

Microbial Isolates from Urine Samples of Patients Presenting with Dysuria and Urinary Frequency at Agbor: Is *Staphylococcus aureus* a Urinary Pathogen?

T.C. Ozoko¹, G.E. Umukoro¹, I. Onyesom^{2*} and S.I. Ovuakporaye³

¹Department of Medical Microbiology and Parasitology, ²Department of Medical Biochemistry,

³Department of Physiology, Delta State University, Abraka, Nigeria.

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Urine samples taken by clean catch method from 210 adults presenting on account of dysuria and urinary frequency between January to June 2006 were analysed. Samples were cultured for 24 hours using MacConkey agar, chocolate agar and cysteine lactose electrolyte deficient agar. Isolates were identified using colony morphologic characteristics, gram stain characteristics, catalase test, coagulase test, indole test, oxidase test, krigler-iron agar, and germ tube test. 81 samples (38.57%) grew at least 10^5 ($\geq 10^5$) colony forming units per ml. The organisms isolated were *Escherichia coli* 36.90%, *Staphylococcus aureus* 25%, *Klebsiella* spp 19.05%, *Proteus* spp 15.48%, *Pseudomonas aeruginosa* 1.19%, *Enterococcus faecalis* 1.19%, *Candida albicans* 1.19%. Male to female ratio of the isolates is 28.4% to 71.6% (1:2.52). The present study shows that *Escherichia coli* is the commonest cause of urinary tract infection. This study shows a relatively high yield of *Staphylococcus aureus* and this suggests that this uncommon commensal of the anterior third of the urethra is a pathogen. Isolation of *Candida albicans* points to the increasing significance of funguria as a component of urinary tract infection. Our data show a significant difference from usual Caucasian patterns.

Key words: Clean catch, commensal, pathogen, funguria.

Urinary tract infection is the second most common reason for presentation to a clinic in the United States of America¹. Its worldwide prevalence has been estimated at 150 million new cases annually². It is also common in Nigeria and other parts of West Africa³. The causative organisms are known to include the enteric gram negative rods (mainly enterobacteriaceae), coagulase negative *Staphylococci* and rarely *Staphylococcus aureus*.

However despite current notion that *Staphylococcus aureus* is a commensal so that isolation of this organism should not be treated, several laboratories have reports of isolation of only *Staphylococcus aureus* from infections of the lower urinary tract. The cardinal symptoms of lower urinary tract infection are acute onset dysuria and frequent urination⁴. The aim of this study is to ascertain the contribution if any of this organism to the causation of lower urinary tract infection and to compare the isolates obtained here with that obtained in western studies.

* To whom all correspondence should be addressed.

MATERIAL AND METHODS

- Adult patients (19-70 years) who presented at Model medical laboratory Agbor with history of dysuria and frequent urination were selected for this study.(january-june 2006)
- Patients obtained the urine samples themselves after the procedure for collecting a clean catch midstream urine sample was explained to them.
- Midstream Urine samples were collected at the laboratory by clean catch method into sterile containers, and inoculation done within fifteen minutes of collection.
- A loopful of urine using a calibrated 1/500ml wire loop was inoculated into MacConkey agar, Chocolate agar, and Cysteine Lactose electrolyte deficient agar and incubated aerobically over 24 hours
- Isolates were identified using colony morphology characteristics, gram stain characteristics, catalase test, coagulase test, indole test, Krigler iron agar, and germ tube test.
- Number of colonies were counted and colony forming units calculated, using the formula below $500 \times$ number of colonies. The results were tabulated, analysed and discussed.

RESULTS

85 samples out of 216 yielded at least 10000 (10^4) to 100000 (10^5) colony forming units(38.57%) 28.4% of the isolates were from male samples and 71.6% of the samples were from

Table 1. Showing distribution of isolates

Organism	Percentage
<i>Escherichia coli</i>	37.64
<i>Staphylococcus aureus</i>	24.71
<i>Klebsiella</i> spp	18.82
<i>Proteus</i> spp	15.29
<i>Pseudomonas aeruginosa</i>	1.18
<i>Enterococcus faecalis</i>	1.18
<i>Candida albicans</i>	1.18

female. 98 sample showed pyuria on microscopy (45.37%).

The male to female ratio of isolates of *Escherichia coli* were 21.9%:78.1%, 93.8% were pure isolates and 6.2% were mixed. The male: female ratio of the isolates of *Staphylococcus aureus* were 52.4%:47.6%, 90.5% were pure isolates and 9.5% were mixed.

DISCUSSION

The results show a relatively low yield of organisms in symptomatic patients, this is likely due to the common habit of unprescribed antibiotic use thereby reducing the chances of obtaining a significant yield of microbes. This may also contribute to the cases of pyuria and symptoms but no growth. This work tended to largely mirror several other studies but with some notable exceptions⁵⁻⁶.

Significant in the results is the absence of coagulase negative *Staphylococci* which is recognized hitherto as a typical uropathogen (along with *Escherichia coli*, *Klebsiella* and *Proteus*) especially in sexually active young women. Results show greater incidence of urinary tract infection in females and is in keeping with previous studies. It is explainable by the unique anatomical features of the female urethra and external urethral meatus plus its proximity to the anal region⁶⁻⁹.

Some authors have noted *Staphylococcus aureus* as a uropathogen¹⁰ and we here report a high percentage of *Staphylococcus aureus* among the isolates. This is more significant considering that in many literature staphylococcal urinary tract infection is mainly a problem of individuals who had urinary tract instrumentation and in cases of upper urinary tract infection¹¹. The higher male to female ratio as well as the uniform collection method and the preponderance of pure isolates show the organism to most probably be the pathogen in these cases. More studies would be needed to ascertain the factors that enabled this commensal of the skin to become a urinary pathogen¹², any strain specificity involved and any other factor necessary for effective treatment. Some western literature appear to recognize this organism as a urinary pathogen¹³.

This work also tries to underscore the need for vigilant surveillance of the microbial world as they are constantly in micro evolutionary flux and patterns of isolates and sensitivities can change at any time.

REFERENCES

1. Chambers S.T, Cystitis and urethral syndromes in Cohen J , Pardely W, Cohen's infectious diseases 2nd ed, U.K; Mosby, 2003; 248-249.
2. Harding G.K.M, Ronald A.R, The management of urinary infection: what have we learned in the past decade? *Int Antimicrob Ag.*, 1994; **4**: 83-88
3. Badoe E.A, Archampong E. Q, Rocha-Afodu J. T, Principles and Practice of Surgery including Pathology in the tropics, 3rd ed, Ghana; Ghana publishing coporation, 2000; 211-212
4. Wilson R.W, Henry N.K, Urinary tract infection in Wilson R.W, Lawrence W et al , Current Diagnosis and Treatment in Infectious Diseases, U.S.A, Mcgraw Hill/Appleton and Lange, 2001; 179.
5. Hope R. A, Longmore J. M, et al , Oxford handbook of clinical medicine, 4th ed, U.K;oxford university press, 1998; 374.
6. Brooks G.F, Butel J.S, Morse S.A, Jawetz, Melnick &Adelberg's Medical microbiology, 23rd ed, Asia;McGraw hill, 2004; 749.
7. Stamey T. A, The role of introit enterobacteria in recurrent urinary infection, *J. Urol.*, 1973; **109**: 467.
8. Gruneberg R.N, Relationship of infecting urinary organism to the faecal flora inpatients with asymptomatic urinary infection. *Lancet.* 1969; **2**: 766.
9. Youmans G. P, Paterson P. Y, Sommers H. M, The biologic and clinical basis of infectious diseases, U.S.A, W.B Saunders, 1975; 426-435.
10. Alonto A, Urinary tract infection in ; Mahan R. C, Lehman D. C, Manuselis G, Textbook of diagnostic microbiology, U.S.A, Saunders, 2007; 1011-1019.
11. Stamm W.E, Urinary tract infections and pyelonephritis in Braunwald E, Hauser S.L et al (eds) Harrison's principles of internal medicine, 15th ed, U.S.A, McGraw hill, pp1620.
12. Cheesbrough M, District laboratory practice in tropical countries, part 2, U.K, Cambridge university press, 2000; 105.
13. Winn W. Jr, Allen S, et al (eds) Koneman's color atlas and textbook of diagnostic microbiology 6th ed , U.S.A, Lippincott, Williams and Wilkins, 2006; 70, 83.