



ISOLATION AND CHARACTERIZATION OF PATHOGENIC BACTERIA CAUSING URINARY TRACT INFECTION (UTI) IN SYMPTOMATIC FEMALES OF REPRODUCTIVE AGE GROUP

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ABSTRACT Urinary tract infection (UTI) is one of the most common infections afflicting women. UTI often accompanies vaginal infections and is frequently caused by pathogens originating in the digestive tract. UTI is caused by pathogenic invasion of the urinary tract which leads to an inflammatory response of the urothelium. UTIs occur in otherwise healthy individuals with no structural or functional urinary tract abnormalities. The main source of the micro-organisms is the individual's own faecal flora. The aim of this study was to isolate and characterize pathogenic bacteria causing urinary tract infection (UTIs) in females of reproductive age group. This is a cross-sectional prospective study carried out in JR Hospital and Research Institute, Manipur. A total of 100 urine samples from female patients in the reproductive age group of 18-45 years constituted the study sample size. Clean catch midstream urine samples were taken in sterile containers and inoculated on different culture medium such as Cystine Lactose Electrolyte Deficient (CLED) agar and MacConkey agar by using calibrated loop (0.001/ml). All positive isolates were then identified at the species level by their colony characteristics, gram-staining reaction and the pattern of biochemical profiles using the standard microbiological techniques. This study shows the need to raise awareness of UTI and to increase the services for preventing UTI by maintaining proper hygienic conditions.

KEYWORDS : Urinary tract infection, Isolation, Characterization, Pathogens, Reproductive age group.

INTRODUCTION

A urinary tract infection (UTI) is characterized by the presence of more than 100,000 microscopic cells in 1 mL of urine and accompanied by clinical symptoms of cystitis, pyelonephritis and asymptomatic bacteria (Badr and Shaikh, 2013). UTIs occur at different ages and among both sexes, but its incidence in females is higher than that of males, considering the female urethra, its proximity to the anus, and hormonal activity (Anuli et al., 2016). It is estimated that about 10-20% of women suffer from UTIs (Lee et al., 2015). Most cases of UTIs are caused by bacteria, especially gastrointestinal bacteria, which infects the urethra through contaminating the area that surrounds the rectum and spreading to the bladder (Anuli et al., 2016). Since the uterus sits directly on the top of the bladder, the increased weight of the uterus, as it grows, can block the drainage of urine from the bladder which results in an infection (Foxman, 2002). However, other factors include upper extremities and increased urinary urethral recurrence as well as reduced bladder size due to uterine contraception which increases the filtration rate thus stressing on the kidneys (Flores et al., 2015). Some of the main and common causes of UTIs are "*Escherichia coli*, *Staphylococcus* spp., *Streptococcus* spp., *Proteus* spp., *Klebsiella* spp., *Corynebacterium*, *Neisseria* and *Pseudomonas* spp. The severity of a UTI depends both on the virulence of the bacteria and on the susceptibility of the host (Hannan et al., 2012). The significance of this study is that UTIs can be particularly dangerous in pregnant women among whom it has been shown that up to 50% of those with Asymptomatic Bacteriuria (ABU) go on to develop pyelonephritis.

UTIs can be classified as uncomplicated or complicated (base on the factor that triggers the infection) or primary or recurrent (depending on the nature of occurrence) (Vasudevan, 2014). UTI can be asymptomatic or symptomatic, characterized by a wide spectrum of symptoms ranging from mild burning micturition to bacteremia, sepsis or even death (Gonzalez and Schaeffer, 1999; Stamm and Hooton, 1993; Foxman, 2003).

MATERIALS & METHODS

Population And Sample Of The Study:

Population of the study comprised of 100 specimens which were collected from JR Hospital and Research Institute, Manipur. Freshly voided midstream urine samples (10-20 ml) were collected from patients in wide mouth sterile container.

Sampling Technique Used:

The samples collected from JR Hospital and Research Institute, Manipur were from females of reproductive age group (18- 45). The convenience sampling technique was used to identify the study.

Analysis of specimen:

All the urine specimens were subjected to culture for quantitative and

qualitative assessment of bacteria. Quantitation was performed by standard calibrated loop method. Urine specimens obtained were inoculated on Cystine-Lactose-Electrolyte-Deficient Agar (CLED) agar and MacConkey agar by using calibrated loop (0.001/ml). Cultures were incubated in aerobic atmosphere at 37C for 24 hrs. A positive urine culture was defined as having colony count $>10^5$ cfu/ml for midstream urine. All positive cultures with significant bacteriuria were then identified at the species level by their colony characteristics, gram-staining reaction and the pattern of biochemical profiles using the standard microbiological techniques (Kass, 1956).

Table1: Distribution Of UTI Cases Between The Age Group 18 – 45 (JR Hospital & Research Institute)

Sl. No	Age groups	No. of cases	Positive cases	Negative cases	Prevalence (%)
1	18- 25	30	9	21	30
2	26- 35	37	11	26	29.7
3	36-45	33	10	23	30.3
		Total 100	30	70	30

Table 2: Morphological And Biochemical Characteristics Of The Isolates

Characters	Name of the organism		
	<i>E. coli</i>	<i>Klebsiella</i> spp.	<i>Proteus</i> spp.
Gram reactions	-ve	-ve	-ve
Shape	Cocci/bacilli	Rod/ Bacilli	Bacilli
Motility	Motile	Non- motile	Motile
Colony dia. (mm)	2-3	2-4	1-2
Elevation	convex	convex	convex
Consistency	Non -mucoid	Mucoid	Non- mucoid
Colour on MacConky Agar	Pink /red	Pink – red	Pale/ colorless
Colour on CLED	Yellowish	Yellow / yellowish- white	Translucent blue -green
Indole	+ ve	-ve	-ve
Citrate	-ve	+ve	+ve
Catalase	+ ve	+ve	+ve
Urease	-ve	+ve	+ve
Oxidase	-ve	-ve	-ve
TSI	A/A	A/A Gas	-

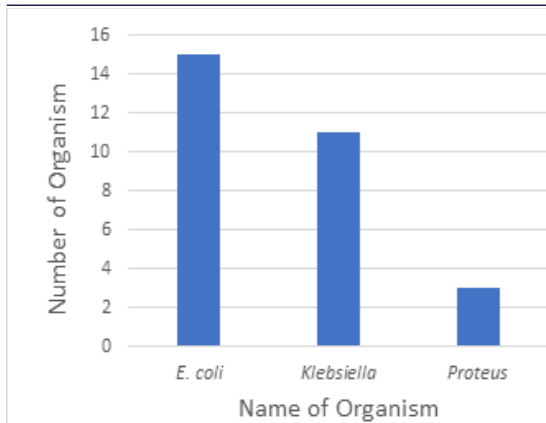


Figure 1: Distribution of pathogenic species causing UTI among study population

Table 3: Number Of Pathogenic Bacteria Causing UTI Among The Study Population

Sl. No.	Number of Organism	Total of organism
1	<i>E. coli</i>	15
2	<i>Klebsiella spp.</i>	11
3	<i>Proteus spp.</i>	3

RESULT & DISCUSSION

A total of 100 urine samples were analyzed for isolation and identification of bacterial isolates as per standard methods. The distribution of UTIs as per the demographic characteristics i.e., age groups was also studied and is presented in Table 1. From the results it was seen that UTI was more prevalent in the age group (18- 45) years. The first age group was between 18-25 year which show 30% of incidence of UTI. The second age group was between 26-35 year which show 29.7% of incidence of UTI. The third age group was between 36-45 year which show 30.3% of incidence of UTI.

In the present study three different types of bacterial isolates were isolated from the urine samples. The organisms were identified according to Standard Conventional Method (Table No. 2). The frequency of pathogens and ranking order is shown in Fig.1. Distribution of pathogenic species causing UTI among study population, *Escherichia coli* was the most common etiological agent of UTI in our study. *Klebsiella* spp. was found to be the second predominant organism and the third most common organism was *Proteus* spp.



Figure 2: Morphological and Biochemical Test: A) Showing MacConkey Agar plate with lactose fermenting (pink) and non-lactose fermenting (colourless) colonies.



B) Oxidase test positive (left) & negative (right)



C) Biochemical test of Enterobacteriaceae: Indole test positive, Citrate test negative, Urease test positive and Triple Sugar Iron (TSI) A/A Gas.

CONCLUSION

UTI is a serious public health problem, if untreated. The burden of UTI among females of reproductive age group are more among those who presented with the symptoms of UTI. The symptoms of UTI can bring about a great discomfort to the patients resulting in a compromised quality of life. Early detection and treatment of UTIs help avoid complications, and lessen the patient's pain, length of stay in the hospital, and economic loss. This study shows the need to raise awareness of UTI and to increase the services for preventing UTI by maintaining proper hygienic conditions.

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