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Review Article

PREVALENCE OF BACTERIAL ISOLATION IN URINE SAMPLES AND THEIR ANTIBIOTIC SUSCEPTIBILITY: A REVIEW

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ABSTRACT

Urinary tract infections (UTIs) can be complicated if not diagnosed early and treated. Bacteriological analysis of urine samples collection, urine samples were collected and classified and analyzed for urinary tract infection (UTI) using pour plate method. The bacterial organisms isolated from the urine samples were characterized and identified using their colony descriptions, morphological and biochemical characteristics. The isolates were subjected to sensitivity test against conventional antibiotics using disc diffusion method.The presence of bacterial isolates with very high resistance to the commonly prescribed drugs leaves the clinicians with very few alternative options of drugs for the treatment of UTIs. So Culture and sensitivity of the isolates from urine samples should be done as a routine before advocating the therapy.

KEYWORDS: *Urinary tract infections, antimicrobial susceptibility,* E. coli, *Broth cultures, Urine analysis.*

INTRODUCTION:

Urinary Tract Infection is classified as the most common and occurring nosocomial bacterial infection in human populations around the world[1-3] UTI is a condition caused by pathogenic invasion of the epithelium, which lines the urinary tract from the minor calyx to prostatic urethra. The proliferation of bacteria in the urothelium can be asymptomatic or symptomatic, which causes inflammatory response and symptomatic case characterized by a wide range of symptoms including, fever, lethargy, anorexia and vomiting [4-9] However, both genders are susceptible to this type of infection, but women are more, as their reproductive anatomy and physiology are more sensitive. Half of all women by 32 years age had experienced at least an infection history [7-10]

Normally, urinary tract urine mostly dominated by *E. coli* 75%- 80%, followed by *S. saprophyticus* 10-15% [11-15]. While, Anatomy or physiological factors cause abnormality of urinary tract and lead to localize infectious bacteria, such as different species of *Klebsiella, Proteus, Enterobacter, Enterococcus, Staphylococcus and Pseudomonas aeruginosa.* Those bacteria are more common in most of the cases, and infrequently cause to uncomplicated cystitis and pyelonephritis[11,12,16]. Furthermore, pathogenesis of Urinary tract is more complicated and influenced by other factors, such as vaginal ecosystem especially *Lactobacillus spp*., intestinal population, genetic and behavioral factors, virulence properties of uropathogens and host defense factors[17-19]. The presence of factors

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will increase opportunity for uropathogens to colonize and invade urothelium[20-22].

More than 95% of urinary tract infections are caused by a single bacterial species. E. coli is the most frequent infecting organism in acute infection[23,24]. *Enterobacter, Staphylococci, Klebsiella, Proteus, Pseudomonas, and Enterococci* species are more often isolated from inpatients, whereas there is a greater preponderance of *E. coli* in an outpatient population[25].

2. MATERIAL & METHODS:

2.1 Study Population/collection Urine samples:

Urine samples were collected from the patients, with age ranging from 18 to 26 years. The collections were randomly selected on everyday basis within the periods of 6.30am to 8.00am. Those patients who were on antibiotic treatment prior to the sampling period were excluded from the study. The urine samples collected were classified based on age, marital status and field of study.

2.2Culturing of the urine Samples:

According to **Obirikwurang et al., 2012,** we can use these particular method for culture the urine samples- The urine samples were cultured using pour plate method (1.0 ml) on Nutrient agar (for total heterotrophic aerobic bacteria count), MacConkey agar (for *Enterobacteriacea* family) and Mannitol Salt Agar (For *Staphylococcus* species). Inoculated plates were incubated inverted at 37°C aerobically for 24 hrs. After incubation, the total heterotrophic aerobic bacterial counts were carried out, and then the plates were sub cultured for further identification.

2.3 Colony counts:

Colonies were counted on Nutrient agar using electric colony counter. A bacterial count of 10 5 per ml was considered significant for urinary tract infection (UTI) and counts of 10 2 104 per ml were considered as suspected bacteriuria while counts less than 10 2 per ml were considered as non-significant bacterial growth **(Obirikwurang et al., 2012)**.

2.4 Preparation of the Test Organisms for Sensitivity Test:

This was carried out using the method of **Obirikwurang et al.(2012).** The isolates were sub cultured on nutrient broth and incubated aerobically at 37°C for 24hrs. Broth cultures of the isolates were centrifuged at 3000 rpm for 10 minutes. The sediments were diluted with sterile phosphate buffer saline (PBS) and adjusted to the 10 8CFU/ml using McFarland matching standard (mixture of 0.6ml of 1% $Bacl_2.H_2O$ and 99.4ml of 1% conc. H_2SO_4) using spectrophotometer at 540nm.

2.5 Bacterial isolation and antimicrobial susceptibility testing:

According to **(Bunchanan and Gribbons, 1974)**A significant bacterial count was taken as count equal to or in excess of 10 5 per milliliter. Identification of pure isolates was done by observing morphological, cultural and biochemical characters according to **Cheesbrough** (2002-2004).

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The isolates were identified by **Bergey s Manual** for Determinative Bacteriology.

2.6 Antibiotic Sensitivity Testing:

According to **IP 2010**, the disc diffusion method was used to carry out the antibiotic sensitivity testing. The test organism was seeded on Mueller Hinton agar using pour plate method, and allowed to solidify. A sterile forceps was used to place the antibiotic sensitivity disc on the surface of the medium. The set-up was incubated aerobically at 37°C for 24 hrs. The inhibition zone diameters were measured using meter rule after 24 hrs incubation and recorded.

We can also use the another method- Antibiotic sensitivity testing was performed using the **Kirby Bauer disc diffusion method**, determining sensitive and resistant bacteria to antibiotics by measuring the diameter of inhibition zone by mm and then compared with the standard diameters that installed in the standard scales. Antimicrobial drug susceptibility testing for Ampicillin 10 g, Amoxicillin/ clavulanic acid (augmentin)20/10 g, Gentamicin 10 g, Cefotaxime 30 g, Ceftriaxone (30 g), Ceftazidime(30mg), Cotrimoxazole 25 g, Ciprofloxacin (5 g), Amikacin 30 g, Nitrofurantoin (300 g)and Norfloxacin (10 g) was done on all bacteria isolated. Interpretation of results was done based on the diameter of the zone.

Bacterial uropathogen isolates from patients with UTIs revealed the presence of high levels of single and multiple antimicrobial resistances against commonly prescribed drugs *E.coli,* which is the predominant cause of UTI, showed high percentage of resistance to ampicillin, cotrimoxazoleceftazidime ciprofloxacin ceftriaxone and norfloxacin and low resistance to Augmentin cefotaxime, Gentamycin,nitrofurantoin but all were sensitive to amikacin. *Klebsiellaspp* which is the second most prevalent pathogen of UTI displayed a similar resistance pattern as of *E.coli* and showed hundred percent resistant to ampicillin however, and all others gram negative isolates were similarly resistant tomost of the antibiotics as that of *E. coli.*[26]

Bacterial infection of the urinary tract is one of the common causes for seeking medical attention in the community. Micro-organisms causing UTI vary in their susceptibility to antimicrobials from place to place and from time to time. So identification of the etiological agent and the selection of an effective antibiotic agent to the organism in question is very important for effective management of patients suffering from bacterial UTIs. UTIs are caused by a variety of microorganisms, including both gram positive and gram negativeones. In our study *Escherichia coli* was predominant isolate followed by *Proteus spp*. and *Klebsiella spp*. respectively. This finding is similar to many reports which indicated that gram negative bacteria mostly *E.coli* and *Proteus spp.* are the commonest pathogens isolated in patient with urinary tract infections.[27]

3. CHARACTERIZATION AND IDENTIFICATION OF THE ISOLATES:

The growth on the mixed culture plates were sub cultured on Nutrient agar and incubated

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aerobically at 37°C for 24 hrs. Growths on the culture media were identified using the colony descriptions of the isolates, morphological characteristics.[28]

4. CONCLUSION:

The systematic representation of urine analysis and isolation of bacteria were identified from patients. Their sensitivity to antibiotics was performed and the activity of antibiotics for inhibiting bacterial growth was at different levels, According to their ability.

5. REFERNCES:

1. Gastmeier P, Kampf G, Wischnewski NA, Hauer T, Schulgen G (1998) Prevalence of nosocomial infections in representative German hospitals. J Hospital Infect 38: 37-49.
2. Najar MS, Saldanha CL, Banday KA (2009) Approach to urinary tract infections. Indian J Nephrol 19: 129-139.
3. Khan IU, Mirza IA, Ikram A, Afzal A, Ali S, et al. (2014) Antimicrobial susceptibility pattern of bacteria isolated from patients with urinary tract infection. J Coll Physicians Surg Pak 24: 840-844.
4. Onu GA, Korir SC, Cheruiyot JC, Ratemo OD, Mabeya BM, et al. (2013) Isolation, identification and characterization of urinary tract infections bacteria and the effect of different antibiotics. J Nat Sci Res 3: 150-159.
5. Gonzalez CM, Schaeffer AJ (1999) Treatment of urinary tract infection: What's old, what's new and what works. World J Urol 17: 372-382.
6. Liang FX, Bosland MC, Huang H, Baptiste S, Deng FM, et al. (2005) Cellular basis of urothelial squamous metaplasia roles of lineage heterogeneity and cell replacement. J Cell Biol 171: 835-844.
7. Foxman B (2003) Epidemiology of urinary tract infections: Incidence, morbidity and economic costs. Am J Med: 113.
8. Weichhart T, Haidinger M, Hörl WH, Säemann MD (2008) Current concepts of molecular defense mechanisms operative during urinary tract infection. Eur J Clin Invest 38: 29-38.
9. Williams G, Craig JC (2011) Long-term antibiotics for preventing recurrent urinary tract infection in children. Cochrane Database Syst Rev.
10. Vasudevan R (2014) Urinary tract infection: An overview of the infection and the associated risk factors. J Micro Exp1: 00008.
11. Balakrishnan, Hill V (2010) Dealing with urinary tract infections. Pharm J 287: 687-690.
12. Ronald A (2003) The etiology of urinary tract infection: traditional and emerging pathogens. Dis Mon 49: 71-82.
13. Stamm WE, Hooton TM (1993) Management of urinary tract infections in adults. N Engl J Med 329: 1328-1334.
14. Kibret M, Abera B (2014) Prevalence and antibiogram of bacterial isolates from urinary tract infections at Dessie Health Research Laboratory, Ethiopia. Asian Pac J Trop Biomed 4: 164-168.
15. Farajnia S, Alikhani MY, Ghotaslou R, Naghili B, Nakhlband A (2009) Causative agents and

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antimicrobial susceptibilities of urinary tract infections in the northwest of Iran. Int J Infect Dis 13: 140-144.

16. Hooton TM (1999) Practice guidelines for urinary tract infection in the era of managed care. Int J Antimicrob Agents 11: 241-245.

17. Schaeffer AJ, Rajan N, Cao Q, Anderson BE, Pruden DL, et al. (2001) Host pathogenesis in urinary tract infections. Infect Dis Clin North Am 17: 245-251.

18. Hooton TM (2000) Pathogenesis of urinary tract infections: An update. J AntimicrobChemother, pp: 1-7.

19. Andreu A (2005) Pathogenesis of urinary tract infections. Enfermedadesinfecciosas y microbiologiaclinica 23: 15-21.

20. Guglietta A (2017). Recurrent urinary tract infections in women: Risk factors, etiology, pathogenesis and prophylaxis. Future Microbiol 12: 239-246.

21. Foxman B (2010) The epidemiology of urinary tract infection. Nat Rev Urol 7: 653-660.

22. Terraf MCL, Tomás MSJ, Rault L, Le Loir Y, Even S, et al. (2017) *In vitro* effect of vaginal lactobacilli on the growth and adhesion abilities of uropathogenic *Escherichia coli.* Arch Microbiol, pp: 1-8.

23. Ronald A. The etiology of urinary tract infection: Traditional and emerging pathogens. Am J Med. 2002;113:14S-9S.

24. Jellheden B, Norrby RS, Sandberg T. Symptomatic urinary tract infection in women in primary health care: Bacteriological, clinical and diagnostic aspects in relation to host response to infection. Scand J Prim Health Care. 1996;14:122-8.

25. Bronsema DA, Adams JR, Pallares R, et al. Secular trends in rates and etiology of nosocomial urinary tract infections at a university hospital. J Urol. 1993;150:414-6

26. Cheesbourgh M. Medical laboratory manual for tropical countries. 2nd ed. England: Butterworth-Heineman Ltd; 2006.

27. 15. Bauer AW, Kirby WMM, Sherris JC, Turck M. Antibiotic susceptibility testing by standard single disc method. Am J ClinPathol. 1966; 45:493–496. [PubMed]

28. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing; 18th informational supplement. Wayne, PA: Clinical and Laboratory Standards Institut;2011.

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