Describing the Major Pathogens Causing UTI Among Patients, The Prevalence Of UTI and Establish Susceptibility Pattern of Antimicrobial Resistance

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Abstract:

Background & Method: The Study was carried out among UTI patients in Index Medical College and Associated Hospital at Khudel Village in Indore that gives healthcare to surrounding area and is used as teaching and referral hospital. The study targeted both male and female outpatients and inpatients presenting with symptoms and signs of UTI which include dysuria, polyuria, fever, nausea, and flank pain were sampled for this study. Baseline demographic data including age, sex, level of education and risk factors such as catheterization, history of UTI, also out and in patients were also collected.

Result: The 385 urine specimens processed, 112(29.0 %) showed significant growth whereas the majority of the urine samples that is 273 (71 %) showed no growth. Fresh samples were collected from patients by mid-stream catch method in sterile universal bottles (Plate 1). The assessment of associated risk factors showed gender ($\chi2$ = 0.116, P=0.0412), age group (P=0.0120), History of UTI ($\chi2$ =0.555, P=0.004) and symptoms of UTI ($\chi2$ =0.895, P=0.017) were significant. Level of education ($\chi2$ =2.742, P=0.523) and catheterization ($\chi2$ =0.17, P=0.054) were not significant.

Conclusion: The prevalence of UTI in Index Hospital was 29.1 %. E. coli was the highest among 120 the isolates. Females had a higher (62.1 %) prevalence of UTI than males (37.9 %). Urinary tract infection was associated with the previous infection and with patients who had the history of catheterization. All isolates were sensitive to nitrofuratoin, cefotaxime and amoxicillinclavulinic acid. High resistance was observed in gentamicin, nalidixic acid, ampicillin and cotrimoxazole. In the 120 isolates were resistant for more than two antibiotics were recorded in 108 (90 %) isolates. Antibiotic susceptibility patterns of all patients with bacterial uropathogens will reduce multidrug resistance.

Keywords: pathogens, UTI, prevalence, susceptibility & antimicrobial resistance.

Study Designed: cross-sectional study.

1. INTRODUCTION

Urinary tract infection (UTI) is the colonization of the urinary tract by pathogenic microorganisms. Infection is caused by fungi, bacteria and viruses. The infection has prolonged admissions in hospital, morbidity in general population and high financial cost implications to the patients[1].

Majority of UTIs are caused by bacteria that are found in the bowel and live as normal flora and often result from faecal and perineal areas. These organisms are capable invading the tissues of the urinary tract and adjacent tissues causing lower urinary tract infections and upper tract infections ([2]Shilpi et al., 2012; [3]Kumar et al., 2013). UTI is a common condition that is found in very young children as well as older people ([4]Manikandan and Amsath 2013). In general population and hospital set up, UTI is a common infection although there are new and more powerful antibiotics in use but bacterial resistance persists ([5]Patel et al., 2012). The spectrum of causative agents and their antimicrobial resistance pattern has been dynamic worldwide ([6]Annapurna and Lakshmi, 2013).

Urinary tract infection may lead to life threatening complications and death ([7]Gupta et al., 2001). Urine culture is the most effective diagnosis of UTI and treatment ([8]Onuoha and Fatokun, 2014). Lower UTI (cystitis) and upper UTI (pyelonephritis) are the two clinical entities mostly found in patients with symptomatic UTI. Lesions caused by UTI are severe and contribute to morbidity in the population resulting in loss of renal function, which leads to long-term illness ([9]Lane and Mobley, 2007).

Microbial colonization of the urinary epithelial cells as well as tissue invasion and multiplication of uropathogens is termed as urinary tract infection (UTI). This is one of the site of bacterial invasions and a number of women have recurrent UTIs at a particular point in their life. Implicated microorganisms, could be bacteria, fungi, protozoa and viruses. Usually bacteria are more prevalent and invasive. The symptoms of UTIs are dysuria, polyuria, burning feeling in the bladder, fever, nausea, flank pain; urine is milky and may have a foul smell[10].

2. MATERIAL & METHOD

The Study was carried out among UTI patients in Index Medical College and Associated Hospital at Khudel Village in Indore that gives healthcare to surrounding area and is used as teaching and referral hospital.

The study targeted both male and female outpatients and inpatients presenting with symptoms and signs of UTI which include dysuria, polyuria, fever, nausea, and flank pain were sampled for this study. Baseline demographic data including age, sex, level of education and risk factors such as catheterization, history of UTI, also out and in patients were also collected. Samples were collected during the period between August 2018 to August 2021.

The study employed a cross-sectional survey design including in and out patients presenting symptoms of UTI were analyzed.

Purposive sampling was used to select patients with UTI symptoms and then simple random sampling was used to select 10 patients per week until sample of 385 was reached. This design was appropriate to the study since it provided baseline information concerning antibiotic susceptibility pattern of bacterial uropathogens inpatients and outpatients in Index Hospital.

3. RESULTS

Table 1: Prevalence of urinary tract infection

Gender	N=385	Frequancy%	Positive	Negative	Chi-Square	P-Value
Male	146	37.9	41	105	0.116	0.0412
Female	239	62.1	71	108		

Of the 385 urine specimens processed, 112(29.0 %) showed significant growth whereas the majority of the urine samples that is 273 (71 %) showed no growth. Fresh samples were collected from patients by mid-stream catch method in sterile universal bottles (Plate 1). The assessment of associated risk factors showed gender ($\chi2$ = 0.116, P=0.0412), age group (P=0.0120), History of UTI ($\chi2$ =0.555, P=0.004) and symptoms of UTI ($\chi2$ =0.895, P=0.017) were significant. Level of education ($\chi2$ =2.742, P=0.523) and catheterization ($\chi2$ =0.17, P=0.054) were not significant.

Table 2:

Age Groups	N=385	Frequancy%	Positive	Negative	Chi-Square	P-Value
1-14	32	8.3	8	24	2.918	0.012
15-24	124	32.2	39	85		
25-34	125	32.4	35	90		
45-54	68	17.7	22	46		
55 and above	24	6.2	4	20		

The age between 25-34 years had the highest number of positive samples 125 (32.4 %) followed the age between 15-24 years which had 124 (32.2 %). Age group of 55 and above had least number of positive

Table 3:

History of UTI	N=385	Frequancy%	Positive	Negative	Chi-Square	P-Value
Yes	341	88.6	99	242	0.555	0.004
No	42	10.9	12	39		

History of Urinary Tract infection was present in most of the patients.

4. DISCUSSION

The prevalence of urinary tract infections among patients in Index Hospital was 29.1 %. However, this study is in agreement with other reports which stress that UTI in Kenyatta National Hospital, Nairobi was 26.7 % and in Khartoum North Hospital, Sudan it was 14.0 %

and Addis Ababa, Ethiopia was 11.6 % (Kolawole et al., 2009) which were lower rates than that of Nakuru Level 5 Hospital. The prevalence rate of UTI in females was 62.1 % higher than in males (37.9 %) in this study[11]. This high prevalence of UTI in females is comparable to prevalence rates of 64 % in females and 36 % reported in Kenya. This could be due to the tendency of men buying antibiotics without prescription in chemists, local shops, supermarkets and from street vendors (Sosa et al., 2012). This was lower than the prevalence reported from Isfahani, Province, Iran (71 % female and 29 % male), in Mubi General Hospital and Yola-Nigeria (74 % female and 36 % male). The high prevalence of infection in females (62.1 %) reported in this study is due to short urethra in females which may predispose them to ascending infection. Most women normally clean perineum area backward from the anus to the vulva instead of forward from vulva to the anus that can cause urinary tract infection. This practice keeps bacteria from getting into the urethra after a bowel movement. Sexual activity moves microorganisms from bowel to vaginal cavity and then urethral opening thus increasing the chances of prevalence of UTI in female patients from organisms that are normal flora of perianal and vaginal regions[12].

There is a need to have high standard of cleanliness in females which will help in reducing the incidence of UTI. The presence of antimicrobial substances in prostatic fluid in males and longer urethra make them less prone to UTIs There was no significant difference between patient's level of education and UTI (P=0.523). This is because they were equally infected. This agrees with studies carried out in Tanzania and Sudan. The prevalence of UTI in patients with previous history of infection was significantly higher than of those without previous history (p=0.004).The results agreed with studies carried out in Pakistan due to the presence of multidrug resistant microorganisms from those who had a previous history of UTI. This might be due to presence of resistance strains from those who had previous history of urinary tract infection. The prevalence of UTI among the patients with previous history of catheterization was significantly higher than those without history of previous catheterization (P=0.0504). These findings were in agreement with previous report in Gonder and was associated with predisposing factors such long duration of catheterization and contamination of the urinary system during inserting of caterers.

5. CONCLUSION

The prevalence of UTI in Index Hospital was 29.1 %. E. coli was the highest among 120 the isolates. Females had a higher (62.1 %) prevalence of UTI than males (37.9 %). Urinary tract infection was associated with the previous infection and with patients who had the history of catheterization. All isolates were sensitive to nitrofuratoin, cefotaxime and amoxicillinclavulinic acid. High resistance was observed in gentamicin, nalidixic acid, ampicillin and cotrimoxazole. In the 120 isolates were resistant for more than two antibiotics were recorded in 108 (90 %) isolates. Antibiotic susceptibility patterns of all patients with bacterial uropathogens will reduce multidrug resistance.

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