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Research Article

TO SCREEN THE CHILDREN AGED 4 MONTHS TO 15 YEARS FOR POSSIBLE UTI AND POINT PREVALENCE ON THE BASIS OF URINE MICROSCOPY AND/OR URINE DIPSTICK IN FEVER WITHOUT A FOCUS IN A PERIPHERAL HOSPITAL

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ABSTRACT

Objective: The aim of the study was to screen the children aged 4 months–15 years for possible urinary tract infection (UTI) and point prevalence on the basis of urine microscopy and/or urine dipstick in fever without a focus in a peripheral hospital.

Methods: This was a hospital-based outpatient study conducted in the pediatric patients of district hospital Shopian between January 2021 and December 2021. A total of 9000 children were seen but most had (or developed) a focus. Only 180 patients did not develop any focus and were the actual subjects subjected to urine microscopy/urine dipstick to identify the possible UTI.

Results: Of the 9000 children seen 8820 patients had (or developed) a focus. One hundred and eighty patients did not develop any focus and corresponded to 2% with 74 (41.111%) male and 106 (58.888%) female children of which 62 had positive urine microscopy/dipstick corresponding to 0.6889%, with 24 (38.7%) male and 38 (61.3%) female suggesting a point prevalence of 0.6889%.

Conclusion: Urine microscopy and/or urine dipstick of a clean voided urine specimen may reasonably be used to rule out UTI and excluded from further confirmatory invasive urine culture. Similarly positive tests could be used to rule in UTI and proceed for further investigation.

Keywords: UTI, Fever, Children, Microscopy, Dipstick, Focus.

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INTRODUCTION

Urinary tract infection (UTI) is among the most common type of bacterial infection in infants with fever without a clear focus. The overall prevalence of UTI in infants with fever without a clear focus is approximately 5% which varies with age, sex, race, and temperature or circumcision status [1]. It is the supposed to be the third most common cause of fever in children [2] and accounts for around 0.7% of all outpatient department (OPD) visits [3]. The bad thing is that fever as a symptom is common in other childhood illnesses including infective and non-infective illnesses and UTI is known to co-exist with these diseases [4]. UTI is more common in undernourished children and the risk of UTI increases with the severity of malnutrition as severe malnutrition is associated with immune deficiency, which makes these children more vulnerable to infections [2]. Gram-negative bacteria are responsible for most of the childhood UTIs arising usually from the fecal flora of the perineum. *Escherichia coli* is the most common pathogen, accounting for approximately 80% of such UTIs. Other common pathogens include *Klebsiella*, *Proteus*, *Enterobacter,* and *Enterococcus* species [5]. Childhood UTI has been associated with kidney damage and hence long-term complications, like hypertension and renal failure. A systematic review found renal scarring was present in approximately 15% of children following a first UTI which signifies the gravity of the situation [6]. In toilet-trained or older children a midstream clean catch sample is the optimal specimen for urine analysis. In school-going children, cleansing is not required unless there is gross contamination of the genitalia. Supra-pubic aspiration (SPA) is reserved for diapered, uncircumcised boys whose urethral opening may not be visualized and those who cannot produce an uncontaminated midstream sample. Urinalysis has been shown to be important in the detection of UTI in children. It is rare not to find pyuria in true UTIs [7]. The contamination rate of mid-clean catch sampling is equivalent to the invasive catheterization. Microscopic examination for pyuria and bacteriuria is superior to dipstick in ruling out UTI performing very well to exclude UTI however urine has been collected [8]. Urine culture result is important for establishing the diagnosis of acute pyelonephritis (APN). However, urine culture alone has few lacunae in comparison to the urine analysis/dipstick as the urine culture result is not available or considered when the prompt discrimination of APN is required in the medical field, plus around 10–35% of APN cases confirmed with acute DMSA scans show negative culture results. One more thing is that urinalysis alone has a very high sensitivity and negative predictive value among the methods used for the diagnosis of UTI. And not to mention, around 1–3% of the healthy population has asymptomatic bacteriuria that can persist for several months. The empirical treatment of APN has to be started early after its clinical diagnosis to prevent the possible future complications of renal scarring even before the culture results. Finally, catheterization or SPA used to collect urine sample for cultures is invasive to children who respond well to the empirical treatment and hence unacceptable to the parents [9]. Dipstick (LE and nitrite) or microscopic analysis [Pyuria (10 WBCs/mm3 of an uncentrifuged urine specimen or ≥5 WBCs of a centrifuged urine sample per high-power field [7] and/or bacteriuria) and/or dipstick (LE and nitrite) of a mid-clean catch urine specimen may well be used to rule out UTI and hence prevented from further investigations including a confirmatory culture. Conversely, positive tests may be used to go for further investigations to rule in UTI [10]. Urine dipsticks are rapid and cheap screening tests. Dipsticks are less reliable in young infants, where frequent voiding flushes substrates out of the bladder. Neither leukocytes nor nitrites are fully sensitive or specific for UTI, but they are very useful screening tests, especially when used in combination. Dipsticks have a good negative predictive value to exclude a UTI. In the presence of suggestive symptoms and

positive dipstick/microscopy, empirical antibiotics are indicated while waiting for the culture [5].

Why not to rely on blood culture

Along with the reasons cited above, there are many other reasons for not relying on culture as given below:

1. Non-availability in peripheral hospitals
2. Non-affordability by all parents
3. Delayed results- by 3rd or 4th day and sometimes even by the 6th or 7th day which is unacceptable clinically
4. Urine collection by invasive method is not acceptable to nearly all parents/guardians.

Aims and objectives

Screening of children aged 4 month–15 years for incidence of possible UTI on the basis of urine microscopy and/or urine dipstick in fever without a focus in a peripheral hospital.

METHODS

This was a hospital-based outpatient study conducted in the pediatric patients of district hospital Shopian between January 2021 and December 2021. A proper consent was taken from the guardians or the parents of the patients participating in the study whose confidentiality was maintained. A total of 9000 children were seen for fever in the OPD some of whom got admitted to pediatric ward for a few hours. Most of the patients either had or developed a clear focus within first few days of fever like respiratory tract infection including otitis media, gastroenteritis, etc. Only 180 patients did not develop any focus and were the actual subjects of the research. A urine examination along with other relevant investigations was advised on contact with such patients and followed up for next 5–7 days for the development of any focus. Most of the patients presented from 2nd to 5th day. Microscopic analysis [Pyuria (10 WBCs/mm3 of an uncentrifuged urine specimen or ≥5 WBCs of a centrifuged urine sample per high-power field [7] and/or bacteriuria) and/or dipstick (LE and nitrite) of a mid-clean catch urine specimen was used to screen for the possible UTI and further investigations including a confirmatory culture were proceeded on the basis of the positivity of the screen.

Inclusion and exclusion criteria

Any child aged 4 months–15 years with fever without a focus and without any underlying disease was included in the study and any child with fever with a clear focus at the time of contact or within few days later or any underlying disease or who were on antibiotics were excluded from the study.

Data analysis

Data analysis was done using test statistics. Variables were summarized as frequency and percentages. Qualitative data were analyzed using Chi-square test. The analysis of the data was done using Statistical Package for the Social Sciences (SPSS) version 20.

RESULTS

Of the 9000 children seen for fever in the OPD some of whom got admitted to pediatric ward for a few hours, 8820 patients either had (or developed within first few days) a clear focus like respiratory tract infection including otitis media, gastroenteritis, etc. Only 180 patients did not develop any focus and corresponded to 2% of which 62 were positive on urine examination (urine microscopy/dipstick) suggesting a point prevalence of 0.6889% [3]. Of these 180, 74 were male and 106 female children corresponding to 41.111% and 58.888% respectively; the positive cases for urine microscopy/dipstick corresponded to 34.4% of total fever without a focus cases [1,2] of which 24 (38.7%) were male and 38 (61.3%) were female. The rest 118 whose urine microscopy/dipstick was negative included 50 male (42.37%) 68 female (57.63%) children respectively. The highest number of positive cases were from the age group of <3 years and 3–6 years comprising a total of 58.065% (29.032% of each group) with the highest percentage of female children in the age group of 3–6 years (88.89%). The age and gender-wise distribution is summarized in tables:

Table 1: Age <3 years

Urine microscopy/dipstick status with male and female percentages			
Negative urine microscopy/dipstick	M	18	47.37%
	F	20	52.63%
Positive urine microscopy/dipstick	M	8	44.44%
	F	10	55.55%

Table 2: Age <3–6 years

Urine microscopy/dipstick status with male and female percentages			
Negative urine microscopy/dipstick	M	10	55.56%
	F	8	44.44%
Positive urine microscopy/dipstick	M	2	11.11%
	F	16	88.89%

Table 3: Age <6–9 years

Urine microscopy/dipstick status with male and female percentages			
Negative urine microscopy/dipstick	M	10	29.41%
	F	24	70.59%
Positive urine microscopy/dipstick	M	6	60%
	F	4	40%

Table 4: Age <9–12 years

Urine microscopy/dipstick status with male and female percentages			
Negative urine microscopy/dipstick	M	10	55.56%
	F	8	44.44%
Positive urine microscopy/dipstick	M	8	66.67%
	F	4	33.33%

Table 5: Age <12–15 years

Urine microscopy/dipstick status with male and female percentages			
Negative urine microscopy/dipstick	M	2	20%
	F	8	80%
Positive urine microscopy/dipstick	M	0	0%
	F	4	100%

DISCUSSION

UTIs are among the most frequent infections encountered in the pediatric population. It is more common in undernourished children and the risk increases with the severity of malnutrition. It can lead to renal scarring in children even following a first UTI which signifies how important it is to at least screen the children for a possible UTI to start an immediate treatment as urine culture may not be possible for one or the other reasons. For example, we had one 4-month plus infant who presented with fever without a focus and had full field pus cells and by any means we were not able to convince the mother for culture at all; so we had to take the decision on the basis of urine examination only to prevent the renal damage and future complications. In this study, 0.6889% of all the cases of OPD visits of fever without a focus proved positive for UTI on urine examination as was seen in a study

conducted by Freedman and Almofarreh*et al*. [3, 11] with 0.7% of all doctor visits as UTIs. The positive cases for urine microscopy/dipstick corresponded to 34.4% of total fever without a focus cases with similar results seen by Gonzalez *et al*. [1] with a point prevalence of 32.9% in febrile boys aged <6 months and 19.3% in febrile girls aged <12 months and 31% (Berkowitz, South Africa) through 34.7% (Kala and Jacobs, South Africa) to 37% (Shimeles and Lulseged Ethiopia [Africa]) in different studies [2]. Hence, urine examination can well be used to screen the children in resource-limited areas or hospitals and regions of world to identify any possible UTI to start treatment early to prevent any future complications.

CONCLUSION

Urine microscopy and/or urine dipstick of a clean void may reasonably be used to rule out possible UTI in fever without a focus and excluded from further invasive confirmatory urine culture in resource-limited situations. Similarly, positive tests could be used to rule in UTI and proceed for further investigation. However, a confirmatory culture may be sent and be preferred before the start of the antibiotic therapy wherever possible and feasible as antibiotic sensitivities may vary.

Limitations of the study

1. The main limitation of the study was urine culture, even though we wanted to send it for confirmation of UTI and culture and sensitivity, we could not as nearly all parents/guardians categorically refused the SPA or catheterization of their child.
2. The other limitation of the study was that a good number of the patients did not follow-up after the initial visit, which were not considered for the study for the possibility of development of a focus.

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CONFLICTS OF INTEREST

None declared.

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