Evaluation of The Incidence of Urinary Tract Infection Among Children With Unexplained Fever

Thesis

Submitted for Partial Fulfillment of Masters Degree in Pediatrics

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بسم الله الرحمن الرحيم
وَأَنْزَلَ اللَّهُ
عَلَيْكَ الْكِتَابَ
وَالْحِكْمَةَ
وَعَلَّمَكَ مَا لَمْ
تَكُنْ تَعْلَمُ
وَكَانَ فَضْلُ
اللَّهِ عَلَيْكَ
عَظِيمًا
صدق الله العظيم
سورة النساء آية
(١١٣)

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List of Abbreviations

C & S	: Culture and sensitivity
CFU	: Colony forming units
DMSA	: Dimercaptosuccinic acid
DTPA	: Diethylene triamine pentaacetic acid
ESRD	: End stage renal disease
HIV	:Human Immune-deficiency virus
MCUG	: Micturating cystourethrogram
ML	: Milliliter
NICE	: National Institute for health and clinical Excellence
PUJ	: Pelvi-ureteric junction
SPA	: Supra-pubic aspiration
STD	: Sexually Transmitted Diseases
U/S	: Ultrasound
UPJ	: Uretero-pelvic junction
URTI	: Upper respiratory tract infection
UTI	: Urinary tract infection
UVJ	: Uretero-vesical junction
VCUG	: Voiding cystourethrogram
VUR	: Vesicoureteric reflux
WBC's	: White blood cells

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INTRODUCTION

Urinary tract infection (UTI) is the most common serious bacterial infection in young febrile children. Infections of the urinary tract can progress to acute pyelonephritis, which in turn can lead to renal scarring, renal insufficiency, hypertension or renal failure necessitating dialysis ***(Keren, ٢٠٠٨)***.

Recent research has indicated that the prevalence of UTI in febrile young children in the emergency department is ٣٪ to ٥٪ and in some groups as high as ٣٠٪ ***(Shaw et al., ١٩٩٨)***.

Uncircumcised males have a significantly higher rate of UTI than any other population, particularly in early infancy ***(Bhat et al., ٢٠١١)***. Uncircumcised, febrile boys less than ٦٠ days of age had the greatest incidence of UTI, with a rate of ٢١٪ compared with ٥٪ in female infants and only ٢,٣٪ in circumcised boys ***(Bhat et al., ٢٠١١)***. Beyond the first ٦ months of age, uncircumcised males experience a higher rate of UTI through several mechanisms, including heavy periurethral colonization by uropathogens and an inability to fully retract the foreskin ***(Bhat et al., ٢٠١١)***.

Girls are less likely than uncircumcised boys to present with a febrile UTI in the first few months of life. However, girls have a significantly greater risk of UTI than boys ***(Bhat et al., ٢٠١١)***. Most authorities recommend routine examination

and culture of the urine in febrile girls ٠ to ٢٤ months of age ***(Shaw et al., ١٩٩٨)***.

Any abnormality resulting in obstruction to flow of urine can lead to an increased risk of UTI by promoting urinary stasis. These obstructions can be anatomic (e.g., urethral stricture, posterior urethral valves) or neurogenic, generally from congenital or acquired abnormalities of the spinal cord ***(Lim, ٢٠٠٩)***.

The evaluation of UTI is generally dependent on the age of the child. The presentation generally shifts from quite nonspecific to more focused complaints as the child grows older ***(Newman et al., ٢٠٠٢)***.

Young infants in particular may present with vague and nonspecific symptoms, such as poor feeding, decreased urinary output, lethargy, increased sleeping, vomiting, failure to thrive, and jaundice. Fever is not necessary to raise the suspicion of UTI in neonates. Occult UTI has been significantly associated with the presence of jaundice, particularly if the onset of jaundice was after ٨ days of age and an elevated conjugated bilirubin fraction is present ***(Honkinen et al., ٢٠٠٠)***.

Beyond the neonatal period, fever is generally the primary symptom that leads to the diagnosis of UTI and most emergency department-based studies explicitly identify fever as inclusion criteria for pediatric UTI. Other nonspecific

features commonly reported in children with occult UTI include vomiting, loose stools (often mistaken for diarrhea); and abdominal discomfort. However, other investigators have found that these associations lack statistical significance ***(Shaw et al., ١٩٩٨)***.

In older verbal children the classic symptoms of dysuria, frequency, abdominal or flank pain, new-onset incontinence (often nocturnal), and fever all carry significant and useful positive likelihood ratios. However, these findings are not adequately specific to diagnose UTI and mandate laboratory evaluation ***(Shaikh et al., ٢٠٠٧)***.

It is important to note that in children under the age of ٢ years, the presence of another possible source of fever such as gastroenteritis, bronchiolitis, upper respiratory infection, otitis media, does not entirely exclude UTI. Positive viral antigen studies (e.g., respiratory syncytial virus or influenza) have been associated with a significant decrease in UTI risk. However, the risk is not insignificant in young infants; respiratory syncytial virus–positive infants less than ٦٠ days of age have a ٥,٤٪ risk of UTI, compared with ١٠٪ in respiratory syncytial virus–negative infants ***(Bhat et al., ٢٠١١)***.

UTI is the most consistently missed serious bacterial infection in studies that have attempted to define low-risk criteria for the evaluation of fever ***(Zorc et al., ٢٠٠٥)***. Screening studies in emergency departments suggest that up to

٥٪ of children under the age of ٢ presenting with fever have UTI and over half of these would have been given alternative diagnoses such as otitis media and the urine had not been screened as part of the study ***(Shaikh et al., ٢٠٠٧)***. The frequency of re-infection during the first year after a UTI has been estimated to be up to ٣٠٪ ***(Shaw et al., ١٩٩٨)***.

AIM OF THE WORK

The aim of the study is to:

- Evaluate the true incidence of UTI in febrile children of different age groups.
- Emphasize the importance of diagnosis of UTI as a clue for early detection of urinary anomalies.

URINARY TRACT INFECTION

Normally, the urinary tract proximal to the distal urethra is sterile, but it is constantly challenged by infectious pathogens fighting to gain access ***(Freedman, ٢٠٠٧)***.

A urinary tract infection UTI, strictly speaking occurs when an infectious agent is present within this sterile system (the urinary tract) ***(Freedman, ٢٠٠٧)***.

Some Important definitions:

The most common types of urinary tract infections are:

- ***Urethritis***: Urethritis is a clinical syndrome that is characterized by urethral inflammation. It can result from infectious and non-infectious exposures and may be asymptomatic in up to half of cases ***(*National Network of STD/HIV Prevention Training Centre, ٢٠٠٧)***.

- ***Cystitis:*** Inflammation of the bladder.

- ***Pyelonephritis:*** Acute pyelonephritis is a potentially organ and/or life-threatening infection that characteristically causes scarring of the kidney ***(Fulop, ٢٠١٢)***.

- ***UTIs*** are also categorized as complicated or uncomplicated ***(Freedman, ٢٠٠٧)***.

- ***Complicated UTIs:*** A clinical syndrome characterized by pyuria and a documented microbial pathogen on culture of

urine, accompanied by local and systemic signs and symptoms including fever (i.e., oral or tympanic temperature greater than ٣٨^{o}C), chills, malaise, flank pain, back pain, and/or costo-vertebral angle pain or tenderness that occur in the presence of a functional or anatomical abnormality of the urinary tract or in the presence of catheterization ***(Lorenz and Toerner, ٢٠١٢)***.

- ***Uncomplicated UTI:*** Describes urinary tract infection in an otherwise healthy child with a structurally and functionally normal urinary tract ***(Dason, ٢٠١١)***.

- ***Recurrent UTI***: is defined as ٢ uncomplicated UTIs in ٦ months or, more traditionally, as ٣ positive cultures within the preceding ١٢ months ***(Foster et al., ٢٠٠٨)***.

- ***A relapse:*** When there is recurrent infection with the same organism despite adequate therapy ***(Epp et al., ٢٠١٠)***.

- ***Re-infection:*** is defined as recurrent UTI caused by a different bacterial isolate, or by the previously isolated bacteria after a negative intervening culture or an adequate time period (>٢ weeks) between infections ***(Epp et al., ٢٠١٠)***.

`Atypical UTI`: The criteria of atypical UTI includes:

- Seriously ill.
- Poor urine flow.