898	 10.2 89.8
Socioeconomic status Low Middle High	 122 804 74	 12.2 80.4 7.4
BMI (kg/m2) Underweight Normal Overweight & obese	 81 809 110	 8.1 80.9 11.0

Mean age of the studied cases is 8.34 years ranging from 1 to 12 years with 89.8% are urban residence, 80.4% are middle socioeconomic status, 12.2% low and 7.4% high socioeconomic status. Among studied children; 82.1% are normal weight, 9% underweight and 8.9% are overweight and obese. Table (1)

Table 2
Penile anomalies distribution among studied sample

	N=1000	% From all studied sample	% From detected genital anomalies
Total penile anomalies	50	5.0	100.0
Hypospadius	6	0.6	12.0
Hidden penis	41	4.1	82.0
Chordae	1	0.1	2.0
Hypospadias and chordae	1	0.1	2.0
Micropenis	1	0.1	2.0

Among studied children; 5% are diagnosed with penile abnormalities. The most frequent congenital anomalies are as following; 82% hidden penis and 12% hypospadias. One case is detected for each of the following; Chordae, hypospadias and chordae and micropenis. Table (2)

Table 3
Relation between socio-demographic, body mass index & prevalence of penile anomalies among studied sample

Risk factors	Total number=1000	Penile anomalies		Test of significance
		Absent n=950	Present n=50	
Age/years Mean±SD	 1000	 8.52±1.63	 4.76±2.31	t=15.55 p<0.001*

Residence Rural Urban	 102 898	 90(9.5) 860(90.5)	 12(24) 38(76)	 x^2=10.94 p=0.001*
Socioeconomic status Low Middle High	 122 804 74	 98(10.3) 782(82.3) 70(7.4)	 24(48.0) 22(44.0) 4(8.0)	 x^2=63.90 p<0.001*
BMI categories Underweight Normal Overweight & obese	 81 809 110	 79(8.3) 771(81.2) 100(8.2)	 2(4.0) 38(76.0) 10(20.0)	 x^2=5.12 p=0.08

T: Student t test, x^2= Chi-Square test, *statistically significant

There was statistically significant relation among presence of penile anomalies and age of the studied children with mean age of cases with anomalies is 4.76 years. There was no statically significant association was detected among presence of penile abnormalities with body mass index (kg/m2) of the studied infants while a statistically significant association was detected among penile anomalies and the following; residence, socio-economic status and with more penile anomalies are detected among cases with urban residence (76%), low socio-economic status (48%) and Overweight & obese (20.0%). Table (3)

Table 4
Relation between socio-demographic, body mass index and presence of hypospadias among studied sample

Risk factors	Total number=1000	Hypospadius		Test of significance
		Absent n=994	Present n=6	
Age/years Mean±SD	 1000	8.37±1.79	2.17±1.17	t=8.44 p<0.001*
Residence Rural Urban	 102 898	 102(10.3) 892(89.7)	 0 6(100)	 t=0.686 p=0.408
Socioeconomic status Low Middle High	 122 804 74	 117(11.8) 803(80.8) 74(7.4)	 5(83.3) 1(16.7) 0	 x^{2MC} =28.53 p<0.001*
BMI Underweight Normal Overweight & obese	 81 809 110	 81(8.1) 805(80.9) 108(10.8)	 0 4(66.7) 2(33.3)	 x^{2MC} =3.38 p=0.185

t: Student t test, x^{2MC}= Monte Carlo test, *Statistically significant

There was no statistically significant relation among presence of hypospadius and age of the studied children. A statistically significant association was detected among presence of hypospadius and the following; residence, socio-economic

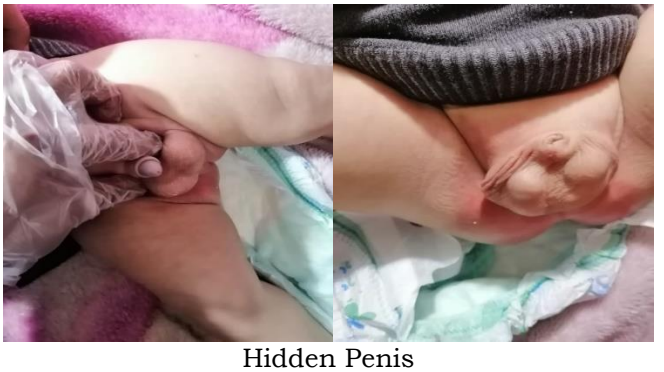
status and body mass index (kg/m^2) with hypospadius anomaly is detected among cases with urban residence (51.2%), low socio-economic status (53.5%) and underweight (37.2%). Table (4)

Table 5
Relation between socio-demographic, body mass index and presence of hidden penis among studied sample

Risk factors	Total number=1000	Hidden penis		Test of significance
		Absent n=959	Present n=41	
Age/years Mean±SD	1000	8.49±1.70	4.68±1.56	t=14.06 p<0.001*
Residence				
Rural	102	90(9.4)	12(29.3)	x^{2FET}=16.97
Urban	898	869(90.6)	29(70.7)	p<0.001*
Socioeconomic status				
Low	122	106(11.1)	16(39)	x^{2MC}=30.06
Middle	804	783(81.6)	21(51.2)	p<0.001*
High	74	70(7.3)	4(9.8)	
BMI				
Underweight	81	79(8.4)	2(4.8)	x^{2MC}=2.02
Normal	809	777(83.4)	32(78.0)	p=0.363
Overweight & obese	110	103(10.7)	7(17.0)	

t:Student t test , x^2= Chi-Square test ,FET: Fischer exact test MC: Monte Carlo test *Statistically significant

There was no statistically significant relation among presence of hidden penis & all socio-demographic characteristics of the studied cases with lower mean age of cases with hidden penis 4.86 years, 70.7% are urban residence, 39% low and socioeconomic and 78% overweight &obese. Table (5).



Hidden Penis

Hypospadius

Discussion

Penile anomalies are frequently observed in clinical settings. Although these lesions are commonly reported to urologists, general physicians and surgeons are frequently the ones who unintentionally find them while performing a physical examination (Romero et al., 2013) [10]. The most frequent birth malformations in male newborns are hypospadias and other penile deformities. It is challenging to determine the prevalence of penile anomalies. Results vary depending on the patient's age, gender, racial or ethnic background, geography, concomitant conditions, and socioeconomic position. Prevalence rates are additionally influenced by the study's context (based on the population/community, hospital/clinic, or other environment), the study's design (retrospective vs. prospective), and the diagnostic evaluation method (clinical, laboratory, or through imaging investigations) (Romero et al., 2013) [10].

Epidemiological studies are crucial because they help with proper diagnosis, raising awareness, promoting preventative measures and educational practises, and accelerating treatment. They could also be used to inform future study on pathogenesis, aetiology, & risk factors of these diseases as well as intra- & inter-country comparisons, temporal differences among varies years old, & research on these diseases' risk factors (Romero et al., 2013) [10]. Mean age of the studied cases is 8.34 years ranging from 1 to 12 years with 89.8% being urban residence, 80.4% are middle socioeconomic status, 12.2% are low and 7.4% are high socioeconomic status. Among studied children, 82.1% are normal weight, 9% are underweight and 8.9% are overweight and obese. Our study showed that 5% are diagnosed with penile abnormalities. The most frequent congenital anomalies are as following: hidden penis (82%) and hypospadias (12%). One case is detected for each of the following: chordae, hypospadias and chordae and micropenis.

Elliott et al. [11]. 5,974,154 male babies were examined to determine the prevalence of hypospadias and penile abnormalities in the state of California. Of those, 30,170 penile malformations were found, yielding a prevalence of one penile anomaly for every 198 male births overall. Of those, 11,347 were found to have hypospadias at birth. At 75.6%, hypospadias was the most common ailment, followed by chordee (9.4percent), micropenis (2.6percent), epispadias (1.46percent), & hidden penis (0.4 percent). Ten percent or so of penile abnormalities had an unknown code. Saleh et al. (2011) [12], reported the frequency of genital malformations in male infants from Upper Egypt was 8.8percent, & it was shown that the prevalence was significantly greater in rural

regions. Researchers evaluated the prevalence & patterns of genital anomalies between male infants in Upper Egypt. The most frequent genital abnormality discovered in male babies was hydrocele, which was followed by cryptorchidism and hypospadias.

Gaspari et al [13], reported the incidences of cryptorchidism, among all male neonates born at full term, hypospadias and micropenis were prevalent. They found 56 cases of genital deformity (2.07%), comprising 18 micropenises, 15 hypospadias, and 23 cryptorchidism (0.85, 0.55, and 0.55, respectively) (0.66 percent). No androgen receptor or 5a-reductase gene mutation was present, and all instances showed normal or subnormal testosterone production. Due to their mothers' everyday domestic use of pesticides (such DDT) & other EDCs, more than 92 percent of these babies had EDC contamination. The majority of these undervirilized male newborns displayed additional EDC contamination, as 80.36 percent of mothers & 58.63 percent of fathers showed paid or unpaid work that involved the use of pesticides & other EDCs before, during, or just after pregnancy for the mothers, & around the time of fertilisation for the fathers. All XY babies with micropenis or other external genital anomalies should have routine investigations into the possibility of parental pesticide exposure and subsequent prenatal contamination.

Our study illustrated that there is statistically significant relation between presence of penile anomalies and age of the studied children with mean age of cases with anomalies of 4.76 years. A statistically significant association was not detected with body mass index (kg/m^2) while a statistically significant association was detected among penile anomalies and the following parameters: residence, socio-economic status with more penile anomalies among cases with urban residence (76%), low socio-economic status (48%) and overweight and obese (20.0%). Nelson et al. [13] A statistically significant increase in congenital penile abnormalities was shown by an analysis of almost four million male births. The likelihood of congenital penile anomalies was also shown to be highest in Caucasian males, with lower rates found in African-American and Hispanic children (16 percent and 42 percent decrease respectively).

In research, there is no statistically significant relation among presence of hypospadius & age of the studied children. A statistically significant association was detected between presence of hypospadius & the following parameters: residence, socio-economic status and body mass index (kg/m^2) with hypospadius anomaly is detected among cases with urban residence (51.2%), low socio-economic status (53.5%) and underweight (37.2%). Up to 0.8 percent of live male infants in the US are affected with hypospadias, and 87 percent of those cases are glandular or coronal (Borer and Retik, 2007) [14]. In 36890 live boys, Ghirri et al (2009) [15] identified 234 occurrences of hypospadias, resulting in a prevalence rate of 6.34 per 1000 male births. Hypospadias was more common in premature infants (gestational age 37 weeks) than full-term infants (6.34 per 1000 live births compared to 2.53 per 1000 live births). The causes of solitary hypospadias are numerous (genetic, endocrine and environmental factors).

Hypospadias was more common in SGA neonates (19.08 per 1000 live births) than AGA neonates (3.83 per 1000 live births) in sample of preterm infants.

frequency of hypospadias was unrelated to maternal age or multiple gestations. Hypospadias' incidence has not increased, according to Fisch et al. (2009) [16]. Romero et al. (2013) [10] discovered hypospadias in 0.6% of males over the age of 40; none of these cases were linked to meatal stenosis and were all observed on glans penis or coronal sulcus. Matsuo et al. (2014) [17] detected buried penis in 20 of 547 (3.7%) newborn babies that were born full-term. Twelve of the 20 newborns with buried penis who were diagnosed between 1 and seven days of age still had them at one month, while eight were lost to follow-up. Twelve newborns underwent follow-up for varying amounts of time; by the time they were 3–4 years old, 10 had either improved or outgrown the problem.

At 4-5 years old, the surviving 2 infants still had buried penis. In Japanese neonates, the prevalence of congenital buried penis ranges from 2 to 5 percent at 1 to seven days of birth to 0.3 percent at four to five years old. This survey has some restrictions, despite the fact that a single examiner in a medium-sized study of researches strengthens it. We didn't regularly do a biopsy or other types of laboratory examinations to verify clinical diagnosis of lesions found. Although this method is frequently employed & therapeutically advised for the majority of problems because a complementary examination won't change a patient's course of treatment, it is insufficient for research because it could lead to false positive or negative bias. Additionally, illnesses that have already received treatment (such as a history of circumcision) or are in clinical remission were not included in our research's prevalence of anomalies (e.g. history of herpes virus infection).

Conclusion

In children, penile anomalies are commonly discovered. There are numerous potential explanations for them, such as viral, inflammatory, traumatic, congenital, or idiopathic conditions. The most common penile abnormalities, according to our estimation of the incidence of penile disorders in Egyptian children, are concealed penis and hypospadias. Since concealed penis and hypospadias have been found to happen more commonly in children born after ICSI, additional research on the presence of conventional in vitro fertilisation (IVF) & ICSI (intracytoplasmatic sperm injection) can be intriguing.

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