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Prevalence of urinary tract infection among febrile under-fives attending the paediatric outpatient clinic in Port Harcourt, Nigeria

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The diagnosis of urinary tract infection (UTI) is often missed in febrile children because its symptoms are usually non-specific. This study was undertaken to determine the prevalence of UTI among febrile under-fives attending the paediatric Out-Patient Clinic of Braithwaite Memorial Specialist Hospital, Port Harcourt, Nigeria. Demographic data was collected from 169 consecutively recruited under-fives. Their urine samples were analyzed in the laboratory using standard urinalysis, microscopy, culture and sensitivity methods. The children aged 0-60 (mean age 19.18±15.99) months included 106 (62.7%) males. The prevalence of UTI was 62 (36.7%). *Escherichia coli* (51.6%) was the commonest organism cultured and vomiting (56.5%) the commonest symptom observed in febrile under-fives with UTI. Urinary tract infection was more prevalent among children aged 12-23 months (42.1%). Urinary tract infection is prevalent among febrile under-fives and vomiting was the commonest symptom found among them.

Keywords: Clinical features; Urinary tract infection; Under-fives; Port Harcourt; Prevalence

INTRODUCTION

Urinary tract infections are common in childhood and are increasingly being included as important causes of childhood morbidity and mortality in Sub-Saharan Africa.[1] Early in the course of the disease especially in young children, patients may present with non-specific symptoms and signs which may not be referable to the urinary tract, thus making diagnosis of urinary tract infection difficult.[1-4] Studies have shown that as many as 0.4-10% of children attending paediatric out-patient clinics have urinary tract infections (UTI).[2,5-7] Fever is a very common presentation in paediatric out-patient clinics especially in developing countries.[2] It is one of the commonest symptoms of UTI, which it shares with several other infections, such as malaria and respiratory tract infections prevalent in our environment.[2,6,8] Urinary tract infection has also been shown to co-exist with these common childhood diseases.[8]

Urinary tract infections have been reported among febrile under-five children in Nigeria with prevalence rates of between 9-24.3%.[2,7-9] Without a high index of suspicion, the possibility of missing a diagnosis of UTI in children presenting with fever cannot be excluded. Untreated or poorly treated UTI in children especially those under-five, can lead to renal scarring which can in turn result in hypertension, reduced renal function and chronic renal failure.[2,7,8] These could in turn have devastating consequences on the child, the family and the health system.[7] Therefore, early detection and effective treatment can prevent these complications from occurring.[10-13]

There is paucity of data on the prevalence of UTI among febrile under-fives in Port Harcourt, Nigeria. This study was therefore carried out to determine the prevalence of UTI in febrile under-fives, the common clinical features and the microbiological profile of UTI at

the paediatric Out-Patient Clinic of the Braithwaite Memorial Specialist Hospital in Port Harcourt, Nigeria.

METHODOLOGY

This cross-sectional descriptive study involved febrile under-fives (0-60 months) who presented at the paediatric out-patient clinic of the Braithwaite Memorial Specialist Hospital (BMSH) over a 6 months period (June 2017-December 2017).

Braithwaite Memorial Specialist Hospital is a tertiary health facility owned by the Rivers State Government in the South-South geo-political zone in Nigeria. It is a 375 bedded hospital and serves as a referral center for all the primary health care facilities, cottage hospitals, general hospitals and private facilities in the state as well as neighbouring states.

Annually the Paediatric out-patient clinic attends to about 20,000 children, many of whom present with fever. Children enrolled were those who presented with documented fever (defined as axillary temperature ≥ than 37.5^{o}C), with no known renal disease and those whose caregivers gave informed consent. Children with renal disorders, those who had received antibiotics within 72 hours of the study and those whose caregivers refused to give informed consent were excluded from the study. Ethical approval was obtained from the Rivers State Health Research Ethics Committee.

A total of 169 children were recruited for the study. Information concerning biodata, presenting complaints and family and social history were recorded by the interviewer in the case record form. Social class was determined according to the classification system of Olusanya et al.[14] The axillary temperatures of the children were taken and documented. Clean voided mid-stream urine samples were collected in children ≥ 2years or clean catch urine samples for children less than 2 years were collected in sterile universal bottles from recruited patients. Urine samples collected were sent to the microbiology laboratory of the hospital within 1 hour of collection for urinalysis, microscopy, culture and sensitivity.

Significant pyuria was defined as pus cells > 5 per high power field (HPF) of urine.[15] Culture media used were Mac-Conkey and Blood agar. Culture plates with bacteria counts greater than or equal to 1x10^{5} colony forming unit per milliliter (cfuml^{-1}) were taken as positive, thus indicating urinary tract infection. The bacterial isolates were identified based on characteristics of colony morphology, Gram stain reaction and biochemical tests using API2OE kits. The identified bacteria were then tested *in vitro* with standard antibiotic discs to determine their antibiotics sensitivity pattern.[2,16]

Children who had UTI were treated according to standard practices and were either admitted or treated as out-patients depending on the severity of the illness. The data was analyzed using Software Package for Social Sciences (SPSS) version 17 and results expressed in frequency tables and Pie charts. P values ≤ 0.05 were considered significant at 95% confidence interval.

RESULTS

Characteristics of the study population

One hundred and sixty-nine children aged 0-60 months (mean age 19.18 ±15.99) participated in the study comprised of 106 (62.7%) males and 63 (37.3%) females with male to female ratio of 1.7: 1. Of these 73 (43.2%) children were aged 0-11 months, Table 1.

The mean temperature documented was 38.14 ± 0.6^{0}C. One hundred and fifty-two (89.9%) children were from urban and 17 (10.1%) from rural areas, while 74 (43.7%), 49 (29%) and 46 (27.3%) were from the high, middle and low socio-economic classes respectively.

Table 1: Age and gender distribution of the study population.

Age group (Months)	Gender Female N (%)	Male N (%)	Total N (%)
0-11	27 (42.9)	46 (43.4)	73 (43.2)
12-23	17 (27.0)	21 (19.8)	38 (22.5)
24-35	8 (12.7)	16 (15.1)	24 (14.2)
36-47	4 (6.3)	8 (7.5)	12 (7.1)
48-60	7 (11.1)	15 (14.2)	22 (13.0)
Total	**63 (100)**	**106 (100)**	**169 (100)**

Characteristics of febrile under-fives with positive urine culture

Of the 169 febrile under-fives studied, 62 had positive urine culture giving a prevalence rate of urinary tract infection (UTI) in febrile under-fives as 36.7%.

Positive urine culture was higher among males, 41 (38.7%). There was no statistically significant difference in the prevalence of UTI among children from rural and urban communities. Positive urine culture was observed more in febrile under-fives who resided in urban settlements, 56 (36.8%) and among children aged 12-23 months (42.1%)as shown in Table II.

Urinary tract infection was most prevalent among children from the middle socio-economic class as shown in TableIII.

Table II: Prevalence of UTI according to demographic characteristics

Parameters	Total	UTI Present N (%)	UTI Absent N (%)	χ^2	P value
Gender					
Female	63	21 (33.3)	42 (66.6)	0.486	0.513
Male	106	41 (38.7)	65 (61.3)		
Type of Settlement					
Urban	152	56 (36.8)	96 (63.2)	0.016	0.900
Rural	17	6 (35.3)	11 (64.7)		
Age Group					
0-11	73	25 (34.2)	48 (65.8)		
12-23	38	16 (42.1)	22 (57.9)		
24-35	24	9 (37.5)	15 (62.5)	1.137	0.906
36-47	12	5 (41.7)	7 (58.3)		
48-60	22	7 (31.8)	15 (68.2)		

Table III: Distribution of UTI among febrile under-fives according to socio-economic class.

Socio-economic Class	Total number	UTI Yes N (%)	UTI No N (%)	χ^2	P value
High	74	25 (33.7)	49 (66.3)	0.480	0.488
Middle	49	24 (48.9)	25 (51.1)	4.490	0.034
Low	46	13 (28.3)	33 (71.7)	1.932	0.164
Total	**169**	**62 (36.7)**	**107 (63.7)**		

Clinical features of under-fives with positive urine culture:

Vomiting and cough were the commonest symptoms seen in febrile under-fives with positive urine culture while dysuria and urinary frequency were among the least symptoms. Symptoms referable to the urinary tract was 13 (20.9%), Table IV.

Causative organisms

Of the 62 positive urine cultures, *Escherichia coli* was the commonest organism isolated as shown in Figure 1. There were no mixed organisms obtained from the culture.

Table IV: Common symptoms among febrile under-fives with positive urine culture

Symptoms	No (%)
Vomiting	35 (56.5)
Cough	30 (48.4)
Catarrh	23 (37.1)
Fast breathing	11 (17.7)
Abdominal pain	9 (14.5)
Watery stools	4 (6.5)
Headache	2 (3.2)
Dysuria	2 (3.2)
Urinary frequency	2 (3.2)
Body aches	1 (1.6)
Excessive crying	1 (1.6)

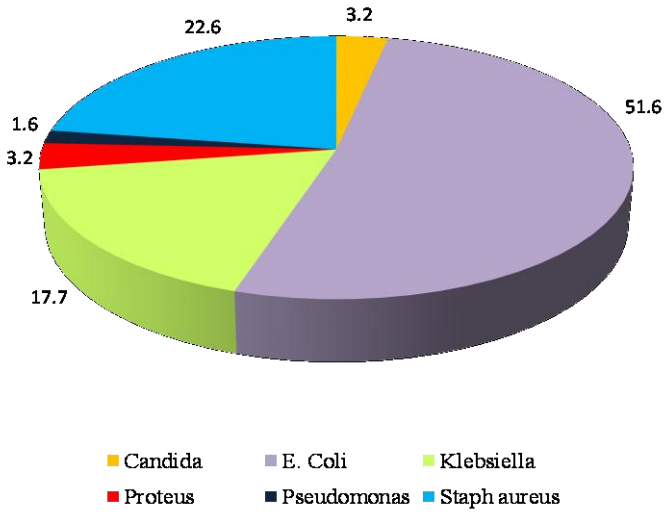

Figure 1: Organisms cultured from the urine.

Antimicrobial sensitivity pattern:

Escherichia coli, the most prevalent organism cultured was most sensitive to nitrofurantoin followed by the quinolones (ofloxacin and ciprofloxacin) and amoxicillin-clavulanic acid, while Staphylococcus aureus the second commonest organism was most sensitive to amoxicillin-clavulanic acid followed by ofloxacin. Both organisms were about 50% sensitive to gentamicin while ceftriaxone sensitivity to the two commonest organisms was less than 50% Figure 2.

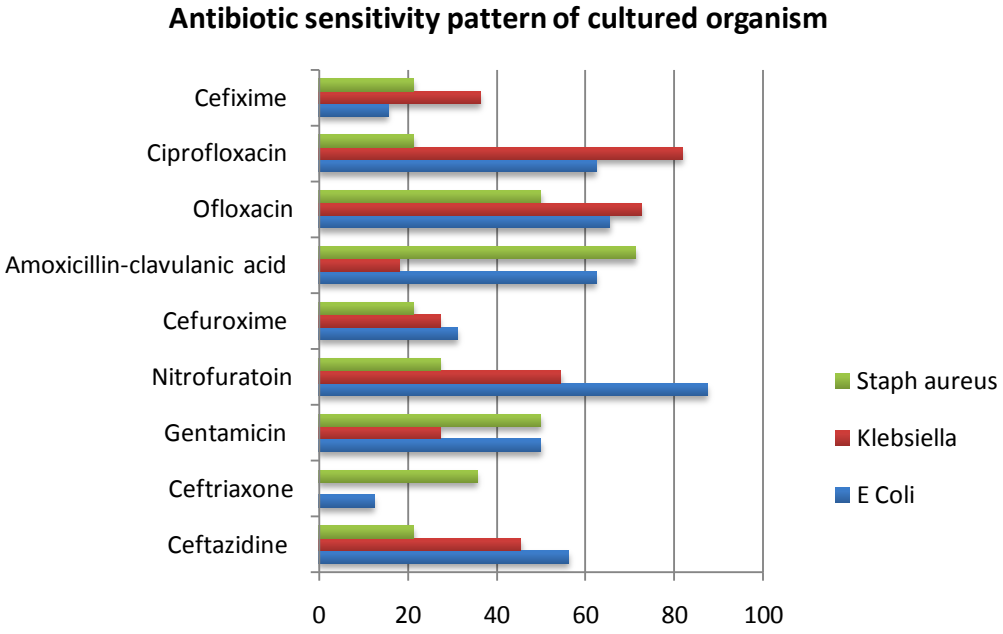

Figure 2: Antimicrobial sensitivity pattern

DISCUSSION

The prevalence of urinary tract infection in febrile under-five children in Port Harcourt of 36.7% is comparable with the 39.7% observed in a similar study in Tanzania[17] but lower than the 43.6% and 44.7% observed in Tanzania[18] and India[19] respectively. This was however much lower than the 16.8%, 11% and 4.6% observed in some other studies in Tanzania[20] and Nigeria[3,7] respectively. These differences in prevalence rates could be attributed to the different geographic regions and methodologies. The much higher temperature cut-off of ≥38 ^{o} C used in the Dar es Salaam, Tanzanian study[20] could account for the much lower prevalence rate observed as against the present study were children with much lower temperature cut-off of ≥37.5^{o} C was used. In the same study, 55.8% of the study population had used antibiotics within 72hours prior to recruitment which could also account for the lower prevalence rate of UTI unlike in the present study where such persons were excluded. The extremely low prevalence rate of UTI of 4.6% observed in Jos, Nigeria[3] could be attributed to the fact that only children with positive nitrite or leukocyte esterase were subjected to microbiological analysis. This is contrary to the present study where all febrile under-fives were subjected to microbiological analysis. The extremely low prevalence of UTI observed in the Jos studies is also not surprising as children below 6 months who are more predisposed to infection due to their more immature immune system were excluded from the study.

Urinary tract infection was commoner in males than in females in the present study. This was however not statistically significant. This observation was comparable to the study in Calabar, Nigeria[21] but was however at variance with other studies[3,7,20,22,23] where females were observed to predominate. The reason for this difference could not be ascertained.

The finding that urinary tract infection was commonest in the younger age groups than the older age groups was also observed in South Eastern Nigeria.[7] This could be attributable to the more immature immune status in the younger age groups as compared to the older age groups, thus predisposing them to increased incidence of infection.

Urinary tract infection was observed more in children living in urban than in rural areas in the present study. This is not surprising as residents in urban areas especially in developing countries are usually faced with over-crowding with its antecedent problem of poor sanitary conditions and hygiene.[24]

The clinical features of urinary tract infection in young children are nonspecific as observed in the present study. Other common symptoms observed in febrile children with UTI were vomiting (56.5%) and abdominal pains (14.5%). Diarrhoea (6.5%), dysuria (3.2%) headache (3.2%) and urinary frequency (3.2%) were however seen less frequently in febrile under-five children with UTI in the present study. A similar study on febrile under-five children showed that vomiting (37.7%) and failure to gain weight (29.1%) were the commonest symptoms while diarrhoea (14.4%), dysuria (12.8%) and increased urinary frequency (1.6%) were also uncommon.[3] An earlier study in Port Harcourt[23] however observed abdominal pain (27.3%) and dysuria (7.6%) as the commonest symptoms after fever. The present study revealed that there was paucity of clinical features (20.9%) referable to the urinary tract in under-fives with urinary tract infection. This was also the case in other studies.[1,2,5,20,23] This could be attributed to the inability of younger children to make effective verbal expressions. This therefore calls for a high index of suspicion and thus febrile under-fives even in the absence of specific urinary symptoms should be investigated for urinary tract infection.

Most of the isolates observed in the present study were gram negative bacteria, the commonest organism being *Escherichia coli.* This was also observed in studies carried out in Tanzania,[17,20,22] India[19] and Nigeria.[1,3,7,21] A much earlier study in Port Harcourt[23] however isolated Klebsiella spp as the commonest organism. This is however not unexpected as the latter study was carried out 19 years ago.

The commonest gram positive organism isolated was *Staphylococcus aureus*. This was also observed in many other studies.[3,7,19,20] The study carried out in Enugu[7] also revealed that *Staphylococcus aureus* was the second commonest organism isolated after *Escherichia coli* as observed in the present study. Contrary to the present study however, *Staphylococcus aureus* was the commonest organism isolated followed by *Escherichia coli* in a study carried out in Benin, Nigeria,[8] whereas, in Maiduguri, North Eastern Nigeria,[2] *Coliforms* was the commonest organism followed by *Escherichia coli*. These differences could be attributable to the difference in geographic locations as well as the different times the researches were carried out.

There were no mixed pathogens isolated in the present study as observed in other studies.[1,8] This suggest the mono-microbial nature of the infection.

Review of the antimicrobial sensitivity of *Escherichia coli* in the present study revealed that nitrofurantoin was the most sensitive antimicrobial followed by amoxicillin-clavulanic acid and the quinolones. Ceftazidine and gentamicin were only about 50% sensitive while ceftriaxone a commonly used antibiotic was less than 15% sensitive. This sensitivity pattern is not very surprising as nitrofurantoin and quinolones are rarely used in the empiric treatment of UTI in our facility whereas ceftriaxone which is commonly used in the unit was one of the least sensitive. Similarly, nitrofurantoin and the quinolones were observed as one of the most sensitive antimicrobials to *Escherichia coli* in a study done in India.[19] A study in Ile-Ife, Nigeria[1] also showed ofloxacin as the most effective antibiotic in in-vitro testing to *Escherichia coli* followed by ciprofloxacin but nitrofurantoin was less than 30% sensitive. Contrary to the present study where ceftriaxone sensitivity to *Escherichia coli* was low, it was however 100% and 50% sensitive to *Escherichia coli* in the studies in Calabar[21] and Jos,[3] Nigeria respectively.

In the present study, amoxicillin-clavulanic acid followed by ofloxacin and gentamicin were the most sensitive antimicrobials to *Staphylococcus aureus,* the second commonest organism isolated in febrile under-fives with UTI. The study in Benin, Nigeria[8] similarly observed co-amoxiclav and ciprofloxacin as highly sensitive to *Staphylococcus aureus.* In North Eastern Nigeria[2] ciprofloxacin and gentamicin were also 100% sensitive to *Staphylococcus aureus.* These differences in anti-microbial sensitivity could be attributed to the different antibiotic prescribing patterns as well as resistance pattern in the different geographic regions.

CONCLUSION

The prevalence of UTI in febrile under-five children in Port Harcourt is high. Thus a high index of suspicion is needed in febrile children even in the absence of symptoms or signs referable to the urinary tract, to reduce long term morbidity and mortality. *Escherichia coli* and *Staphylococcus aureus* were the commonest organisms implicated in UTI among febrile under-fives and they were highly susceptibility to nitrofurantoin and amoxicillin-clavulanic acid.

We therefore recommend that UTI be considered as possible diagnosis in under-fives that present with fever and as such should be actively investigated. Regular audit of urinary tract pathogens and their antimicrobial sensitivity pattern is of utmost importance.

REFERENCES

1. Aiyegoro AO, Igbinosa OO, Ogunmwonyi IN, Odjadjare EE, Igbinosa OE, Okoh AI (2007). Incidence of urinary tract infections (UTI) among children and adolescents in Ile-Ife, Nigeria. Afr. J. Microbiol. Res 7:013-019.
2. Rabasa AI, Gofama MM(2009). Urinary tract infection in febrile children in Maiduguri, North Eastern Nigeria. Niger J Clin Pract; 12: 124-7.
3. Ocheke OI, John CC, Ogbe P, Donli A, Oguche S (2016). The febrile child: How frequent should we investigate for urinary tract infection. Niger J Paed 43: 30-33
4. Yap HK (1994). Disorders of kidney and urinary tract in: Standfield P, Brueton M, Waterson T, eds. Diseases of children in the subtropics; Edward Arnold 186
5. Morton RE, Lawade R (1982). Frequency and clinical features of urinary tract infection in Paediatric out-patient in Nigeria. Ann Trop paediatr 2: 113-7.

6. Eke FU, Eke N (1999). Urinary tract infections. In: Azubuike JC, Nkanginieme KEO, Eds. Paediatrics and child health in tropical region. Owerri: African Educational services326-9.
7. Ibeneme CA, Oguonu T, Okafor HU, Ikefuna AN, Ozumba UC(2014). Urinary tract infection in febrile under five children in Enugu, South Eastern Nigeria. Niger J ClinPract 17:624-8.
8. Okunola PO, Ibadin MO, Ofovwe GE, Ukoh G (2012). Co-Existence of urinary tract infection and malaria among children under five years old: A report from Benin City, Nigeria. Saudi J Kidney Dis Transpl 23:629-34.
9. Wammanda RD, Aikhionbare HA, Ogala WN (2000). Use of nitrite dipstick test in the screening for urinary tract infection in children. West Afr J Med 19: 206-208
10. Akor F, Okolo SN, Agaba E, Okolo A (2009). Urine examination findings in apparently healthy new school entrants in Jos, Nigeria. SAJCH **3**:2.
11. Abdulla AA, Taha AA, Awatif EE, Elnawawy AN, Abdelrahman AH (2014). Screening for urine abnormalities among preschool children in Western Saudi Arabia. Saudi Med J **35**:1477-1481.
12. Yaguo Ide LE (2011). Microalbuminuria: A Review. The Niger Health J 1: 5.
13. Gorelick M, Shaw KN (1999). Screening tests for urinary tract infection in children: A meta-analysis. Paediatrics 104; 54.
14. Olusanya O, Okpere E, Ezimokhai M (1985). The importance of socioeconomic class in voluntary fertility control in a developing country. W Afr J Med4: 205-212.
15. American Academy of Paediatrics (1999). 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. Paediatrics 103:843-852.
16. Okolo AA, Omene JA, Odita JC (1985). Symptomatic urinary tract infection in high-risk Nigerian newborn infants. Ann Trop Paediatr 5:181-4.
17. Festo F, Hokororo A, Kidenya BR, Mahana SE (2011). Predictors of Urinary Tract infection among febrile children attending at Bugando Medical centre, North Western Tanzania. Arch Clin Microbiol 2: 3823-3829
18. Magufwa AF. Epidemiology of urinary tract infection among febrile children under five years in Morogoro municipality, Tanzania, 2016 http://www.suaire.suanet.ac.tz:8080/xmlui/handle/123456789/1408
19. Ravi KCH, Thirupathi RA, Ramesh KB (2017). A study on culture and sensitivity pattern on UTI of febrile children. International J Comtemporary Med Research 4: 1258-1261
20. Fredrick F, Francis JM, Fataki M, Masselle ST (2013). Aetiology, antimalarial susceptibility and predictors of urinary tract infection among febrile under-fives at Muhimbili National Hospital, Da res Salaam, Tanzania. Afr J Microbiol Res 7: 1029-1034
21. Jombo GTA, Odey F, Ibor S, Bolarin DM, Ejezie GC, Egah DZ, Okwori EE, Enenebeaku MNO, Alao OO (2010). Subclinical significant bacteriuria among pre-school children in Calabar municipality: A survey. J Med MedSci 4: 134-140
22. Bahati PM, Stephen EM, Adolfina H, Humphrey D, Mazigo, Domenica M (2014). Prevalence and predictors of urinary tract infection and severe malaria among febrile children attending Makongoro health centre in Mwanza city, North-Western Tanzania. Arch Public Health 70: 4-12
23. Anochie IC, Nkangineme KEO, Eke FU (2014). The influence of instruction about the method of urine collection and storage on the prevalence of urinary tract infection. Nig J Paed 28: 39-42
24. Leon DA (2008). Cities, urbanization and health. Intern J Epidemiol 37: 4-8