

STUDY OF BACTERIURIA AMONG PREGNANT WOMEN ATTENDING A TERTIARY CARE HOSPITAL IN PANIPAT DISTRICT, INDIA

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ABSTRACT

Most common population at risk for both symptomatic urinary tract infection (UTI) and asymptomatic bacteriuria, however, is sexually active women. Although asymptomatic infection in this group does not clearly produce serious medical problems, it may be a predictor of future symptomatic infection. Women are more susceptible to infection than men because of the shorter length of the female urethra. Perineal bacterial microbiota that originate in the gastrointestinal tract are the usual pathogens, especially if the bacteria possess factors that facilitate their binding to the uroepithelium. Sexual intercourse facilitates entry of the bacteria into the female urethra. Pregnant women are extra at risk of expand UTIs due to physiological adjustments within the urinary tract. UTI constitute severe threats to human health worldwide and hundreds of thousands of the humans affected every year. The aim of this study was to know the prevalence and antimicrobial susceptibility pattern of isolates in pregnant female patients. A total two hundred pregnant and non-pregnant females patients had been included on this study after obtaining the consent. Under strict aseptic precautions midstream urine samples had been taken from all sufferers. All the samples had been processed with the aid of using the usage of standard bacteriological methods i.e. wet mount, inoculation on blood agar and MacConkey's agar after which diagnosed with the aid of using standard biochemical tests, antibiotic sensitivity trying out changed into completed with the aid of using Kirby Bauer's disc diffusion method. In this study 80 out of 200 females patient i.e. 40% were showed UTI of which a most of 20 to 30 years age group had a considerably better occurrence of UTI i.e. 56.25%, while the age group of 60 years and above suggests the lowest contamination rate i.e. 2.5% as compared to others. Females belonging to lower socioeconomic status had been extra liable to UTI then others. Pregnant females were more prone to UTI then non-pregnant females i.e. 52.73% and 35.17% respectively. Amongst pregnant females, primigravida and those in the first and second trimesters had been at higher risk. All isolates had been sensitivity to ampicillin+sulbactam, sparfloxacin, and gatifloxacin. Our study mentioned that the prevalence of UTIs was 40%; the pregnant female patients were more prone to UTI than non-pregnant females. The most isolated microorganism had been *Escherichia coli* which was maximum accountable for UTIs. The sexually active age group 26-30 years was highly at risk of UTI. Females belonging to lower socioeconomic status had been extra liable to contamination. Pregnancy was one in each of the predisposing elements for UTI. All isolates had been confirmed sensitivity to ampicillin+sulbactam, sparfloxacin, and gatifloxacin.

KEYWORDS:- Urinary Tract Infections, Bacteria, Antibiotic Sensitivity Testing, Panipat.

INTRODUCTION

The urinary tract is divided into the upper urinary tract, composed of the kidneys, renal pelvis, and

ureters, and the lower urinary tract that consists of the urinary bladder and the urethra. Upper urinary tract infections are most commonly ascending (i.e., infections originate in the urinary bladder and ascend through the ureters to the kidneys). Normally, the vesicourethral valve prevents reflux of urine from the urinary bladder into the ureters. Individuals with urogenital anomalies or with overdistention of the urinary bladder from outflow obstruction, neurogenic

malfunctions, or pressure from an enlarged uterus during pregnancy are particularly susceptible to ascending urinary tract infections. Infections of the renal pelvis (pyelitis) and kidney (pyelonephritis) are the most common complications. The infections can be acute or can be recurrent with chronic inflammatory damage. Upper urinary tract infections (UTIs) less commonly result from hematogenous spread of bacteria into the renal cortex in patients with septicemia. Multifocal abscesses or acute suppurative pyelonephritis are common manifestations. UTI is one of the maximum regularly occurring ailment affecting

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humans from all age groups consisting of neonate and geriatric age groups. Every 12 months approximately a hundred and fifty million humans are being recognized with urinary tract infection worldwide. Each and each lady has an entire life chance of growing UTI is 60%; via way of means of contrast, guys have an entire life chance of most effective 13%. (1,4)

UTI is the maximum not unusualplace acute contamination which happens in females. Females are extra often laid low with UTI (specifically cystitis) because of colonization of the urethra via way of means of Gram-negative bacilli especially *Escherichia coli*, the proximity of the urethra to anus, a quick duration of the urethra (approximately 4cm), and in the course of sexual intercourse micro organism may also introduce into the bladder. Three-quarters of UTIs arise in pregnant girls and one and area in non-pregnant females (5).

Pregnant females are extra inclined than non-pregnant females to increase UTIs due to physiological adjustments withinside the urinary tract in the course of being pregnant. Beginning withinside the sixth weeks attaining a height via way of means of twenty second to twenty fourth weeks about 90% of pregnant female increase urethral dilation, a good way to stay till her delivery. Increased bladder distension and decreased bladder tone, coupled with decreased urethral tone, contribute to increased urinary stasis and ureteral reflux. High rates of incidence occur in certain conditions, such as diabetes or pregnancy. In the elderly, higher rates of occurrence can be expected for both women (20%) and men (10%) in whom predisposing conditions exist, such as obstructive uropathy from the prostate in men, poor emptying of the bladder from uterine prolapse in women, and procedures that require instrumentation in both men and women (6,7)

A foreign body, such as an indwelling urinary catheter, guarantees colonization of the catheter within five days of placement. The presence of a colonized catheter results in asymptomatic bacteriuria and puts the patient at risk for developing symptomatic infection, including pyelonephritis and urosepsis. When the patient is also afflicted with dementia, as many elderly individuals are, it may be difficult to ascertain whether the infection is symptomatic. Without fever and leukocytosis the only indicators may be subtle changes in personality or mentation (4).

UTIs, particularly those with ascending infections, symptoms consistent with lower tract infections develop first. The differentiation is important because the approach to antimicrobial chemotherapy differs for the two conditions (8,9). The regular urinary tract is proof against bacterial colonization and commonly

removes microorganisms swiftly and efficiently. The pH, chemical content, and flushing mechanism of urine enables to get rid of organisms withinside the urethra. (10). Significant bacteriuria may also every so often arise withinside the absence of signs and symptoms and pyuria in sufferers who in the end broaden signs and symptoms of UTI e.g. pregnancy. Bacteria can be absent (e.g. in absence of previous chemotherapy) or indicates a low bacterial remember (102 to 104 in step with ml of midstream urine) in symptomatic sufferers. Culture remember ought to be interpreted approximately the medical records approximately the patient. Thus some specimens from symptomatic sufferers with real infections may also comprise few as 103 possible bacterial/ml and if the prevalence of the infection may be proven to be minimal, their sensitivity ought to be examined their presence stated as likely or probably great (10).

MATERIALS AND METHODS

A total of 200 female patients, including pregnant women showing symptoms of urinary tract infections, were enrolled in the study at NC Medical College and Hospital OPD in Panipat's Israna, and each patient's medical history was recorded in separate form. It is preferable to collect a clean middle course urine sample in a sterile bottle before administering the antibiotic. The patient was instructed to clean the genitals with soap and water before collecting the sample.

The periurethral area and perineum are first cleansed with two or three gauze pads saturated with soapy water, using a forward-to-back motion, followed by a rinse with sterile saline or water. The labia should be held apart during voiding, and the first few milliliters of urine passed into a bedpan or toilet bowl to remove bacteria from the urethra. The midstream portion of urine is then collected in a sterile, wide-mouthed container that can be covered with a tightly fitted lid. (5) Examined the sample for physical and microscopic examination. In the presence of pyuria cells (showing significant pyuria), urine samples were mixed appropriately and inoculated into blood agar and MacConkey agar using a calibrated standard loop to produce 0.001 ml of urine. The inoculated plate was incubated at 37 °C for 48 hours. Samples showing more than 100 colonies were considered important and bacterial identification was performed by standard microbiological methods. (5) Antibiotic susceptibility testing was performed using the Kirby Bauer disc diffusion method according to CLSI guidelines (11,12).

Ethical clearance was obtained from the Institutional Ethical committee of N.C. Medical College and Hospital, Panipat before starting the study.

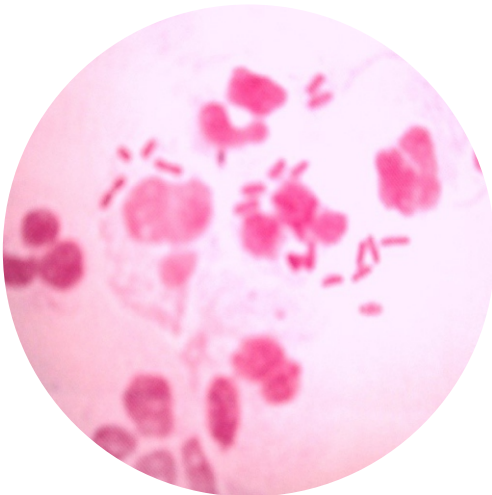


Fig.1: Gram Negative Bacilli along with Pus Cells Seen in 100x



Fig.4: Antibiotic Sensitivity Pattern of Gram Negative Bacteria



Fig.2: MacConkey's Agar Plate Showing LF Mucoid Colonies

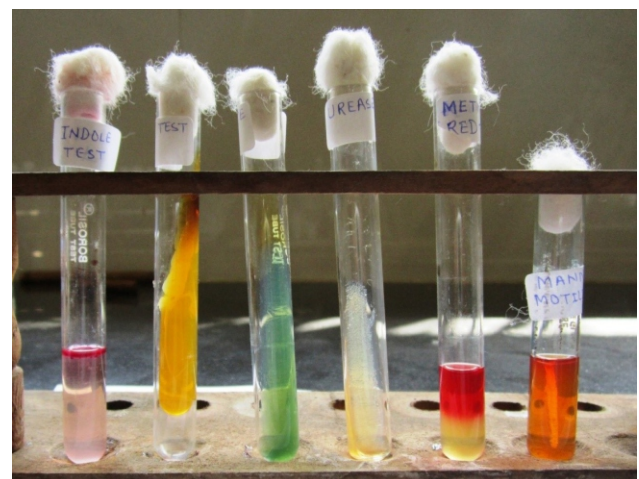


Fig.5: Biochemical Reaction for Escherichia coli



Fig.3: Blood Agar Plate Showing Golden Yellow Colour Colonies with Beta Haemolysis



Fig.6: Biochemical Reaction for Klebsiella Species

S. No.	Name of Organisms isolated	Total number	Percentages (out of 89)
1	<i>Escherichia coli</i>	44	49.44%
2	<i>Staphylococcus aureus</i>	15	16.85%
3	<i>Pseudomonas aeruginosa</i>	9	10.11%
4	<i>Enterococcus</i> species	7	7.87%
5	<i>Klebsiella</i> species	5	5.62%
6	Coagulase Negative Staphylococci	4	4.49%
7	<i>Acinetobacter</i> species	3	3.37%
8	<i>Proteus vulgaris</i>	2	2.25%
Total		89	100%

Table 7: Shows Distribution of Bacterial Isolates Associated With UTI.

Name of organism	AS 20 mcg (%)	CIP 5 mcg (%)	LZ 30 mcg (%)	GEN 10 mcg (%)	L 2 mcg (%)	CF 30 mcg (%)	RO 15 mcg (%)	TE 30mcg (%)	COT 25 mcg (%)	LE 5 mcg (%)	VA 30 (%)
<i>Staphylococcus aureus</i> (n=15)	15 (100)	9 (60)	15 (100)	10 (66.67)	7 (46.67)	13 (86.67)	4 (26.67)	11 (73.33)	7 (46.67)	12 (80)	15 (100)
<i>Enterococcus</i> spp. (n=7)	6 (75)	2 (25)	8 (100)	4 (50)	5 (62.5)	6 (75)	1 (12.5)	7 (87.5)	2 (25)	2 (25)	3 (37.5)
CoNS (n=4)	4 (100)	2 (50)	4 (100)	4 (100)	3 (75)	4 (100)	3 (75)	4 (100)	1 (25)	3 (75)	4 (100)

Table 8: Shows Antibiotic Sensitivity Pattern of Gram Positive Bacteria In UTI Cases.

Abbreviation for Antibiotic – AS=Ampicillin + Sulbactam, CIP= Ciprofloxacin, LZ= Linezolid, GEN= Gentamicin, L=Lincomycin, CF= Cefotaxime, RO= Roxithromycin, TE= Tetracycline, COT= Co-trimoxazole, LE= Levofloxacin, VA= Vancomycin.

Name of organism	AS 20 mcg (%)	COT 25 mcg (%)	CN 30 mcg (%)	CZX 30 mcg (%)	TE 30 mcg (%)	CIP 5 mcg (%)	C 30 mcg (%)	NIT 300 mcg (%)	SPX 10 mcg (%)	GAT10 mcg (%)	NX 10 mcg (%)	OF 5 mcg (%)
<i>E. coli</i> (n=44)	34 (77.27)	17 (38.64)	30 (68.18)	17 (38.64)	17 (38.64)	9 (20.45)	22 (50)	31 (70.45)	44 (100)	44 (100)	22 (50)	22 (50)
<i>Pseudomonas</i> spp. (n=9)	5 (55.56)	4 (44.44)	6 (66.67)	4 (44.44)	3 (33.33)	1 (11.11)	3 (33.33)	4 (44.44)	8 (88.89)	9 (100)	5 (55.56)	4 (44.44)
<i>Klebsiella</i> spp. (n=5)	2 (40)	1 (20)	5 (100)	5 (100)	5 (100)	2 (40)	2 (40)	1 (20)	5 (100)	5 (100)	1 (20)	2 (40)
<i>Acinetobacter</i> spp. (n=3)	2 (66.67)	1 (33.33)	2 (66.67)	1 (33.33)	0 (0)	0 (0)	0 (0)	1 (33.33)	2 (66.67)	2 (66.67)	1 (33.33)	2 (66.67)
<i>Proteus</i> spp. (n=2)	2 (100)	0 (0)	1 (50)	2 (100)	2 (100)	1 (50)	1 (50)	2 (100)	2 (100)	2 (100)	2 (100)	1 (50)

Table 9: Shows Antibiotic Sensitivity Pattern of Gram Negative Bacteria

RESULTS

This study was conducted to determine the incidence of urinary tract infections in pregnant and non-pregnant women. A total of 200 women were included in the study, 140 were not pregnant and 60 were pregnant. The incidence of UTI in pregnant and non-pregnant females was 80 out of 200 i.e 40%. (Table 1) In our study, of 80 UTI cases, peak cases were 45 (56.25%) in the 20-30 year-old group, followed by 23 (28.75%) in the 31-40 age group.(Table 2) Also, the maximum number of UTI patients, i.e. 44 patients (55%) came from lower socio-economic groups. (Table 3) In our study the pregnant female patients were more prone to UTI than non-pregnant females i.e. 52.73% and 35.17% respectively (Table 4).

Total No of Samples	No. of Positive for UTI	Percentages (%)
200	80	40%

Table 1: Shows Prevalence of Urinary Tract Infection.

Age group (years)	Patients with UTI n = 80	Percentages (%)
20 – 30	45	56.25%
31 – 40	23	28.75%
41 – 50	6	7.50%
51 - 50	4	5.00%
60 & above	2	2.50%
Total	80	100%

Table 2: Shows age wise distribution of pregnant and non-pregnant female patients.

Socio economic status	Patients with UTI n = 80	Percentages (%)
High	11	13.75%
Middle	25	31.25%
Lower	44	55%
Total	80	100%

Table 3: Shows Socio Economic Status of Pregnant and Non-pregnant Female Patients.

In our study pregnant females had the highest incidence of UTI was in primigravida i.e. 38%, followed by secondgravida 29% and multigravida 16%. (Table 5) Our study showed that the pregnant female patients had the highest incidence of UTI in the first and second trimesters i.e. 39% and 38% respectively. (Table 6)

In our study bacteria, isolates were *Escherichia coli* (49.44%) followed by *Staphylococcus aureus* (16.85%), *Pseudomonas aeruginosa* (10.11%), *Enterococcus* species (7.87%), *Klebsiella* species (5.62%), Coagulase Negative Staphylococci (4.49%), *Acinetobacter* species (3.37%) and *Proteus vulgaris* (2.25%) (Table 7).

All isolates had been sensitivity to ampicillin, ulbactam, sparfloxacin, and gatifloxacin. (Table 8).

Total No. of samples 200	Sample	Patients with UTI n = 80	Percentages (%)
Pregnant females	55	29	52.73%
Non-pregnant female	145	51	35.17%

Table 4: Shows Incidence of UTI in Females Patients.

Gravida	No. of Patients	Patients with UTI	Percentages (%)
Gravida I (primigravida)	40	15	38%
Gravida II (secondgravida)	35	10	29%
Multigravida	25	4	16%
Total	100	29	29%

Table 5: Shows Incidence of Uti In Pregnant Females-Effect of Gravida.

Trimster	No. of Patients	Patients with UTI	Percentages (%)
1st	38	11	29%
2nd	21	8	38%
3rd	41	10	24%
Total	100	29	29%

Table 5: Shows Incidence of Uti In Pregnant Females-Effect of Gravida.

Abbreviation for Antibiotic – AS=Ampicillin + Sulbactam, COT= Co-trimoxazole, CN= Cephalexin, CZX=Ceftizoxime, TE= Tetracycline, CIP= Ciprofloxacin, C= Chloramphenicol, NIT= Nitrofurantoin, SPX= Sparfloxacin, GAT= Gatifloxacin, NX= Norfloxacin, OF= Ofloxacin

DISCUSSION

A total of 200 female patients were included in the study, 140 non-pregnant and 60 were pregnant women. The incidence of UTI in pregnant and non-pregnant females was 80 out of 200 i.e 40%. (Table 1) Singh et al. (2013) (15) reported that the prevalence rate of urinary tract infection was 32.5%. In our study, of 80 UTI cases, peak cases were 45 (56.25%) in the 20-30 year-old group, followed by 23 (28.75%) in the 31-40 age group. (Table 2) Also, the maximum number of UTI patients, i.e. 44 patients (55%) came from lower socio-economic groups. (Table 3) A study by Lavanya et al. (2002) (7) Reported a higher incidence of UTI in patients in the low-income group compared to the high-income group. In this study the pregnant female patients were more prone to UTI than non-pregnant females i.e. 52.73% and 35.17% respectively. (Table 4) However, the incidence in this study was higher than that reported by Nath et al. (1996) (13), Little et al. (1996) (14), and Lavanya et al. (2002) (7). In our study females had the highest incidence of UTI was in primigravida i.e. (38%). A study by Nath et al. (1996) reported a higher prevalence of UTI in primigravida (9).

In our research bacterium, the isolate was *Escherichia coli* (49.44%) followed by *Staphylococcus aureus* (16.85%), *Pseudomonas aeruginosa* (10.11%), *Enterococcus* species. (7.87%), *Klebsiella* species (5.62%), Coagulase Negative Staphylococci (4.49%), *Acinetobacter* species (3.37%) and *Proteus vulgaris* (2.25%). (Table 7) Nath et al. (1996) *E. coli* was reported to be the most common isolate responsible for causing UTI (13). Another study by Singh et al. (2013) reported that the common bacteria were isolated i.e. *Escherichia coli* (33.85%) followed by Coagulase negative staphylococci (16.92%), Enterococci, (15.38%), *Staphylococcus aureus* (10.77%), *Klebsiella pneumoniae* (7.69%) and *Klebsiella oxytoca*, *Acinetobacter baumannii* and *Citrobacter diversus* was (1.54%) each (15). Lavanya et al. (2002) (7) and Sarwar et al. (2013) (16) reported that *Escherichia coli* were the most common bacteria causing urinary tract infection.

In our study, *Enterococcus* species isolates from UTI showed maximum sensitivity to Linezolid followed by Tetracycline, Ampicillin+Sulbactam, Cefotaxime, and Lincomycin whereas minimum sensitivity towards

Roxithromycin followed by Cotrimoxazole and Levofloxacin. *Staphylococcus aureus* isolates showed maximum sensitivity to Ampicillin+Sulbactam, Cefotaxime, Ciprofloxacin, Tetracycline, Levofloxacin and Linezolid, and minimum to Gentamicin, Roxithromycin, and Lincomycin. *Streptococcus* species isolate showed maximum sensitivity to Linezolid followed by Ampicillin+Sulbactam, Lincomycin, and Vancomycin whereas it showed minimum sensitivity to Co trimaxazole, Ciprofloxacin. Coagulase negative *Staphylococcus* isolates showed maximum sensitivity to Linezolid followed by Ampicillin+Sulbactam, Cotrimoxazole, Cefotaxime, Levofloxacin, Gentamicin, Lincomycin, Vancomycin, Roxithromycin, Tetracycline, whereas it showed minimum sensitivity to Ciprofloxacin. *Escherichia coli* isolates from UTI showed maximum sensitivity to Sparfloxacin and Gatifloxacin followed by Ampicillin + Sulbactam and Nitrofurantoin whereas it showed minimum sensitivity to Ciprofloxacin followed by Cotrimaxazole, Tetracycline, and Ceftizoxime. *Pseudomonas* species isolates from UTI showed maximum sensitivity to Gatifloxacin followed by Sparfloxacin, Cephalexin whereas it showed minimum sensitivity towards Ciprofloxacin followed by Tetracycline and Chloramphenicol. *Acinetobacter* species isolates from UTI showed maximum sensitivity to Gatifloxacin followed by Sparfloxacin, Cephalexin, Ampicillin + Sulbactam, and Ofloxacin whereas it was resistant to Ciprofloxacin and Chloramphenicol. The *Klebsiella* species isolated from UTI were most sensitive to gatifloxacin, then sparfloxacin, cephalexin, ceftizoxime, and tetracycline, but co, trimoxazole. , Nitrofurantoin, and norfloxacin showed minimal sensitivity. The *Proteus* species isolated from UTI were most sensitive to gatifloxacin, followed by sparfloxacin, ceftizoxime, tetracycline, nitrofurantoin, and norfloxacin. , Cotrimoxazole and cephalexin were minimally sensitive.

Singh et al. (2013) (15) reported that amikacin, ampicillin/sulbactam, sparfloxacin and gatifloxacin were highly susceptible to common pathogens. Lavanya et al. (2002) (7) reported that the organisms were sensitive to Cephalexin, nitrofurantoin, amoxicillin, and norfloxacin in decreasing order.

CONCLUSION

Our study mentioned that the prevalence of UTIs was 40%; The pregnant female patients were more prone to UTI than non-pregnant females i.e. 52.73% and 35.17% respectively. The most isolated microorganism had been *Escherichia coli* which was maximum accountable for UTIs. The sexually active

age group 26-30 years was highly at risk of UTI. Females belonging to lower socioeconomic status had been extra liable to contamination. Pregnancy was one in each of the predisposing elements for UTI. All isolates had been confirmed sensitivity to ampicillin+sulbactam, sparfloracin, and gatifloxacin.

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