Nigerian Journal of Clinical Practice
June 2009 Vol 12(2):124-127

# URINARY TRACT INFECTION IN FEBRILE CHILDREN IN MAIDUGURI NORTH EASTERN NIGERIA

**A I Rabasa, MM Gofama**
*Department of Paediatrics, University of Maiduguri Teaching Hospital Maiduguri, Borno State, Nigeria.*

**ABSTRACT**
One hundred and forty five children aged 1 month to sixty months who had fever at presentation to the paediatric department of University of Maiduguri Teaching Hospital were investigated for urinary tract infection in this prospective study from November 2004 to October 2005. Prevalence of urinary tract infection was found to be 13.7 per cent. While the female sex and malnutrition were found to be significantly associated with urinary tract infection, height of temperature and symptoms referable to urinary system were not. Ninety per cent of the isolates were Gram negative; mainly *coliform* Spp, the remaining 10 per cent were due to *staphylococcus aureus*. Gentamicin was still found to be effective against most of the urinary pathogens. However, clavulinic acid potentiated amoxicillin, ampicillin, nalidixic acid and cotrimoxazole were found to be poorly effective. We therefore conclude that all ill children especially younger ones presenting with fever be screened for urinary tract infection. A regular surveillance of urinary tract infection pathogens and their antibiotic sensitivity pattern is recommended.

**Key Words:** Urinary tract, infection, febrile, children. *(Accepted 8 April 2008)*

## INTRODUCTION

Unitary tract infection (UTI) is a common cause of childhood morbidity and motility, [1, 2, 3] its incidence varies with age and sex. Surveys of children attending out patient services have reported frequencies of of UTI ranging from 0.4-5%. In the tropics, there is an increased frequency of UTI in malnourished children ranging from 10-30%.[4,5] Although UTI may either be symptomatic or symptomatic, the diagnosis even in symptomatic UTI may be missed especially in young children, because symptoms may not be referable to the urinary system.[1,2,6] Fever however, is one of the commonest symptoms of UTI[6,7] as well as several other conditions prevalent in our environment and is a common presentation in most paediatric out patient units, especially in developing countries. Asinobi et al[8] reported a prevalence of UTI of 21.6 per cent in febrile sickle cell anaemia children in Ibadan. Where as Okafor[9] reported a prevalence of 2.1 percent in asymptomatic nursery school children in Eungu. Urinary tract infections, whether symptomatic or asymptomatic are of great importance in childhood as most renal scars occur often after such infections within the first five years of life.[9] Early diagnosis and treatment is therefore of utmost importance. However, such efforts may be frustrated by the lack of specific symptoms and signs. Hence, it behoves every Paediatrician to have a high index of suspicion when presented with a sick child, especially with fever. It is therefore important to study the prevalence of UTI in febrile children presenting to the UMTH, where like other tropical environments, fever is a common cause of hospital visit.

Correspondence: Dr A I Rabasa

## PATIENTS AND METHOD

This prospective study was conducted in the paediatric department of University of Maiduguri Teaching Hospital (UMTH) between November 2004 and October 2005. The study group consisted of children between the ages of one month to 60 months (5years) who presented with fever (axillary temperature $\geq 37.5^0$c).[10] Children younger than one month or older than 5 years and those with axillary temperature less than $37.5^0$C were excluded. Ethnical clearance for the study was obtained from the hospital ethical committee.Following a history and full clinical examination, clean catch urine (CCU) specimen was collected into a universal sterile container and analysed within 30 minutes of collection. Where CCU specimen was not available, a suprapubic bladder aspiration (SPA) was carried out.

A sample was placed onto MacConkey's agar and cysteine Lactose electrolyte deficient medium and incubated for 18-24 hours, at $37.1^0$c. All organisms were identified by standard laboratory techniques.[11] all isolates were tested for antimicrobial sensitivity using the disc diffusion methd.[12] Urinalysis was also done immediately on a portion of the freshly obtained urine sample by dipstick method. Number of pus cells were also counted using x40 objective. Significant pyuria defined as pus cells > 5 per high power field (HPF) of urine.[13]

Urine culture was considered positive in the presence of pure growth of $>10^5$ colony forming units (CFU) per millilitre of the freshly obtained urine from clean catch specimens,[14] or presence of any growth from a urine specimen obtained by suprapubic bladder aspiration.[5]

**STATISTICAL ANALYSIS**

Categorical variables were compared between patients using the Chi-square test($X^2$). Fisher's exact test (two tailed) was used where appropriate. Continuous variables were compared using the student t-test. A P- value of < 0.05 was considered to be significant.[15]

**RESULTS**

One hundred and forty five (145) children were included in the study. Mean age of 20.3 $\pm$ 6.5 months (range 1-60months). There were 89 (61.4per cent) males and 56 (38.6per cent) females (M: F 1.6:1). Of the 145 patients studied; twenty (13.7per cent) had positive urine cultures. Of these 12 (60 per cent) were females and 8(40 per cent) males. The female sex was observed to be at increased risk of UTI in this study ($X^2$=4.47, P <0.05). Age and temperature at presentation were not significantly different among the UTI and non UTI patients (t- value of 0.68 and 0.13, P> 0.05) respectively. Poor nutritional status based on weight for age was observed to be significantly associated with UTI among the patients($X^2$=4.75, P<0.05). There was no significant difference in the frequency of symptoms of vomiting, abdominal pain, dysuria/crying on micturition among the patients. Table I.

Table1: **Frequency of Symptoms and Signs in the Study Population.**

| Clinical features | Children With UTI | Children with No UTI | $X^2$ Value | P Value |
|---|---|---|---|---|
| Crying on micturition /dysuria | 2 | 18 | 0.28 | >0.05 |
| Frequency of micturition | 0 | 1 | | |
| Suprapubic pain | 1 | 6 | | |
| Vomiting | 12 | 50 | 2.8 | >0.05 |
| Suprapubic tenderness | 0 | 5 | | |

Table 2: **Pathogens Causing UTI and Their Antibiotic Sensitivities.**

| Organisms isolated | Frequency (No. of children) |
|---|---|
| Coliform spp | 9 |
| E. coli | 4 |
| Klebsiella spp | 3 |
| Proteus spp | 2 |
| Staph aureus | 2 |

Information about previous medication revealed that 51 of the 145 (35.2per cent) children studied had antibiotics within the last 24 hours before presentation. Of these, 6 had positive urine culture. The most commonly used antibiotics before presentation include, cefuroxime; 35 (68.6 per cent), and gentamicin; 18 (35.3per cent).Table 2 shows frequency of organisms isolated in the urine of patients studied. Gram-negative organisms constituted 18 of 20 (90%) organisms isolated. Untypable *coliform* species (spp) was the most commonly isolated organism (45per cent) followed by *Escherichia coli* and *klebseilla* spp. *Staphylococcus aureus* was isolated in only 2(10per

Table 3: **Pathogens Causing UTI and Their Antibiotic Sensitivities**

| Organisms | Antibiotic sensitivity (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Am | Ci | Of | Str | Cot | Na | Aug | Pef | Gen | Ceph |
| Coliform Spp | 33 | 100 | 83 | 85 | 57 | 20 | 57 | 100 | 71 | 42 |
| E. Coli | 33 | 75 | 100 | 66 | 0 | 0 | 0 | 100 | 100 | 33 |
| Klebsiella spp | 0 | 100 | 100 | 50 | 0 | 33 | 66 | 50 | 66 | 0 |
| Proteus spp | 0 | 100 | 100 | 0 | 50 | 0 | 0 | 100 | 100 | 0 |
| Staph aureus | 0 | 100 | - | 100 | - | - | - | - | 100 | - |
| Total % sensitivity | 13.2 | 95 | 95.7 | 60.2 | 25.5 | 13.3 | 30.7 | 87.5 | 87.4 | 18.7 |

Am = Ampicillin Str = Streptomycin
Pef = Peflacin Ci =Ciprofloxacin
Cot = Cotrimo Gen = Gentamicin
Of = Ofloxacin Aug = Augmentin
Ceph = Cephalexin Na=Nalidixic acid
- = Not tested against the corresponding antibiotic.

no observed correlation between antibiotic usage and type of organisms isolated among the patients. The antimicrobial sensitivities of the various organisms isolated are shown in Table 3. Cotrimoxazole, ampicillin, nalidixic acid and clavulinic acid potentiated amoxicillin, through commonly used antimicrobials in UTI, were found to be poorly sensitive invitro. The quinolone group of antibioticswere found to be the most sensitive among all isolates. Gentamicin however still remains effective against most of the isolates.Urinary nitrite test was positive in only 5 of the 20 children with UTI and 8 of those without UTI. The sensitivity, specificity and positive predictive value of the nitrite test in UTI were 25%, 94%, and 38% respectively. Significant pyuria was found in children with UTI with a mean pus cells per high power field (HPF) of 10 $\pm$ 6.5. In children with no UTI mean pus cells per HPF was 3$\pm$3.7(t= 2.8, P <0.05).

**DISCUSSION**

The prevalence of UTI in children with fever in this study (13.7 percent) although lower than a previous report form Ibadan[8] (21.6 percent), is however higher than the 10 percent reported by Morton and Lawande[4] in Zaria. This disparity may be partly due to the difference in patients studied. While the Ibadan study looked at children with sickle cell anaemia, in this study, all children with fever who fulfilled the inclusion criteria were studied.The observed female preponderance in this study is in agreement with previous reports.[6, 9, 16] this 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.Although, age and height of temperature at presentation were not found to be significant in this study, poor nutritional status however was significantly associated with UTI. This observation is similar to previous report from this Centre[5] and elsewhere[16, 17]Symptoms and signs referable to urinary system such as dysuria, suprapubic pain, urethral discharge, and renal angle tenderness were not found to be significant in this study. This however contrasts with previous report where dysuria was observed in 7.6[16] per cent and 43 per cent.[17] Those reports however, included children older than five years of age. Such children may have loin pain or symptoms directly related to micturition, such as frequency, urgency, dysuria, enuresis or cloudy urine. 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. Significant pyuria observed in this study is in agreement with previous report.[19] In contrast, pyuria was not significant in severely malnourished children with UTI[5]. That was attributable to the impaired phagocytic process in the malnourished children.A low nitrite sensitivity and positive predictive value were observed in this study compared to previous reports[20, 21].The low sensitivity and positive predictive value observed in this study may be due to the relative lower age of our study population. It is known that, nitrite positively is dependent on the duration of urine stasis in the bladder. Young children with smaller bladder capacity tend to keep urine for shorter duration in the bladder, hence, the lower sensitivity and positive predictive value of the nitrite test. However, a positive nitrite test is highly suggestive of UTI and hence, the high specificity.The commonest organism isolated was untypable *coliform* spp followed by *E. coli*. This observation is in agreement with previous reports.[1, 5, 6, 9] *Staphylococcus aureus* was the only Gram positive isolate in this study, accounting for 10 per cent of the isolates. Ibadin[22] in Benin however reported a higher frequency of *staph aureus* isolates. The Benin study however looked at patients with Nephrotic syndrome and therefore the difference in the causative organisms observed. Although the sensitivities of the isolates were not tested against the third generation cephalosporin, their sensitivities to commonly used antibiotic and antimicrobial such as ampicillin, cotrimoxazole, nalidixic acid and clavulinic acid potentiated amoxicillin were low. This is in agreement with previous reports.[5, 22] Gentamicin offered average 82.7per cent sensitivity against the Gram negative organisms and 100 per cent against *Staph aureus*. The increase trend to resistance by common bacterial pathogens to routinely used antibiotics have been previously reported by other workers.[5,22] The common practice of self medication and availability of over-the counter drugs may be responsible for the poor sensitivities to these commonly used antimicrobials. However, the organisms isolated showed good sensitivities to the quinolone group of antibiotics such as ofloxacin, pefloxacin and ciprofloxacin invitro. The quinolone antibiotics however are not recommended in children younger than 17years of age.[23] Therefore, the need to establish the pattern of organisms in UTI and antimicrobial sensitivities in the local environment is recommended. In addition, further investigation of the children to exclude anatomical abnormalities of the urinary tract would have been useful in determining the presence of an underlying abnormality. 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.

## REFERENCES


1. **Yap HK.** Disorders of kidney and urinary tract in: Standfield P, Brueton M, Waterson T, eds. Diseases of children in the subtropics and tropics. London: Edward Arnold, 1994:186.

2. **Neumann GC, Pryless CV.** Pyelonephritis in infants and children. Autopsy experience at Boston City Hospital, 1933-1960. Am J. Dis child 1962; 104:125 29?

3. **Marr TA, Traisman HS.** Detection of bacteriuria in paediatric out patients. American J disease of children 1975; 129:940-3.

4. **Morton RE, Lawade R.** Frequency and clinical features of urinary tract infection in Paediatric outpatient in Nigeria. Ann Trop paediatr 1982; 2:113-7.

5. **Rabasa AI, Shattima D.** Urinary tract infection in severely malnourished children at the University of Maiduguri Teaching Hospital. Journal of Tropical Paediatrics 2002; 48:359-361.

6. **Eke FU, Eke N.** Urinary tract infections. In: Azuibuke JC, Nkanginieme KEO, Eds. Paediatrics and child health in tropical region. Owerri: African Educational services 1999: 326-9.

7. **Glass J.** Diagnosis of urinary tract infection. In: Posthethwaite RJ ed. Clinical paediatrics nephrology. Bristol: Wright 1986:350-360.

8. **Asinobi AO. Fatunde OJ, Brown BJ, Osinusi K, Fasina NA.** Urinary tract infection in febrile children with sickle cell anaemia in Ibadan, Nigeria. Ann Trop paediatr. 2003 June; 23(2): 129-31.

9. **Okafor HU, Okoro BA, Ibe BC Njoku-Obi NU.** Prevalence of asymoptomatic bacteriuria among Nursery school children. Nig J. paediatr 1993; 20:84-8.

10. **Osinusi K. Njinyam MN.** Comparison of body temperature taken at different sites and the reliability of axillary temperature in screening for fever. Afr J Med Sci. 1997; 26:163-6.

11. **Okolo AA Omene JA, Odita JC.** Symptomatic urinary tract infection in high-risk Nigerian newborn infants. Ann Trop Paediatr 1985; 5:181-84.

12. **Bauer AN**. Antibiotic susceptibility testing by standard single disc method. Am J. Clin Pathol 1986; 45:493?

13. American Academy of Pedictrics: Committee on quality improvement: Subcommittee on urinary tract infection. Practical parameter: The diagnosis, treatment and evaluation of the initial urinary tract infection in febrile infants and young children. Pediatrics 1999; 103:843-52.

14. **Kass EH.** Asymptomatic infection of the urinary tract. Trans Assoc Am Physicians 1956; 69:56-64.

15. **Swinston TDV.** Statistics at square one. British Medical Association, London, 1983.

16. **Anochie IC, Nkanginieme KEO, Eke FU.** The influence of instruction about the method of urine collection and storage on the prevalence of UTI. Nig. J Paediatr 2001:28(2) : 39-42.

17. **Reed RP, Wegerhoff FO.** Urinary tract infection in malnourished rural African children. Ann trop paediatr 1995; 15:21-6.

18. **Okoro BA, Okafor HU.** Pattern of childhood renal disorders in Enugu. Nig. J. paediatr 1999;26:14-8.

19. **Brown BJ, Asinobi AO, Futunde OJ, Osinusi K, Fasina NA.** Evaluation of nitrite test in screening for urinary tract infection in febrile children with sickle cell Anaemia. Nig J Paediatr 2004; 31(1) 10-13.

20. **Munyi ST, Macharia WM, Alwart AJ, Njeru EK.** Screening of UTI in children with cancer. East Afr Med J 1998; 75:264-7.

21. **Wammanda RD, Aikhinbare HA, Ogala WN.** Use of nitrite dipstick test in the screening for urinary tract infection in children. West Afr J. Med 2000; 19:206-8.

22. **Ibadin MO.** The prevalence of urinary tract infection in childhood Nephrotic syndrome. Nig. J Paediatr 1997;24(2-4): 40-4.

23 **Elder JS.** Urologic disorders in infants and children. In: Behrman RE, Kliegman RM, Jenson HB (eds). Nelson textbook of padiatrics. Sanders, Philadelphia 2000: 1621-24.