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Islamic Azad University

College of Medicine

Thesis:

For Doctorate of Medicine

Subject:

**Clinical manifestations of UTI in children under 12
years of age attending to shohada-e-tajrish hospital in
2005-2007**

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Year : 2010

No. 4512



دانشگاه آزاد اسلامی
واحد پزشکی تهران

پایان نامه :

جهت دریافت دکترای پزشکی

موضوع :

بررسی فراوانی علائم بالینی در کودکان زیر ۱۲ سال مبتلا به عفونت ادراری در
طی ۳ سال ۸۶-۸۴ در بیماران مراجعه کننده به بیمارستان شهدای تجریش

استاد راهنما:

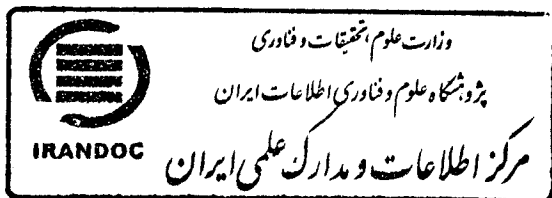
سرکار خانم دکتر فاطمه عرفا

نگارش:

خانم دکتر روزیتا دوستی

شماره پایان نامه : ۴۵۱۲

سال تحصیلی : ۱۳۸۹



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English Abstract

Objective: This study was performed to evaluate the clinical manifestations in children fewer than 12 years of age with UTI attending to Shohada-e-Tajrish Hospital in 2005-2007.

Methods and Materials: This study is a descriptive cross-sectional survey with sample volume of 260 under 12 years of age children with confirmed diagnosis of UTI at Shohada-e-Tajrish Hospital in Tehran in years 2005 to 2007. Patients were consecutively enrolled in a census method. The inclusion criteria were having age of less than 12 years and having no other known infections.

Results: In this study, 174 children (66.9%) were female and 86 children (33.1%) were male, 55.8% had fever, 20.8% had agitation, 19.2% had diarrhea, 46.2% had nausea and vomiting, 36.5% had loss of appetite, 50.4% had abdominal pain, 11.5% had urinary change, 26.9% had weight loss, 54.2% had dysuria, 37.3% had urinary frequency, 8.5% had dripping, 10% had urinary incontinence, 1.9% just had nausea and vomiting, and 20% just had fever.

Conclusions: It is concluded that the most common symptoms in children with UTI are differed from those of adults. In this study 1.9% just had nausea and vomiting, so in any child with this symptom Urine Analysis (U/A) and Urine Culture (U/C) must be done. In this study 20% just had fever, thus UTI may be a reason of fever with out source (FWS). Then in any child with FWS, U/A and U/C must be done. It is recommended to design more epidemiological studies to develop better diagnosis and immediate treatment.

Keywords: UTI, FWS, children, U/A, U/C.

Introduction

In the pediatric patient, urinary tract infections (UTIs) are one of the most common serious bacterial infections (SBI) encountered. They are a frequent cause of fever and can cause significant morbidity if not properly identified and treated. Prevalence and incidence of UTIs varies based on age, sex, and gender. Overall, UTIs are estimated to affect 2.4-2.8% of all children every year. As much as 5% of all children younger than 2 years who present to the emergency department with fever have a UTI (1, 2).

Presentation varies based on the age of the patient. Neonates and infants often present with vague, nonspecific symptoms, necessitating a high index of suspicion for UTIs in this age group. Older pediatric patients are more likely to present with more typical and localized complaints. The symptoms in neonates include Jaundice, Fever, Failure to thrive, Poor feeding, Vomiting, and Irritability. The symptoms in Infants include Poor feeding, Fever, Vomiting, Strong-smelling urine, Abdominal pain, and Irritability. The symptoms in preschoolers include Vomiting, Abdominal pain, Fever, Strong-smelling urine, Enuresis, and Urinary symptoms (dysuria, urgency, frequency). The symptoms in school-aged

children include Fever, Vomiting, abdominal pain, Flank/back pain, Strong-smelling urine, Urinary symptoms (dysuria, urgency, frequency), Enuresis, and Incontinence. Adolescents are more likely to present with typical urinary symptoms. Adolescent girls are more likely to have vaginitis (35%) than UTI (17%). Those diagnosed with cystitis frequently have a concurrent vaginitis (1).

As mentioned the clinical symptoms are varied based on the age. Hence, this study was conducted to evaluate the clinical manifestations in children fewer than 12 years of age with UTI attending to Shohada-e-Tajrish Hospital.

Review of Literatures

Background

Urinary tract infections (UTIs) affect about 3 percent of children in the United States every year. Throughout childhood, the risk of a UTI is 2 percent for boys and 8 percent for girls. UTIs account for more than 1 million visits to pediatricians' offices every year. The symptoms are not always obvious to parents, and younger children are usually unable to describe how they feel. Recognizing and treating urinary tract infections is important. Untreated UTIs can lead to serious kidney problems that could threaten the life of your child. Urinary tract infection causes irritation of the lining of the bladder, urethra, ureters, and kidneys, just like the inside of the nose or the throat becomes irritated with a cold. If your child is an infant or only a few years old, the signs of a urinary tract infection may not be clear, since children that young cannot tell you exactly how they feel. Your child may have a high fever, be irritable, or not eat (3,12).

On the other hand, sometimes a child may have only a low-grade fever, experience nausea and vomiting, or just not seem healthy. The diaper urine may have an unusual smell. If your child has a high temperature and appears sick for more than a day without signs of a runny nose or other obvious cause for discomfort, he or she may need to be checked for a bladder infection (3).

An older child with bladder irritation may complain of pain in the abdomen and pelvic area. Your child may urinate often. If the kidney is infected, your child may complain of pain under the side of the rib cage, called the flank, or low back pain. Crying or complaining that it hurts to urinate and producing only a few drops of urine at a time are other signs of urinary tract infection. Your child may have difficulty controlling the urine and may leak urine into clothing or bedsheets. The urine may smell unusual or look cloudy or red (3).

Epidemiology

Studies from Sweden have indicated that at least 3% of girls and 1% of boys have a symptomatic urinary tract infection by the age of 11

years. However, data from recent epidemiologic surveys suggest incidences higher than these. Occurrences of a first-time symptomatic urinary tract infection are highest for both boys and girls during the first year of life and markedly decrease after that. The minimum cumulative incidence in both boys and girls aged 2 years is slightly over 2%. Most episodes of urinary tract infection during the first year of life are pyelonephritis . After 2 years of age first-time urinary tract infection manifesting as cystitis is common among girls. More recent data suggest that 8% of girls have a symptomatic urinary tract infection during childhood. The incidence of a first urinary tract infection in boys older than 2 years is exceedingly low, probably less than 0.5% (4).

Mortality related to urinary tract infection is exceedingly rare for otherwise healthy children in developed countries. Morbidity associated with pyelonephritis is characterized by systemic symptoms, such as fever, abdominal pain, vomiting, and dehydration. Bacteremia and clinical sepsis may occur. Children with pyelonephritis also may have cystitis. Long-term complications of pyelonephritis are hypertension, impaired

kidney function, end-stage renal disease (ESRD), and complications of pregnancy (eg, urinary tract infection, pregnancy-related hypertension, low-birth-weight neonates). The voiding symptoms of cystitis are usually transient, clearing within 24-48 hours of effective treatment. Long-term complications of urinary tract infection are caused by renal damage secondary to pyelonephritis. Cystitis may cause voiding symptoms and require antibiotics, but it is not associated with long-term deleterious kidney damage. Data are scant. However, in studies by Hoberman et al, the prevalence of a febrile urinary tract infection in white infants exceeded that of black infants. These investigators found that 17% of white female infants younger than 1 year with a temperature of 39°C or more seen in an emergency department had urinary tract infections (2, 5).

During the first few months of life, the incidence of urinary tract infection in boys exceeds that in girls. By the end of the first year and thereafter, both first-time and recurrent urinary tract infections are most common in girls. The prevalence of urinary tract infection in girls aged between 1 and 2 years is 8.1%; in boys, it is 1.9%. The rate in

circumcised boys is low, 0.2-0.4%. The rate in uncircumcised boys is 5-20 times higher than in circumcised boys. In a systematic review, investigators calculated crude estimates of urinary tract infection during the first 24 months of life. Rates were 3% in boys younger than 1 year, 2% in boys older than 1 year, 7% in girls younger than 1 year, and 8% in girls aged 1-2 years. First-time urinary tract infection is most common in the first 2 years of life (6, 7).

Clinical Findings

The 2 broad clinical categories of urinary tract infections (UTI) are pyelonephritis, or upper urinary tract infections, and cystitis, or lower urinary tract infections. The history and clinical course varies with the patient's age and the specific diagnosis (3).

- Children aged 0-2 months: Neonates and infants in this age range who have pyelonephritis usually do not have symptoms localized to the urinary tract. Urinary tract infection is discovered as part of an evaluation for neonatal sepsis (3).
- Infants and children aged 2 months to 2 years .

- Infants and young children in this age range with pyelonephritis may have a history of unexplained fever (eg, rectal or tympanic membrane-derived temperature of $>38^{\circ}\text{C}$) (3).
- These patients are at higher risk for renal injury than are older children, possibly because the lack of localizing signs of infection delays the start of antibiotic therapy. This situation had led to a 3-day rule: An infant or child with unexplained fever should not be observed for more than 3 days without a urine specimen being obtained (3).
- Some infants with pyelonephritis in this age range have fever and few other symptoms, whereas others are acutely ill and have a history of irritability, decreased oral intake, abdominal pain, vomiting, and loose bowel movements (3).
- Children aged 1-2 years may present with voiding symptoms suggestive of cystitis, with crying on urination or only a foul

odor to the urine in the absence of clinically significant fever (temperature $<38^{\circ}\text{C}$) (3).

- Children aged 2-6 years
 - Children in this age group with febrile urinary tract infection (pyelonephritis) usually have systemic symptoms with loss of appetite; irritability; and abdominal, flank, or back pain. Voiding symptoms may be present or absent (3).
 - Children with acute cystitis have voiding symptoms with little or no temperature elevation. Voiding dysfunction may include urgency, frequency, hesitancy, dysuria, or urinary incontinence (3).
 - Suprapubic or abdominal pain may be present, and the urine sometimes has a strong or foul odor (3).
- Children older than 6 years and adolescents
 - Urinary tract infection among children in this age range usually affects the lower tract, but pyelonephritis also occurs. Symptoms are similar to those in children aged 2-6 years.

- Girls who have pyelonephritis in infancy or early childhood, including those with persistence of vesicoureteric reflux (VUR), usually have cystitis with urinary tract infection when they are older. They are also prone to have a recurrence during pregnancy (3).

Symptoms and signs of UTI in children(8)

Symptom	1-24m	2-5y	5-12y
FTT	36	7	0
Jaundice	0	0	0
Vomiting	29	16	3
Diarrhea	15	0	3
Fever	38	57	50
Convulsion	7	9	5
Irritability	13	7	0
Changes in Urine	9	13	0
Hematuria	7	16	8
Frequency, Dysuria	4	34	41
Enuresis	0	27	29
Abdominal Pain	0	23	0
Flank Pain	0	0	0

Physical findings

- Findings on physical examination, such as tenderness in the costovertebral angle or flank, may help localize the site of infection to the kidney. Suprapubic tenderness may be present (8).
- Infants and younger children with pyelonephritis usually have no localizing findings, but they are febrile and irritable (8).
- The older children with pyelonephritis often have tenderness of the flank or costovertebral angle, and those with cystitis may have suprapubic tenderness (8).

Abnormalities leading to urinary problems

Many children who get urinary tract infections have normal kidneys and bladders. But if a child has an abnormality, it should be detected as early as possible to protect the kidneys against damage. Abnormalities that could occur include the following (3):

- **Vesicoureteral reflux (VUR).** Urine normally flows from the kidneys down the ureters to the bladder in one direction. With VUR, when the bladder fills, the urine may also flow backward

from the bladder up the ureters to the kidneys. This abnormality is common in children with urinary infections (3).

- **Urinary obstruction.** Blockages to urinary flow can occur in many places in the urinary tract. The ureter or urethra may be too narrow or a kidney stone at some point stops the urinary flow from leaving the body. Occasionally, the ureter may join the kidney or bladder at the wrong place and prevent urine from leaving the kidney in the normal way (3).
- **Dysfunctional voiding.** Some children develop a habit of delaying a trip to the bathroom because they don't want to leave their play. They may work so hard at keeping the sphincter muscle tight that they forget how to relax it at the right time. These children may be unable to empty the bladder completely. Some children may strain during urination, causing pressure in the bladder that sends urine flowing back up the ureters. Dysfunctional voiding can lead to vesicoureteral reflux, accidental leaking, and UTIs (3).

Methods and Materials:

Design:

This study is a descriptive cross-sectional survey with sample volume of 260 under 12 years of age children with confirmed diagnosis of UTI at Shohada-e-Tajrish Hospital in Tehran in years 2005 to 2007. Patients were consecutively enrolled in a census method. The inclusion criteria were having age of less than 12 years and having no other known infections. Our objective was to evaluate the clinical symptoms in children fewer than 12 years of age with UTI in Pediatric Ward and clinic in Shohada-e-Tajrish Hospital. We collected our data by a questionnaire which was filled by researcher and limited to those variables determined in literature review. Finally we performed data analysis by SPSS-13 statistical software and the results are presented in next portion.

Check list was: Number, File number, Name, Sex, Date, Fever, Agitation, Diarrhea, Nausea and Vomiting, Loss of appetite, Abdominal pain, Urinary change, Weight loss, Dysuria, Urinary frequency, Dripping, Urinary incontinence, Just Nausea and Vomiting, Just Fever.

Results

Table 1- Total Characteristics of the patients

Symptom	Number	Percent
Fever	145	55.8%
Agitation	54	20.8%
Diarrhea	50	19.2%
Nausea and Vomiting	120	46.2%
Loss of appetite	95	36.5%
Abdominal pain	131	50.4%
Urinary change	30	11.5%
Weight loss	70	26.9%
Dysuria	141	54.2%
Urinary frequency	97	37.3%
Dripping	22	8.5%
Urinary incontinence	26	10%
Just Nausea and Vomiting	5	1.9%
Just Fever	52	20%

Table 2- Frequency distribution of fever

Fever

		Frequency	Percent	Cumulative Percent
Valid	Pos	145	55.8	55.8
	Neg	115	44.2	100.0
	Total	260	100.0	

145 children (55.8%) had fever.

Table 3- Frequency distribution of agitation

Agitation

		Frequency	Percent	Cumulative Percent
Valid	Pos	54	20.8	20.8
	Neg	206	79.2	100.0
	Total	260	100.0	

54 children (20.8%) had agitation.

Table 4- Frequency distribution of diarrhea

Diarrhea

		Frequency	Percent	Cumulative Percent
Valid	Pos	50	19.2	19.2
	Neg	210	80.8	100.0
	Total	260	100.0	

50 children (19.2%) had diarrhea.

Table 5- Frequency distribution of nausea and vomiting

Nausea and Vomiting

		Frequency	Percent	Cumulative Percent
Valid	Pos	120	46.2	46.2
	Neg	140	53.8	100.0
	Total	260	100.0	

120 children (46.2%) had nausea and vomiting.