Screening Program for Urinary Tract Infection of Prepubertal Children at Al Nasiriya City Primary Schools

برنامج تحري عن التهابات المسالك البولية عند الاطفال ماقبل سن البلوغ في المدارس الابتدائية في مدينة الناصرية

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المستخلص:

الهدف: لتحديد انتشار التهابات المسالك البولية عند الاطفال ماقبل سن البلوغ ، وإيجاد العلاقة بين التهابات المسالك البولية والصفات الديموغرافية والاعراض والعلامات والعوامل الخطرة ومعرفة مدى انتشارها عند هذه الفئة العمرية.

المنهجية: دراسة وصفية اجريت على طلبة المدارس الابتدائية في مدينة ال ناصرية لكلا الجنسين من الفترة 19 من شهر شباط الى 4 من شهر اذار لسنة 2014. أختيرت العينة بمرحلتين المرحلة الاولى هي اختيار المدارس بواسطة عينة عنقودية طبقية . بلغت المدارس التي تم اختيارها (12) مدرسة ممثِلة لمدارس المدينة من مجموع (400) مدرسة، ومن ثم المرحلة الثانية لاختيار الطلبة وذلك بواسطة عينة طبقية غير متناسبة اختير من خلالها (120) طالب وطالبة من المرحلة الابتدائية في مدينة الناصرية.

النتائج: نتائج الدراسة الحالية اظهرت ان اكثر الاطفال في عمر ما قبل سن البلوغ المصابين بالتهابات المسالك البولية عند عمر (12-14) سنة واكثرهم من الذكور . وقد وجدت علاقة ذات دلالة احصائية بين (المصابين باسترجاع المثانة والحالب (تشوهات خلقية) وارتفاع درجة الحرارة والآم البطن والحوض والظهر والامساك المزمن والغثيان والتقيء) وبين اصابة الاطفال بالتهابات المسالك البولية **.كذلك اثبتت الدراسة على وجود** علاقة ذات دلالة احصائية بين التهابات المسالك البولية عند الاطفال ماقبل سن البلوغ وبين (حرقة البول ووجود دم في البول وكذلك سلس البول والديدان الدبوسية وتقرح منطقه الخروج وارتداء الملابس الضيقة).

التوصيات: أوصت الدراسة بأن تقوم وزارة الصحة بالتعاون مع وزارة التربية بعمل برنامج تحري أو مسح واسع النطاق في عموم العراق لغرض معرفة انتشار التهابات المسالك البولية في المدارس الابتدائية . كما توصي الدراسة على تفعيل مشروع الصحة المدرسية للكشف عن الأمراض غير المشخصة ومعالجتها كجزء من الوقاية الأولية لمنع حدوث المضاعفات وتأثيرها المستقبلي على حياة الأطفال .

Abstract:

Objective(s): The study aims Finding relationship between UTI and demographic variable include: child's age, child's gender, if males are circumcised or not, child's order in his family, father's level of education, mother's level of education, place of residence and family socioeconomic status.

Methodology: A descriptive study was conducted on students of primary schools for both sexes, for the period from 19th. February 2014 through to 4th March 2014. A selected sample from two steps the first stage is to choose a school by a stratified- cluster sample, getting schools that have been selected (12) schools as representative for the schools of the Al Nasiriya, from the total (400) schools. The second step of selection of students by the disproportionately-stratified sample chosen from which (120) students from the Al Nasiriya city.

Result(s): The results of the study indicate that most of the incidence occur with the age (12-14) years, and most likely with males rather than female. The study showed the presence of a statistically significant relationship between urinary tract infections and (viscourithral reflex; fever; abdominal and pelvic pain; back pain; chronic constipation and nausea & vomiting). The study also demonstrates the presence of a statistically significant relationship between urinary tract infections in the prepubertal children and between (dysuria; hematuria; urinary incontinence and pinworms; irritation of perineal area and wear tight clothes).

Recommendation: The study recommends that the Ministry of Health has to apply a wide program or investigate large-scale survey throughout Iraq for the purpose of assessing the spread of urinary tract infections in primary schools. Also, the study recommends a special program to be conducted in conjunction with Ministry of Education to assess, and give children a primary care plan to cease the spread of urinary tract infection among them.

Key words: **Screening program; Urinary tract infection; Prepubertal children**

Introduction:

Urinary tract infection (UTI) is the most frequent serious bacterial infection during childhood, affecting approximately 2% of boys and 8% of girls by the age of 7 years [1]. Infection of the urinary tract is among the commonest causes of diseases in childhood [2]. It affects the entire pediatric age group, and has been shown to be a significant cause of morbidity and long-term complications especially in the tropics and subtropics [3]. In the year 1997 UTI accounts approximately 7 million office visits and 1 million emergency department visits, resulting in 100,000 hospitalizations in the United States [4].

Prevalence of urinary tract infection among school aged children is about 7% for girls and 1% for boys [5]. Approximately 75% of UTIs occur in the first 2 years of life [6]. The first peak of UTI is in the first year of life, and the second peak of UTI occurs between the ages of 2 to 4 years during toilet training. After the age of 6 years, UTIs are infrequent and often associated with dysfunctional elimination [7].

In children, especially the school age group, urinary tract infection (UTI) could be symptomless otherwise known as asymptomatic bacteriuria (ASB). When symptoms are present, they are usually vague and non-specific, and may not be referable to the urinary tract. Asymptomatic bacteriuria may be followed by symptomatic UTI. Whether symptoms are present or not, renal damage and scarring occur in a number of patients especially if it occurs before five years of age. About 10-35% of children with ASB have vesico-uretericreflux and other renal abnormalities [8].

UTI symptoms include abdominal pain, back pain, dysuria, frequency, new-onset incontinence, but none of these symptoms alone is sufficient to establish UTI diagnosis in verbal children We often notice the presence of hematuria while examining urinary infection or in a routine urine test [9].

In some countries there are long-term urinary screening programs for early detection of renal diseases, and various researches has shown the effectiveness of these programs Prevalence of urinary tract infection among school aged children, is about 7% for girls and 1% for boys [5].

Methodology :

A descriptive study was conducted on students of primary schools for both sexes, for the period from 19th. February 2014 through to 4th March 2014. In order to determine the prevalence of urinary tract infections for children pre-puberty, and to find the relationship between urinary tract infections and demographic characteristics and know of the prevalence of its spread in the prepubertal children at Al Nasiriya city primary schools.

A selected sample from two steps the first stage is to choose a school by a stratified- cluster sample, getting schools

that have been selected (12) schools as representative for the schools of the Al Nasiriya, from the total (400) schools. The second step of selection of students by the disproportionately-stratified sample chosen from which (120) students from the Al Nasiriya city.

Data was collected through using a questionnaire modeled and made up of two parts, the first part included socio-demographic data, and the second part included risk factors and signs & symptoms of urinary tract infection. The data were collected by the researcher through the interview with students.

Urine samples from school children have been collected in sterile cups and transported to the Bint Al-Huda Teaching hospital lab by using a portable container, locked tightly to avoid any bacterial. Children have been sampled by clean catch midstream urine. Samples of urine have been tested within few hours after getting them. Urinalysis was performed on these specimens. The samples are centrifuged (Hermile Z200A) and microscopic (Olympus) examination to determine the presence of pus cells. The result of (GUE) that contain three pluses (+++) or more of pus cells are considered as an indication of urinary tract infection.

Results

Table (1) : Distribution of the Study Sample by their General Information

Variables		F	%
Gender	Male	**60**	**50**
	Female	60	50
Age (years)	9-11 year	**69**	**57.5**
	12-14 years	51	42.5
SESS	High	38	31.7
	Middle	65	54.2
	Low	**17**	**14.2**

F = frequency, % = percentage, SESS = Socio-economic Status Score

This table shows that (60%) of the children are male; (57.5%) their age is 9-11 years old, and (54.2%) of them come from middle level of socio economic status score.

Table (2) : Distribution of Urinary Tract Anomalies, Involuntary Urination, Dysuria, Hematuria and Bad Odor of Urine of Prepubertal children & its Association with Urinary Tract Infection (UTI)

Demographic variables about prepubertal children		infected	not infected	Total	P- value	
UT anomalies Viscourithral reflex (VUR)	Yes	3	0	3	0.03*	S
		7.9%	.0%	2.5%		
	No	35	82	117		
		92.1%	100.0%	97.5%		
Gender	Male	21	39	60	0.556	NS
		55.3%	47.6%	50.0%		
	Female	17	43	60		
		44.7%	52.4%	50.0%		
involuntary urination	Yes	17	13	30	0.002*	HS
		44.7%	15.9%	25.0%		
	No	21	69	90		
		55.3%	84.1%	75.0%		
Dysuria	Yes	21	3	24	0.0*	HS
		55.3%	3.7%	20.0%		
	No	17	79	96		
		44.7%	96.3%	80.0%		
Hematuria	Yes	15	1	16	0.0*	HS
		39.5%	1.2%	13.3%		
	No	23	81	104		
		60.5%	98.8%	86.7%		
bad odor of urine	Yes	13	3	16	0.0*	HS
		34.2%	3.7%	13.3%		
	No	25	79	104		
		65.8%	96.3%	86.7%		
Total		38	82	120		
		100.0%	100.0%	100.0%		

***Significant using chi-squared test at p≤ 0.05 level of significance. % = percentage , S = Significant, HS = High Significant**

This table shows that (7.9%) prepubertal children with urinary tract infection suffered from viscourithral reflex (VUR), 44.7% with involuntary urination, (55.3%) with dysuria, (39.5%) with hematuria and (34.2%) with bad odor of urination. Respectively there is significant association with viscourithral reflex (VUR) and high significant association with dysuria, hematuria and bad odor of urine and presence high significant relationship with involuntary urination.

Table (3): Distribution of Nausea and Vomiting, Constipation, Abdominal and Pelvic Pain, Back Pain and Fever and its Association with Urinary Tract Infection

Demographic variables about prepubertal children		infected	not infected	Total	P- value	
nausea and vomiting	Yes	15	14	29	0.015*	S
		39.5%	17.1%	24.2%		
	No	23	68	91		
		60.5%	82.9%	75.8%		
constipation	Yes	8	3	11	0.004*	HS
		21.1%	3.7%	9.2%		
	No	30	79	109		
		78.9%	96.3%	90.8%		
abdominal and pelvic pain	Yes	23	24	47	0.002*	HS
		60.5%	29.3%	39.2%		
	No	15	58	73		
		39.5%	70.7%	60.8%		
back pain	Yes	18	13	31	0.001*	HS
		47.4%	15.9%	25.8%		
	No	20	69	89		
		52.6%	84.1%	74.2%		
Fever	Yes	29	28	57	0.0*	HS
		76.3%	34.1%	47.5%		
	No	9	54	63		
		23.7%	65.9%	52.5%		
Total		38	82	120		
		100.0%	100.0%	100.0%		

Infection *Significant using chi-squared test at p≤ 0.05 level of significance. % = percentage, S = Significant, HS = High Significant

This table shows that (39.5%) of prepubertal children with (UTI) have nausea and vomiting; (21.1%) with constipation; (60.5%) with abdominal and pelvic pain; (47.4%) with back pain and (76.3%) with fever. All these variables in this table show high significant association with urinary tract infection. Nausea and vomiting show there is significant relation with (UTI).

Table (4) : Distribution of Irritation of Perineal Area and Child Wear Tight Clothes, Kidney stone, History of Urinary Tract Infection, and Pin Worms and Its Association with Urinary Tract Infection (UTI)

Demographic variables about prepubertal children		infected	not infected	Total	P- value	
irritation perineal area	Yes	21	6	27	0.0*	HS
		55.3%	7.3%	22.5%		
	No	17	76	93		
		44.7%	92.7%	77.5%		

Continues.....

Table (4) :to be continued

child wear tight clothes	Yes	15	16	31	0.036*	S
		39.5%	19.5%	25.8%		
	No	23	66	89		
		60.5%	80.5%	74.2%		
kidney stone	Yes	7	0	7	0.0*	HS
		18.4%	.0%	5.8%		
	No	31	82	113		
		81.6%	100.0%	94.2%		
history of UTI	Yes	15	6	21	0.0*	HS
		39.5%	7.3%	17.5%		
	No	23	76	99		
		60.5%	92.7%	82.5%		
pin worms	Yes	23	11	34	0.0*	HS
		60.5%	13.4%	28.3%		
	No	15	71	86		
		39.5%	86.6%	71.7%		
Total		38	82	120		
		100.0%	100.0%	100.0%		

***Significant using chi–squared test at p≤ 0.05 level of significance. % = percentage , S = Significant, HS = High Significant**

This table shows that (55.3%) of prepubertal children with urinary tract infection irritated perineal area, (39.5%) of children with urinary tract infection wear tight clothes; (18.4%) with kidney stone; (39.5%) with previous history of urinary tract infection and (60.5%) with pin worms. Respectively there is presence association with child wear tight clothes. And there is high significant relationship with irritated perineal area, kidney stone, and history of urinary tract and pin worms.

Discussion:

Children with viscourithral reflex (VUR) will be of high susceptible to get (UTI). Hence, the (VUR) is consider be to a predisposing factor for (UTI). This study finding has stated that 7.9% of prepubertal children with urinary tract infection (UTI) have urinary tract anomalies, viscourithral reflex (VUR); there is statistical significant relationship between (UTI) and viscourithral reflex (VUR) (*P*= 0. 03). These findings agree with the results obtained from the study that reports that children who have a UTI have a high incidence of (VUR), which indicates that (VUR) predisposes patients to (UTI) table (2) [16].

Table (2) also shows significant relationship between urinary tract infection (UTI) and dysuria (*P*= 0.0) this finding agrees with results obtained from a study that emphasizes the main clinical symptoms of urinary tract infection (UTI) frequency and dysuria. The researcher thinks that there is association between UTI and dysuria[11].

The relationship between hematuria, bad odor of urine and involuntary urination

with (UTI), table (2) shown (39.5%) of prepubertal children with urinary tract infection (UTI) have hematuria there is significant relationship between (UTI) and hematuria (*P*= 0. 0). These findings agree with results obtained from a study reports that interstitial cystitis is a separate disease entity with an unknown etiology. The incidence of hematuria in patients with interstitial urinary tract infection (cystitis) may be higher than previously reported. Hematuria may be found in up to (30%) of patients with interstitial cystitis [12].

Also shown there is high significant relationship between urinary tract infection in children and bad or unpleasant odor in the urine of children (*P*= 0.0). This finding agrees with results obtained from a study reports that malodorous urine is reported in (57%) of the children with a UTI [13]. The present study has also found that (44.7%) of sample involuntary urination (daytime wetting) and high significant relationship (*P*= 0. 002) with urinary tract infection. This finding agrees with results obtained from a study that reports that children with daytime wetting with/without night wetting very often have bladder sphincter dysfunctions which are in turn correlated with recurrent urinary tract infections; (8%) of the school children (10-12 years old) report day time wetting with/without night wetting with some frequency [14].

The relation of (UTI) and gastro-intestinal tract are shown in the study results as shown in table (3) are significant. There is high significant relationship (*P*= 0. 004) between constipation and urinary tract infection (UTI) there is agreement with results obtained from a study states that, in constipation stool remains in the rectum for a long period of time, and bacteria tends to colonize in the perineum, as a result increasing the risk for UTI [15].

Also the study shows (39.5%) of prepubertal children with urinary tract infection (UTI) have nausea and vomiting. There is statistical relationship between (UTI) and nausea and vomiting (*P*= 0. 015). This finding agrees with that reports that the systemic symptoms such as abdominal or flank pain, and vomiting of highly suggestive of pyelonephritis [16].

To identify relation between fever and (UTI), the study has found that (76.3%) of prepubertal children with urinary tract infection (UTI) have elevated temperature (fever). There is significant relationship between (UTI) and fever (*P*= 0. 0). These findings agree with that reports that fever of at least seven days duration to be associated with a significantly increased UTI prevalence table (3) [17].

Also table (3) shows that (60.5%) of prepubertal children with urinary tract infection suffer from abdominal and pelvic pain. Results show high significant relationship between (UTI) and abdominal pain (*P*= 0. 002). These finding are agree with a study that the systemic symptoms such as abdominal or flank pain, and vomiting are highly suggestive pyelonephritis; also significant relationship between urinary tract infections (UTI) and back pain (*P*= 0.001) [16]. These findings are

agreed and supported by the results obtained from a study that reports that there is relationship between (UTI) and important clinical symptoms such as back pain and frequency of urination [18].

The relationship between prepubertal children with urinary tract infection (UTI) and irritation and of perineum area show (*P*= 0.0) that there is high significant relation. This finding agrees which states that the most urinary tract infections are due to dysfunctional voiding which lead to a moist, irritated perineal area and bacteria subsequently entering the urethra [18].

In addition to wearing tight clothes, as a shown in table (4), (39.5%) of prepubertal children are with urinary tract infection (UTI). The finding shows significant relationship between UTI and wearing tight clothes (*P*= 0. 036) this finding agrees and is supported with results obtained by a study that reports that in older children poor perineal hygiene and insufficient ventilation are due to tight clothing; he considers that as a predisposing factor for UTI. Hence, it seems prudent to advise parents to keep the child's genital area dry and will reduce bacterial overgrowth and the consequent risk of infection [9].

In the current study, the prepubertal children with urinary tract infection (UTI) who have kidney stone are (18.4%). This indication shows that there is high significant relationship between urinary tract infection (UTI) and kidney stone (*P*= 0.0). This finding agrees and is supported with results obtained from a study that reports that in the last 10 years, incidence of urolithiasis has shown about 5 fold increase the cause of urinary tract infection [20].

The Present study shows that (39.5%) of prepubertal children with urinary tract infection (UTI) have history of (UTI). This indication shows that there is high significant relationship between (UTI) (*P*= 0. 0) and history of (UTI) table (4). This finding agrees and is supported with results obtained from a study that reports that the recurrence rate of (UTI) varied from 10 and (30%) of children and most of these recurrences occur within 12 months of the primary infection [21].

It has been found and reported that there is statistically significant correlation between pinworm infection and urinary tract infections. This finding agrees and is supported by current finding as shown in table (4), (60.5%) of prepubertal children with urinary tract infection suffer from pinworm infection and there is high significant relationship between (UTI) and pinworm infestation (*P*= 0. 0) [22].

Recommendations:

1. A widespread screening program for UTI should be implemented to know the exact prevalence of UTI in Iraq as a whole, as there are no studies on the subject.
2. Ministry of Health should cooperate with Ministry of Education to make, occasionally visiting to schools to make health promotion lectures.
3. Most health promotion programs are needed to be implemented at schools, to increase the awareness of students and their teachers and improve their healthy behaviors.
4. Joint programs should be held between Ministry of Health and Ministry of Education to raise the standard of care among students and prevent the incidence of (UTI).

References:

1. Shaikh N, Abedin S, Docimo SG. Can ultrasonography or uroflowmetry predict which children with voiding dysfunction will have recurrent urinary tractinfections? J Urol 2005; 174(4 Pt 2):1620-1622; discussion 1622.
2. Brkic S, Mustafic S, Nuhbegovic S, Ljuca F, Gavran L. Clinical and epidemiology characteristics of urinary tract infections in childhood. Med Arh *2010; 64(3): 135-8.*
3. Taneja N, Chatterjee SS, Singh M, Singh S, Sharma M. Pediatric urinary tract infections in a tertiary care center from North India. Indian J Med Res 2010; 131: 101-5.
4. Ghedira, L., Messaoudi, A., Ben Meriem, C., Guediche, MN. Profile of antimicrobial resistance of agents causing urinary tract infections in children. Tunis Med. 2004 Mar; 82(3):299-305.
5. Avner ED. Pediatric nephrology. 5th ed ed. New York: Lippincott Williams & Willkins; 2004, p.1092.
6. Ismaili K, Wissing KM, Lolin K, et al. Characteristics of first urinary tract infection with fever in children: a prospective clinical and imaging study. *Pediatr Infect Dis J* 2011; 30(5):371-374.
7. Keren R, Carpenter MA, Hoberman A, et al. Rationale and design issues of the Randomized Intervention for Children With Vesicoureteral Reflux (RIVUR) study. Pediatrics 2008; 122 Suppl 5:S240-250.
8. Bartowski DP. Recognizing UTIs in infants and children: early treatment prevents permanent damage. Post Grad Med 2001; 109: 171-81.
9. Sahi, R., Carpenter, C. Does This Child Have a Urinary Tract Infection?. Annals of Emergency medicine. 2008.
10. Jacobson SH, Hansson S, Jakobsson B. Vesico-ureteric reflux: occurrence and long-term risks. Acta Paediatr Suppl 1999; 88(431):22–30.

11. McLoughlin, TG Jr., Joseph, MM. Antibiotic resistance patterns or uropathogens in pediatric emergency department patients. Cad Emerg Med.2003 Apr; 10(4):347-51.
12. Gomes CM, Sanchez-Ortiz RF, Harris C, et al. Significance of hematuria in patients with interstitial cystitis: review of radiographic and endoscopic findings. Urology 2001; 57:262–5.
13. Gauthier M, Gouin S, Phan V et al. Association of malodorous urine with urinary tract infection in children aged 1 to 36 months. Pediatrics. 2012. 129: 885–90.
14. Bakker, E., Van Sprundel, M., Van der Aurwera, JC., Van Gool, JD., Wyndaele, JJ. Voiding habits and wetting in a population of 4332 Belgian schoolchildren aged between 10 and 14 years. Scand J Urol Nephrol.2002; 36(5):354-62.
15. Dulczak, S., Kirk. Overview of the evaluation, diagnosis, and management of urinary tract infections in infants and children. Urologic nursing. July 2005; Available: www.medscape.com/ viewarticle /507162.
16. Smellie JM, Hodson CJ, Edwards D, Normand ICS. Clinical and radiological features of urinary infection in childhood. BMJ 1997; 5419: 1222–6.
17. Mussa-Aisien A, Ibadin O, et al. Prevalence and antimicrobial sensitivity pattern in urinary tract infection in febrile under-5s at a children's emergency unit in Nigeria. Annals of Tropical Paediatrics. 2003; 23: 39-45.
18. Freedman AL. Urologic diseases in North America Project: trends in resource utilization for urinary tract infections in children. J Urol. 2005; 173(3):949– 54.
19. Rushton HG. Urinary tract infections in children: epidemiology, evaluation, and management. Pediatr Clin North Am. 1997; 44(5):1133-69.
20. VanDervoort K, Wiesen J, Frank R, Vento S, Crosby V, Chandra M, et al. Urolithiasis in pediatric patients: a single centerstudy of incidence, clinical presentation and outcome. *J Urol.* 2007; 177(6):2300-5.
21. Panaretto KS, Craig JC, Knight JF, *et al.* Risk factors for recurrent urinary tract infection in preschool children. Journal of Pediatrics and Child Health 1999; 35(5):454–9.
22. Gutiérrez, Yezid. Diagnostic pathology of parasitic infections with clinical correlations (Second ed.). Oxford University Press. 2000; pp. 354–366.