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Research Article

**STUDY TO KNOW PREVALENCE OF URINARY TRACT
INFECTION IN FEBRILE CHILDREN****Dr. Muhammad Javed¹, Dr. Arsalan Ali², Dr. Ali Mehdi³**

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Abstract:

Introduction: Urinary tract infection (UTI) is a problem that is frequently encountered by paediatric healthcare providers. UTI among children varies with gender, age, habits and other various factors. The current study evaluates the prevalence of UTI in febrile children and determined the predictors and associated factors. Patients and Methods: This study was a hospital-based cross-sectional descriptive study performed between April 2016 to May 2017 in Children Hospital Multan. Relevant information such as age, gender, symptoms, was obtained in a checklist for each patients. Physical examination was carried out on each subject to identify possible source of infection and other variables that could help the clinical diagnosis. Chi Square test was used for correlation between qualitative variables and T Test was used for quantitative variables. Multivariate linear regression analysis was used for predicting factors related to UTI. Results: We included 144 febrile patients with inclusion criteria. The mean age of them was 2.17 ± 2.56 years old. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of pyuria was respectively 0.52, 0.99, 0.95 and 0.85. We showed that age, temperature, admission weight, WBC, ESR and CRP were significantly higher in UTI positive patients in febrile children ($P < 0.05$). Our predicting analysis showed that delivery type, temperature, pyuria and positive nitrite can significantly UTI in febrile children ($P < 0.05$).

Conclusion: We presented high prevalence of UTI among febrile children in our setting and is predicted by pyuria, type of delivery, temperature and positive nitrite test. However, the common factor in almost all study that predict the UTI in febrile children is pyuria and should be attended by physicians for screening in febrile children.

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INTRODUCTION:

Urinary tract infection (UTI) is a common cause of fever in children (1). The presence of fever in infants and young children with UTI is of significant importance because it is a clinical marker of renal parenchymal involvement (2). Renal parenchymal infections lead to renal scarring (3), which is the prelude to chronic morbidities associated with UTI, such as hypertension, reduced renal function and chronic renal failure (4). The relevance of UTI to childhood morbidity is more marked in under-fives amongst whom the risk of renal damage is more and diagnosis is often missed as the clinical features are seldom overt and in most cases not referable to the urinary tract (5). Whereas UTI episodes if appropriately diagnosed and well-managed, can be effectively controlled with antibiotics, the attendant possible complications of untreated UTI, such as end-stage renal disease, (4) could have devastating consequences on the child, the family and the health system. The Subcommittee on Urinary Tract Infection suggested that to optimize the diagnosis of UTI, “clinicians should require both urinalysis results that suggest infection (pyuria and/or bacteriuria) and the presence of $\geq 50,000$ colony-forming units (CFUs) per milliliter of a uro-pathogen cultured from a urine specimen obtained through catheterization or suprapubic aspirate” (6).

The finding of ≥ 10 white blood cells (WBCs) per microliter in an un-centrifuged urine sample has been reported to be a sensitive indicator of UTI (6, 7). The sensitivity and specificity of pyuria for the diagnosis of UTI in children are 73% and 81%, respectively. Moreover, expert opinions state that the absence of pyuria does not rule out the diagnosis of UTI, specifically in infants <2 months of age (7). Unfortunately, the classic signs of UTI and pyelonephritis in older children and adults are not present or easily discerned in the toddler or young child. Fever is the most common symptom of UTI in the infant (8). Also, the presence of another source of fever on examination, such as otitis media or other viral symptoms, does not exclude a UTI (9). Screening for UTI is uncomfortable for patients, time-consuming for staff, and expensive in the aggregate. Community studies suggest that boys younger than 1 year of age and girls younger than 5 years of age are most at risk for UTI (9). The literature estimates that the prevalence of UTI in febrile children presenting for outpatient evaluation ranges from 1% to 20% (3). So, because of its prevalence and hidden nature in febrile children the aim of this study was to evaluate the frequency of UTI in febrile children with all-cause of

fever referred to our center.

PATIENTS AND METHODS:

This study was a hospital-based cross-sectional descriptive study performed between April 2016 to May 2017.

Inclusion & exclusion criteria

Children aged 1 month to 12 years presenting with fever (axillary temperature $\geq 37.6^{\circ}\text{C}$) with/without localizing sign (s) were recruited. Exclusion criteria included children with history of antibiotic treatment during last week of the day of enrolment, urologic manipulation such as catheterization and urinary tract anomalies. Children with chronic disorders such as sickle cell disease, malignancies, nephrotic syndrome, using immunosuppressing agent, glomerulonephritis and chronic renal failure were also excluded.

Data Collection

Relevant information such as age, gender, symptoms, was obtained in a checklist for each patient. Physical examination was carried out on each subject to identify possible source of infection and other variables that could help the clinical diagnosis. A clinical diagnosis of UTI was made in subjects with any of the following: Pain or crying on micturition, urinary frequency, urgency, loin pain, suprapubic tenderness, costovertebral angle tenderness. The definite diagnosis was performed based on the urine culture for UTI. The predicting factors of UTI in febrile children were evaluated, too.

Statistics

SPSS software version 21.0 was used to analyse the data. We presented descriptive quantitative data as mean \pm S.D. Chi Square test was used for correlation between qualitative variables and T Test was used for quantitative variables. We also used multivariate linear regression for predicting factors of UTI in febrile children. P Value lesser than 0.05 was considered as significant.

RESULTS:**Demographic data**

We included 144 febrile patients with inclusion criteria. The mean age of them was 2.17 ± 2.56 years old. Fifty-six patients (38.9%) were female and 88 of them (61.1%) were male. Seventy-six of them (52.8%) were born as normal vaginal delivery and others (68, 47.2%) as caesarian section. The mean of birth weight was 1820.35 ± 1582.61 grams and the mean admission weight was 7947.62 ± 8508.77 grams.

Signs, symptoms & risk factors

Twenty-one patients (14.6%) had history of previous UTI. Eleven patients had history of constipation in recent 2 weeks (7.6%). Growth

retardation was reported in 32 patients (22.2%). Signs, symptoms & risk factors of patients are listed in Table1. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of pyuria was respectively 0.52, 0.99, 0.95 and 0.85.

Table1- Risk factors of UTI in febrile children constipation in recent 2 weeks

| Characteristics | Frequency | Percent |
|-------------------------|-----------|---------|
| Gastroenteritis | 71 | 49.3 |
| Otitis Media | 10 | 6.9 |
| Pneumonia | 46 | 31.9 |
| Previous positive urine | 21 | 14.6 |
| Pyuria | 38 | 26.4 |
| Hematuria | 12 | 8.3 |
| Positive Urine Nitrite | 3 | 2.1 |
| VUR history | 14 | 9.7 |
| Vomiting | 71 | 49.3 |
| Irritability | 73 | 50.7 |
| Diarrhea | 65 | 45.1 |
| Abdominal Pain | 16 | 11.1 |
| Pharyngitis | 6 | 4.2 |

There were no cellulitis or arthritis and abdominal mass. Positive urine culture is more frequent in female than male patients. Prevalence of urine culture according to gender distribution is listed in Table2.

Table2- Distribution of urine culture in children based on gender

| Gender | Male | Female | Total | P-Value |
|----------------|----------|----------|----------|---------|
| Positive Urine | 1, 4.8 | 20, 95.2 | 21, 100 | 0.0001 |
| No (N, %) | 55, 44.7 | 68, 55.3 | 123, 100 | |
| Total | 56, 100 | 88, 100 | 144, 100 | |

Nine patients with previous UTI had positive urine culture (P=0.0001). History of constipation, otitis media, growth retardation, positive Nitrite test were not related to positive urine culture (P>0.05). Patients presented with gastroenteritis (P=0.04) and pneumonia (P=0.0004) had lower positive urine culture significantly. There was significant relationship between pyuria and hematuria and positive urine culture (P=0.001). Clinical and laboratory quantitative data of febrile patients are summarized in Table3 according to positive or negative U/C groups.

Table3- Clinical and laboratory data of febrile patients

| Variables | u/c | Mean | Std. Deviation | P Value |
|------------------------------|-----|----------|----------------|---------|
| Age (years) | yes | 3.63333 | 3.490644 | 0.001 |
| | No | 1.92573 | 2.302760 | |
| PR (Per/minute) | yes | 107.05 | 28.239 | 0.21 |
| | No | 114.80 | 18.631 | |
| RR (Per/minute) | yes | 27.90 | 11.291 | 0.88 |
| | No | 32.42 | 14.035 | |
| Temperature (Axillary) °C | yes | 38.5619 | .64844 | 0.02 |
| | No | 38.3106 | .55335 | |
| Weight (born) (gram) | yes | 1677.38 | 1516.891 | 0.43 |
| | No | 1844.76 | 1598.272 | |
| Weight (admit) (gram) | yes | 11828.57 | 13120.876 | 0.001 |
| | No | 7279.59 | 7310.581 | |

| | | | | |
|-----------|-----|-----------|-----------|-------|
| WBC (g/L) | yes | 11974.286 | 6932.9565 | 0.014 |
| | No | 10571.545 | 4853.2146 | |
| Hb (g/dL) | yes | 11.0524 | 1.06378 | 0.42 |
| | No | 20.1951 | 98.35112 | |
| ESR | yes | 20.067 | 32.8535 | 0.002 |
| | No | 19.054 | 20.8038 | |
| CRP | yes | 70.2857 | 239.97810 | 0.001 |
| | No | 10.4795 | 19.69048 | |

Our predicting analysis showed that delivery type, temperature, pyuria and positive nitrite can significantly UTI in febrile children (Table4).

Table 4- Linear regression test for predicting UTI in febrile children

| Characteristics | Unstandardized Coefficients | | Standardize d Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
|------------------|-----------------------------|------------|----------------------------|--------|------|---------------------------------|-------|
| | B | Std. Error | Beta | | | Lower Bound | Upper |
| Delivery Type | -.159 | .055 | -.222 | -2.884 | .005 | -.269 | -.050 |
| T(axillary) | -.105 | .050 | -.164 | -2.086 | .039 | -.205 | -.005 |
| Pyuria | .489 | .093 | .598 | 5.280 | .000 | .305 | .673 |
| Positive Nitrite | .547 | .254 | .182 | 2.152 | .034 | .043 | 1.052 |

DISCUSSION:

The present study found that UTIs were present in 14.58% of children one month to 12years of age febrile hospitalized. UTI in febrile children has been widely studied in different parts of the world (3, 8, and 10). Festo et al. reported the prevalence of UTI by culture as 39.7% (11). This value is comparable with the figures of 9% and 13% documented in studies among febrile children of similar ages in Benin (12) and Maiduguri (13) respectively. Reddy and Sri Laxmi reported a prevalence of 4% of UTI in febrile children (14). Ibeneme et al. reported 11% of UTI in febrile children (3). Higher pervasiveness in Maiduguri could be attributed to characteristics of the subjects as this study included patients with PEM. Lower value of 1.7% was obtained by Bauchner et al. (15) in USA among febrile children of similar ages. The higher prevalence of UTI in the mentioned studies and our study in comparison with studies in USA can be related to the higher incidence of bacterial infections in developing countries compared with the developed countries. Our frequency was nearly compatible with other studies.

We showed that in our study pyuria had a sensitivity of 52% and specificity of 99% with high PPV and NPV. Goldsmith et al recorded a sensitivity of 82% and specificity of 81% (16) while Reddy and Sri Laxmi showed in their study, its sensitivity as 85% and specificity as 88% with low PPV (25%) (14). Hoberman et al obtained figures of 54% and 96% respectively (10). Rabassa and

Gofama showed significant pyuria in their patients (13). Festo et al. reported the sensitivity of pyuria in diagnosing UTI using culture as a gold standard as 44.2% with specificity of 86.5% (11). Other studies confirmed the significance of pyuria in detection of UTI in febrile patients (17). It showed that despite of low sensitivity of pyuria it has high specificity and can be useful simple laboratory finding for suspicion to UTI in febrile children. So it can be used by physicians in their first evaluation.

We showed that UTI was significantly higher in female rather than male patients. Rabassa and Gofama also showed that female preponderance in their study (13). This has been demonstrated by Ibeneme et al. study with females having about 3 times the risk of infection than male children in the same age group (3). Such finding was noted by Aiyegoro et al. (18).

Similarly, Okafor et al. in Enugu documented higher rate of asymptomatic bacteriuria among female preschool children (19). This may be attributable to the small number of infants studied. Furthermore, children especially males with a history suggestive of urinary tract abnormalities such as obstructive uropathy were excluded in our study and may have contributed to the observed trend.

It was reported in Reddy and Sri Laxmi study in this way and our study was in line with other studies (3, 14, and 15). It is probably attributable to the anatomy of the female urinary tract. The short-

urethra in females makes it easy for organisms to enter the bladder from the vulva.

We showed that age, temperature, admission weight, WBC, ESR and CRP were significantly higher in UTI positive patients in febrile children. Other study showed that age and higher temperature at presentation were not found to be significant, poor nutritional status however was significantly associated with UTI (13). Jeena *et al.*, in South-Africa documented infrequency of urinary tract signs in their series as only 13% of patients with UTI in their study had signs attributable to the urinary tract (20).

Asinobi *et al.* in South-western Nigeria found 11% of patients with UTI to have symptoms of UTI (21). This suggests that UTI may be present in a febrile child below the age of 5 years with or without symptoms and signs referable to the urinary tract. This further supports the need for a high index of suspicion for UTI.

It is therefore, suggested that UTI should be investigated even in the absence of specific urinary symptoms, in the presence of fever especially in young children.

Our predicting analysis showed that delivery type, temperature, pyuria and positive nitrite can significantly predict UTI in febrile children. Festo *et al.* demonstrated that on multivariate logistic regression analysis positive urine culture was strongly predicted by age below 2 years (OR 2, $p=0.008$), female sex (OR 2.6, $p<0.001$), positive WBC microscopy (OR 4.9, $p<0.001$), positive nitrite test (OR 11.5, $p<0.001$), diarrhea (OR 2.3, $p=0.001$) and prolonged fever for more than 5 days (OR 1.6, $p=0.04$) (11). Hendaus *et al.* revealed that being female (OR 1.94; $P=0.025$) and older age at diagnosis (OR 2.41; $P=0.006$) were significantly associated with an increased risk for UTI and in multivariable logistic regression analysis controlling for all potential covariates, such as sex, age at diagnosis, gestational age and older age at diagnosis remained significantly associated with UTI (22). It is clear that factor predicting UTI in febrile children is varying by the local environment and is unique for every study.

CONCLUSION:

We presented high prevalence of UTI among febrile children in our setting and is predicted by pyuria, type of delivery, temperature and positive nitrite test. However, the common factor in almost all study that predict the UTI in febrile children is

pyuria and should be attended by physicians for screening in febrile children. Due to more time for definite diagnosis of UTI by urine culture, using pyuria in urine analysis as a cheap and available and rapid test for predicting UTI can be helpful in young children and can be used for better treatment. According to high prevalence of UTI in female young children should be considered as a key point for evaluation of febrile children. Therefore, the need to establish the pattern of organisms in UTI and antimicrobial sensitivities in the local environment is recommended.

In conclusion, it is recommended that UTI should be suspected and actively investigated in children presenting with fever. Regular surveillance of urinary tract pathogens and their antibiotic sensitivity pattern is important. Performing large population study and multi-centric ones are suggested.

Conflict of Interest

Authors declare any conflict of interests.

REFERENCES:

1. Zorc JJ, Kiddoo DA, Shaw KN. Diagnosis and management of pediatric urinary tract infections. *Clinical microbiology reviews*. 2005;18(2):417-22.
2. Lin K-Y, Chiu N-T, Chen M-J, Lai C-H, Huang J-J, Wang Y-T, *et al.* Acute pyelonephritis and sequelae of renal scar in pediatric first febrile urinary tract infection. *Pediatric Nephrology*. 2003;18(4):362-5.
3. Ibeneme C, Oguonu T, Okafor H, Ikefuna A, Ozumba U. Urinary tract infection in febrile under five children in Enugu, South Eastern Nigeria. *Nigerian journal of clinical practice*. 2014;17(5):624-8.
4. Schlager TA. Urinary tract infections in children younger than 5 years of age. *Paediatric drugs*. 2001;3(3):219-27.
5. Neumann CG, Pryles CV. Pyelonephritis in Infants and Children: Autopsy Experience at the Boston City Hospital, 1933-1960. *American Journal of Diseases of Children*. 1962;104(3):215-29.
6. Roberts KB. Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months. *Pediatrics*. 2011;128(3):595-610.
7. Robinson JL, Finlay JC, Lang ME, Bortolussi R. Urinary tract infections in infants and children: Diagnosis and management.

- Paediatrics & Child Health (1205-7088). 2014;19(6).
8. Winberg J, Andersen H, Bergström T, Jacobsson B, Larson H, Lincoln K. Epidemiology of symptomatic urinary tract infection in childhood. *Acta Paediatrica*. 1974;63(S252):1-20.
 9. Hoberman A, Chao H-P, Keller DM, Hickey R, Davis HW, Ellis D. Prevalence of urinary tract infection in febrile infants. *The Journal of Pediatrics*.123(1):17-23.
 - 10.Hoberman A, Chao H-P, Keller DM, Hickey R, Davis HW, Ellis D. Prevalence of urinary tract infection in febrile infants. *The Journal of pediatrics*. 1993;123(1):17-23.
 - 11.Festo E, Kidenya BR, Hokororo A, Mshana SE. Predictors of Urinary tract infection among febrile children attending at Bugando Medical Centre Northwestern, Tanzania. *Archives of Clinical Microbiology*. 2011;2(5).
 - 12.Musa-Aisien A, Ibadin O, Ukoh G, Akpede G. 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(1):39-45.
 - 13.Rabasa A, Gofama M. Urinary tract infection in febrile children in Maiduguri North Eastern Nigeria. *Nigerian journal of clinical practice*. 2009; 12(2).
 - 14.Reddy B. Clinical and laboratory profile of urinary tract infection in febrile children aged 1 to 5 years. *International Journal of Contemporary Pediatrics*. 2016;3(3):700-4.
 - 15.BAUCHNER H, PHILIPP B, DASHEFSKY B, KLEIN JO. Prevalence of bacteriuria in febrile children. *The Pediatric infectious disease journal*. 1987; 6(3):239-42.
 - 16.Goldsmith BM, Campos JM. Comparison of urine dipstick, microscopy, and culture for the detection of bacteriuria in children. *Clinical pediatrics*. 1990;29(4):214-8.
 - 17.Brown B, Asinobi A, Fatunde O, Osinusi K, Fasina N. Evaluation of the nitrite test in screening for urinary tract infection in febrile children with sickle cell anaemia. *Nigerian Journal of Paediatrics*. 2004;31(1):10-3.
 - 18.Aiyegoro O, Igbinosa O, Ogunmwonyi I, Odjadjare E, Igbinosa O, Okoh A. Incidence of urinary tract infections (UTI) among children and adolescents in Ile-Ife, Nigeria. *African Journal of Microbiology Research*. 2007;1(2):13-9.
 - 19.Okafor H, Okoro B, Ibe B, Njoku Obi N. Prevalence of asymptomatic bacteriuria among nursery school children. *Nig J Paediatr*. 1993;20:84-8.
 - 20.Jeena P, Coovadia H, Adhikari M. Probable association between urinary tract infections (UTI) and common diseases of infancy and childhood: a hospital-based study of UTI in Durban, South Africa. *Journal of tropical pediatrics*. 1996;42(2):112-4.
 - 21.Asinobi A, Fatunde O, Brown B, Osinusi K, Fasina N. Urinary tract infection in febrile children with sickle cell anaemia in Ibadan, Nigeria. *Annals of Tropical Paediatrics: International Child Health*. 2013.
 - 22.Hendaus MA, Alhammadi AH, Khalifa MS, Muneer E, Chandra P. Risk of urinary tract infection in infants and children with acute bronchiolitis. *Paediatrics & Child Health*. 2015;20(5):e25-e9.