

A Study of Bacteriological Profile of UTI in a Tertiary Care Hospital in Western U.P., IndiaAmit Kumar^{1*}, Divya Sharma², Muzaffari Yasmeen³, Swati Verma⁴¹M.D. (Microbiology), Associate Professor, Microbiology, Rama Medical College Hospital & Research Centre, Hapur, U.P, India²M.Sc. (Biotechnology), Lecturer, Biotechnology, Dr. Kedarnath Modi Institute of Pharmaceutical Education and Research, Ghaziabad, U.P, India³M.D. (Microbiology), Professor & HOD, Microbiology, Rama Medical College Hospital & Research Centre, Hapur, U.P, India⁴M.Sc. (Biotechnology), Department of Biotechnology, Multanimal Modi College, Ghaziabad, U.P, India

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Corresponding author: Dr. Amit Kumar

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Abstract:**Introduction:** Urinary tract infection ranges in severity from asymptomatic (which is carrier status in the urine) to symptomatic acute infections of the kidney with resultant sepsis. This study was done to determine Prevalence of UTI, bacteriological profile and antimicrobial susceptibility of organism causing UTI and to evaluate the rate of CAUTI.**Material and Methods:** All samples were processed by standard microbiological procedures including wet mount of urine, Culture on CLED Media, Morphology, Gram Stain, Motility, Biochemical test and Antimicrobial susceptibility test.**Results:** Prevalence of UTI was found to be 25.7%. CAUTI was found in 25% of UTI. There were 32% Gram positive cocci, 63.5% Gram negative bacilli and 4.5% Candida species isolated.**Conclusion:** Increasing multidrug resistance in bacterial uropathogens is an important and emerging public health problem. The UTI standard treatment guidelines must be adjusted accordingly.**Keywords:** UTI, CAUTI.

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Introduction

Urinary tract infection is the term applied to a variety of clinical conditions ranging in severity from asymptomatic (which is carrier status in the urine) to symptomatic acute infections of the kidney with resultant sepsis.

UTI describes microbial colonization of the urine and infection of the structures of the urinary tract-Kidney, renal pelvis, ureters, bladder and urethra, as well as adjacent structures such as the perinephric fascia, prostate, and epididymis. About 150 million people are diagnosed with UTI each year worldwide. The prevalence of UTI ranges from 17.1% to 53.8% (D. Prakash and R. S. Saxena, 2019, M. Dash, S. Padhi et.al, 2013).

In 20-30% of sepsis patients, the infection originates from the urinary tract, and urosepsis often develops from UTI acquired in a community or hospital. The mortality rate of severe sepsis is 20%-42%.

Types of UTI

- Upper UTI- Includes acute pyelitis & Acute Pyelonephritis.
- Lower UTI- Includes Urethritis, Cystitis and Prostatitis

Symptoms of upper UTIs include:-Pain and tenderness in the upper back and sides, Chills, fever, nausea.**Symptoms of Lower UTIs include:-**Burning with urination, increased frequency of urination without passing much urine, increased urgency of urination, bloody urine, Cloudy urine, urine that has a strong odour, pelvic pain in women, rectal pain in men.

UTI can additionally be classified according to whether it is uncomplicated (occurring in the normal urinary tract of immunocompetent individuals, usually young healthy non-pregnant women) or complicated (occurring in individuals that are immunocompromised or have genitourinary tracts with structural or functional abnormalities).

Risk Factors: The complicated UTI is a UTI in the setting of an underlying conditions or factors which increases the risk of treatment failure: - some of these factors include:

- Sex
- Age
- Diabetes
- Pregnancy
- Hospital acquired infection
- Renal stone
- Presence of catheter, stent
- Functional or anatomical abnormality of urinary tract
- History of UTI in childhood
- Renal Transplantation

Sexually active females are more prone to UTI due to short urethra proximity to the anus. The incidence of UTI among young sexually active women has been found to be 0.5-0.7 per person-year. The lifetime risk of UTI among women has been found to be 60% (K. Ejrnaes, 2011)

The diagnosis of UTIs begins with the screening of patients clinically suspected of having UTI due to their claiming with problems suggestive of UTIs by a physician. Determination of the number and types of bacteria in urine is an extensively important diagnostic procedure. Bacteruria is regarded as significant when the urine contains 10^5 organisms or more per ml (10^8 /litre) in pure culture. Sample of urine from the ureters, or renal pelvis may contain, $<10^5$ bacteria/ml and yet indicate infection.

Wet mount of urine is useful in diagnosis of UTIs. Pyuria is the presence of an increased number of Pus cells (WBC) in urine (generally >5 WBC/hpf) and is evidence for genitourinary tract inflammation.

E.coli is the primary pathogen, accounting for 75 to 90% (Dogra V, 2012) of the infection followed by Staphylococcus species that constitute to 10-15 % (Dogra V, 2012). In addition, bacterial species Klebsiella, Pseudomonas, Proteus, and Enterococcus species play a minor role in conferring the infection.

Increasing multidrug resistance in bacterial uropathogens is an important and emerging public health problem. The Infectious Disease Society of America (IDSA) identified some microorganisms for new effective therapies. Those microorganisms were called "ESKAPE pathogens" which include Enterococcus faecium, S. aureus, Klebsiella spp., Acinetobacter spp., Pseudomonas spp., and Enterobacter spp. increasing drug resistance in UTI needs regular monitoring of the antibiotic susceptibility of uropathogens in a particular area. The prevalence of multidrug resistant bacteria is 25%. A higher percentage of MDR isolates was also observed among elderly patients (30.2%).

The etiology of urinary tract infection and the antibiotic resistance pattern of uropathogens have been changing over the past years. Resistance to commonly prescribed antibiotics for UTI is an expanding global problem both in developed and developing countries. So, this study was done to determine Prevalence and bacterial profile of organism causing urinary tract infections in different wards of Rama Medical College Hospital and Research centre, Hapur.

Materials and Methods

Place of Study - The study was carried in department of Microbiology in Rama Medical College, Hospital & Research Centre, Hapur.

Duration of study - Samples were collected from 1-February 2022 to 30- July 2022 from the inpatient departments of the hospital.

Inclusion criteria- All IPD patients Suspected of UTI

Exclusion Criteria- All OPD patients

Clinical History - For diagnosis of UTI we took into consideration the history of patients. The information extracted included -

1. Risk Factors

- Pregnancy
- Presence of Catheter
- History of UTI in childhood
- Diabetes
- Renal failure/Renal Stone

2. Associated Symptoms

- Frequency
- Dysuria
- Fever

Sample - Urine samples were collected in variety of ways according to the collection site and patient type.

- 1) Midstream Clean Catch Urine
- 2) Suprapubic Aspiration
- 3) Catheterized Urine

Majority of samples were midstream urine, and other included catheterized urine samples and suprapubic aspirates.

Sample Processing

Urine samples collected were transported to laboratories as soon as possible. In chance of delay it was refrigerated at 4°C. All collected samples were processed by standard microbiological procedures including direct wet mount of urine, culture on CLED (Cystine Lactose Electrolyte Deficient Medium) agar, morphology, Gram stain, motility, biochemical test and antimicrobial susceptibility test.

To determine the degree of Pyuria, direct wet mount of urine sample was made and WBCs were counted per high power microscopic field (HPF). Pyuria was defined by the presence of a significant number of WBCs on microscopic urinalysis (>5/HPF).

Culture – Streak Culture (Surface Plating) - Streaking the agar plate for isolation is performed on selective media (CLED Agar) so that certain types of microbes are encouraged to grow, while others are inhibited.

All the culture plates were incubated at 37°C aerobically for 18-24 hrs. When the growth was obtained on CLED medium, the identification of the responsible pathogen was done by the observation of colony characteristics such as Shape, Size, Elevation, Margins, Surface, Edges, Colour, Consistency and Emulsifiability. Gram staining was used to identify Gram negative bacteria and Gram positive bacteria, their morphology (cocci or bacilli), shape (circle, oval

and rod) & any specific arrangement (chain, cluster or pair).

Motility Test was done by Hanging Drop Preparation. Biochemical identification was done by Catalase, Coagulase, Oxidase, Indole, MR, Citrate, Urease, Triple Sugar Iron (TSI) tests.

Antimicrobial Susceptibility Test (AST)

Antimicrobial susceptibility testing was done by using the Kirby –Bauer Disc Diffusion method. Presumptive identification was done on the basis of Gram Stain, Catalase, Coagulase, Oxidase and Motility.

The bacterium was swabbed on the Mueller-Hinton agar and the antibiotic discs were placed. The zone of inhibition of each antibiotic is measured; known as zone size. The zone sizes are looked up on a standardized chart to give a result of sensitive, resistant, or intermediate using CLSI, 2022 M100-Ed32.

Antibiotic Discs

Antibiotics (GPC)	µg	Antibiotics (GNB)	µg
• Ampicillin(AMP)	10	• Amikacin(AK)	30
• Amoxicillin-clavulanate (AMC)	20/10	• Amoxicillin-clavulanate (AMC)	20/10
• Ciprofloxacin(CIP)	5	• Cefepime(CPM)	30
• Cefoxitin(CX)	30	• Ceftriaxone(CTR)	30
• Clindamycin(CD)	2	• Cefuroxime(CXM)	30
• Ceftazidime(CAZ)	30	• Ciprofloxacin(CIP)	5
• Doxycycline(DO)	30	• Fosfomycin(FO)	200
• Erythromycin(E)	15	• Gentamicin(GEN)	10
• Gentamicin(GEN)	10	• Imipenem(IPM)	10
• High level Gentamicin(HLG)	100	• Meropenem(MRP)	10
• Linezolid(LZ)	30	• Nitrofurantoin(NIT)	300
• Nitrofurantoin(NIT)	300	• Tobramycin(TOB)	10
• Trimethoprim sulfamethoxazole(COT)	1.25/ 23.75	• Trimethoprim-sulfamethoxazole (COT)	1.25/ 23.7
• Tetracycline(TE)	30		
• Vancomycin(VA)	30		

Results

In the study period from 1 February 2022 - 30 June 2022, 892 urine samples were collected from patients who were admitted in different wards of Rama Medical College, Hospital and Research centre Hapur.

Sex Distribution

A total of 892 urine samples were cultured, among the all samples 295(36%) were male and 597(72.01%) were females.

Table 1: Distribution of Patients according to their Age Group & Sex

Age	Male	Female	Total
Below 12	29	45	74
12 To 18	45	79	124
18 To 50	116	383	499
Above 50	105	90	195
Total	295	597	892

Majority of Patients were between 18-50 yrs(60.1%) followed by above 50 yrs(21%), 12 to 18 yrs(13.9%), and below 12yrs(8.29%)

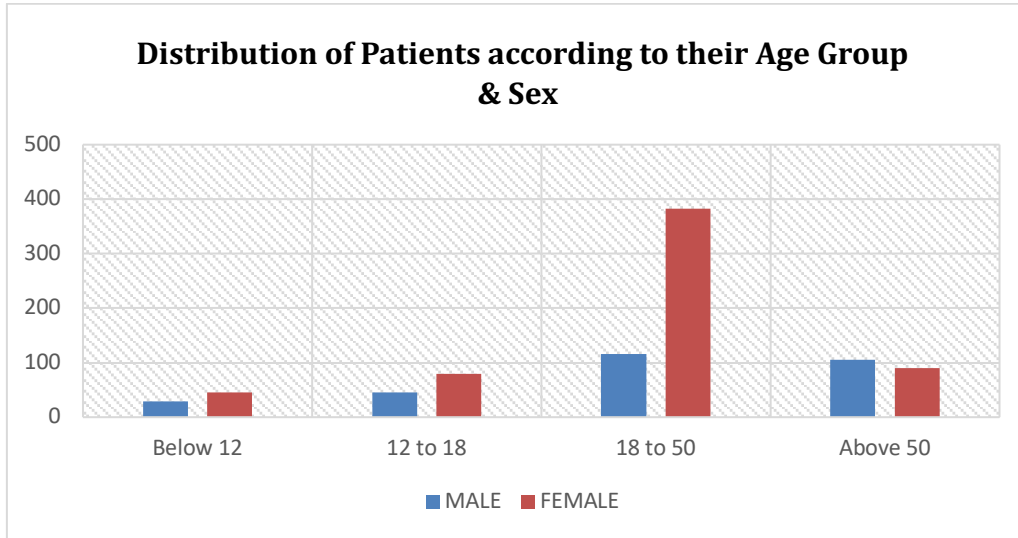


Figure 1: Distribution of Patients according to their Age Group & Sex

Table.2: Number of Samples Collected From Patients in Different Wards

Ward Name	No. of Samples
Obstetrics & Gynae Ward	228
Pediatrics Ward	74
Female Surgery Ward	142
Male Surgery Ward	79
Male Medicine Ward	86
Female Medicine Ward	123
Intensive Care Unit	83
Neurosciences	4
TB& Chest	24
Orthopaedic	49
Total	892

Majority of samples collected from patients admitted in Obs & Gynae ward is 27% (228) followed by Female surgery ward 17.1% (142), Female medicine ward 14.8% (123), Male medicine ward 10.3%(86), Intensive Care Unit 10.2% (83), Male surgery ward 9.5% (79), Pediatrics ward 8.9%(74) and 6%(49) were from the Orthopaedic ward, least no. of patients were from the TB & Chest 3% (24) and Neurosciences ward 0.5%(4).

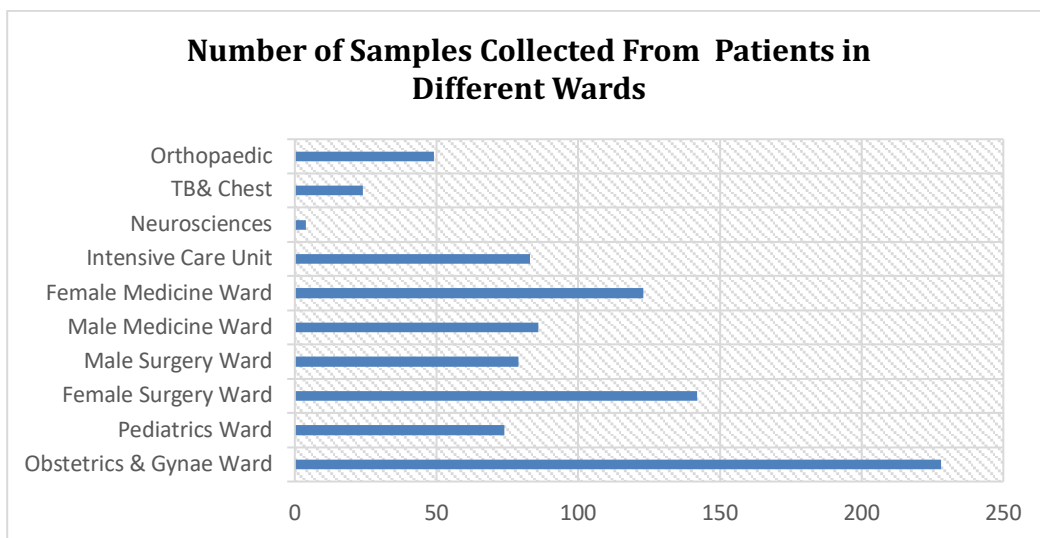


Figure 2: Number of Samples Collected from Patients in Different Wards

Table 3: Results of Direct Microscopy (Wet Mount)

Wet Mount Finding	No. of Patients	Percentage
Total No. of Samples	892	(100%)
Pus Cell	783	(87.7%)
Epithelial Cell	549	(61.5%)
Microorganism	203	(22.7%)

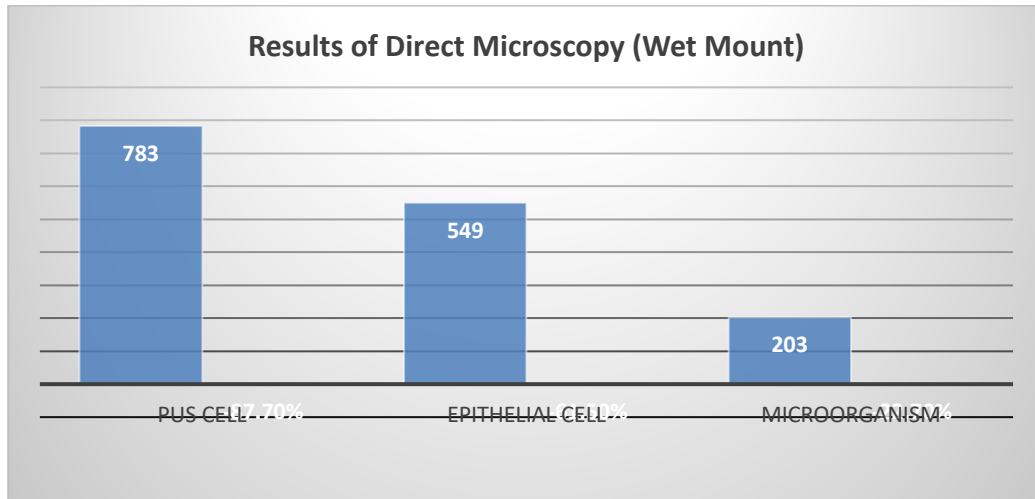


Figure 3: Results of Direct Microscopy (Wet Mount)

Table 4: Significant Pyuria

Pus Cell/hpf	No. of Patients	Percentage
1-5	540	68.9%
6-10	195	24.9%
>10	48	6.20%
Total	783	100

>5 Pus cells/ hpf was seen in 243patients (27.24%).

Culture Results

Table5: Culture Result

Results	No. of Patients	Percentage
Positive	243	25.7%
Negative	649	74.3%
Total	892	100%

A total of 892 urine samples were cultured, of which 243(27.24%) samples were positive and 649(72.7%) were negative. Among the culture-positive cases, 192 (21.52%) were females and 51(5.71%) were males.

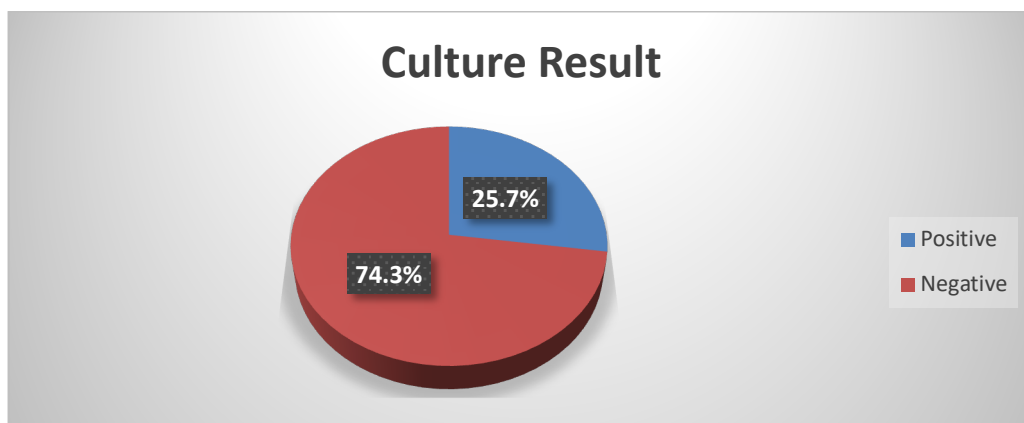


Figure 4: Culture Result

Table 6: Distribution of Culture Results According to Sex

Gender	Positive	Negative	Total
Male	51	244	295
Female	192	405	597
Total	243	649	892

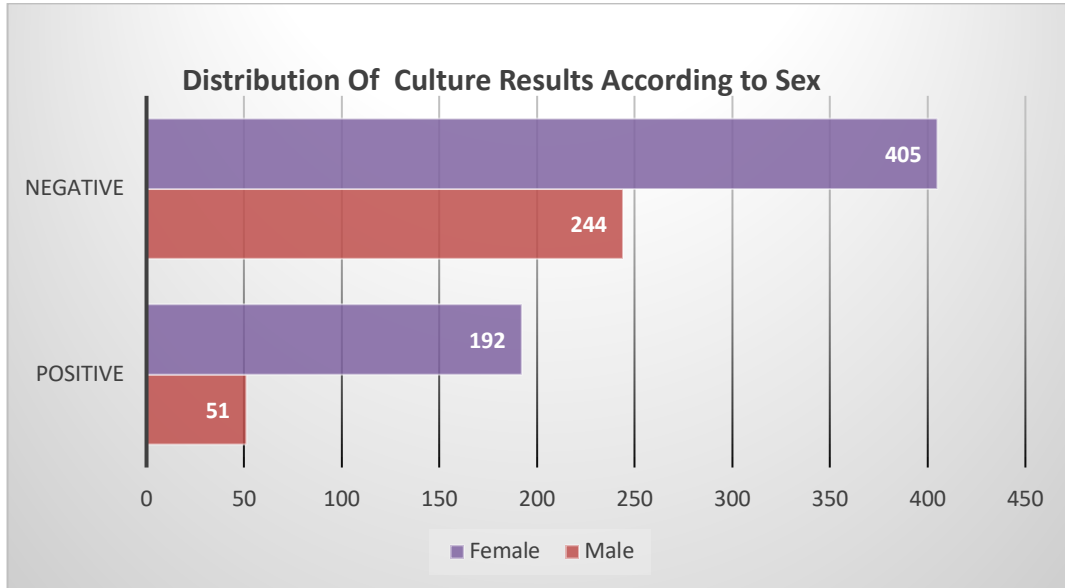


Figure 5: Distribution Of Culture Results According to Sex

Table 7: Distribution of Culture Results according to Age Group

Age	Positive	Negative	Total
Below 12yr	19	55	74
12 to 18yr	35	89	124
18 to 50yr	170	329	499
Above 50yr	19	176	195
Total	243	649	892

Majority of Positive Patients Age group were between 18-50 yrs (69.95%), followed by 12 to 18 yrs (14.40%), below 12 yrs (7.81%), and above 50yrs (7.81%)

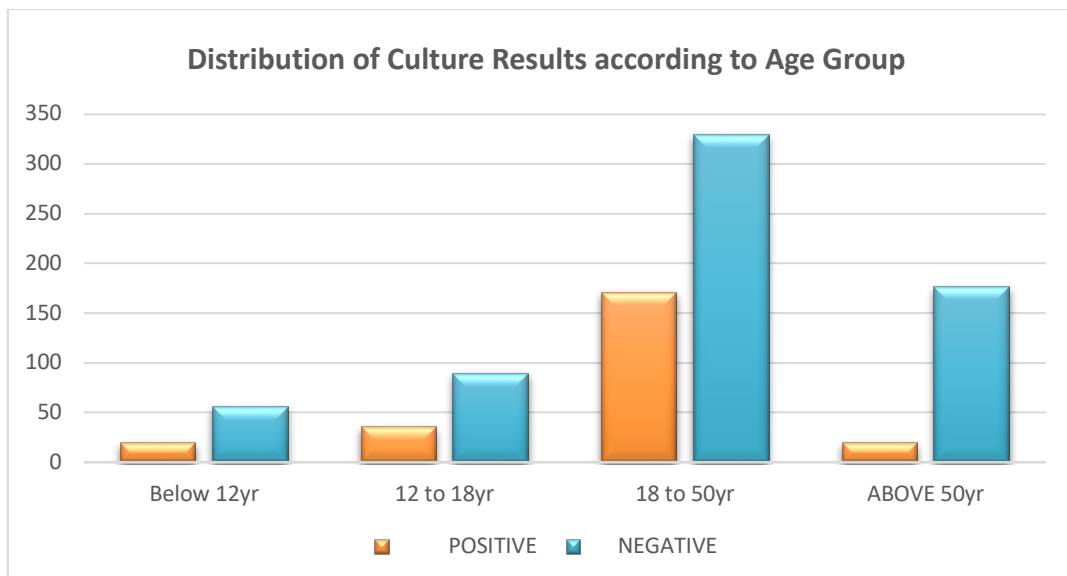


Figure 6: Distribution of Culture Results according to Age Group

Table 8: Culture Positivity in Pregnant Women

Pregnancy	Positive	Negative	Total
Pregnant	17	8	25
Not Pregnant	173	399	572
Total	190	407	597

Out of total 25 pregnant females UTI was present in 17 (8.94%).

Table 9: Correlation of Associated Clinical History with Positive Urine Culture

Serial no.	Clinical History		Culture Positive	Culture Negative	Total
1	Diabetes	Diabetic	23	74	97
		Non-Diabetic	220	575	795
2	Kidney Failure	Present	28	18	46
		Absent	215	613	846
3	Hyper tension	Present	23	156	179
		Not present	220	493	713
4	Colitis	Present	22	119	141
		Absent	221	530	751
5	Chronic Kidney Disease	Present	96	61	94
		Absent	147	588	798
6	Hypothyroidism	Present	33	61	94
		Absent	210	588	798
	Total		243	649	892

Out of total Diabetic patients there were 23 (9.46%) were culture positive patients and 220 (90.53%) were Non-Diabetic culture positive patients. Among the Kidney Failure cases 28 (11.52%) patients were found culture positive. Among the Hypertension cases 23 (9.46%) patients

were culture positive. Among the Colitis cases 22 (9.04%) patients were culture positive. Among the Chronic Kidney Disease cases 96 (39.50%) patients were found culture positive Among the Hypothyroidism cases 33 (13.58%) patients were culture positive.

Table 10: Correlation of Associated Risk Factors with Positive Urine Culture

Serial no.	Risk Factors		Culture Positive	Culture Negative	Total
1	Catheterised Patients	Present	56	189	245
		Absent	187	460	467
2	History of UTI in childhood	Present	21	206	227
		Absent	222	443	665
3	History of Renal Stone	present	52	228	280
		absent	191	421	612
4	Urethral stricture	present	52	31	83
		Not present	191	618	809
5	Cystitis	Present	22	88	116
		Absent	215	561	776
	Total		243	649	892

Among the culture positive cases 56 (23.04%) were positive in catheterized-patients and 187 (77.77%) were positive in non-catheterized-patients.

Among the culture positive cases patients the History of UTI in childhood was present in 21 (8.64%) patients and 222 (91.35%) patients had no history of UTI in childhood. Among the culture positive cases 52 (21.39%) patients had renal stone

whereas 191(78.60%) were culture positive in absence of renal stone.

Among the culture positive cases Urethral Structure was present in 52 (21.39%) patients and was absent in 31 (12.75%) patients who had UTIs. Among the culture positive cases Cystitis was present in 28 (11.52%) patients and was absent in 88 (36.21%) patients who had UTIs.

Table 11: Correlation of Associated Symptoms with positive Urine Culture

Serial no.	Clinical Features		Culture Positive	Culture Negative	Total
1	Frequency	Normal	25	468	493
		Increased	142	61	203
		Decreased	76	120	196

2	History of UTI in childhood	Present	21	206	227
		Absent	222	443	665
3	Dysuria	present	171	414	585
		absent	72	235	307
4	Fever	present	175	214	389
		Not present	68	435	503
5	Haematuria	Present	32	55	87
		Absent	211	594	805
	Total		243	649	892

Among the culture positive cases Normal Frequency of urine was found in 25 (2.8%) 142 (15.9%), and decreased frequency of urine was found in 76 (8.5%) In total positive culture patients Dysuria was present in 171 (70.37%) patients and absent in 72 patients (29.62%). Among the culture

positive cases fever was present in 175 (72.01%) patients and was absent in 68(27.98%) patients who had UTIs. Among the culture positive cases Haematuria was present in 32 (13.16%) patients and was absent in 55 (22.63%) patients who had UTIs.

Table 12: Distribution of Total Isolates

Isolates	No. of Isolates	Percentage
Gram positive cocci	95	38.6%
Gram negative bacilli	139	57.2%
Candida spp.	9	3.7%
Total	243	100%

There were 139 Gram Negative bacilli (57.2%), 95 Gram positive cocci (38.6%) whereas fungal isolates, (Candida spp.) were isolated in 9 (3.7%) cases.

Table 13: Distribution of Bacterial Isolates

Bacterial Isolates	No. Of Isolates	Percentage
Escherichia coli	89	36.6%
Klebsiella species	39	16.5%
Staphylococcus aureus	35	14.4%
MRSA	27	12%
Enterococcus species	21	8.6%
CONS	12	4.9%
Candida	9	3.7%
Pseudomonas species	7	2.8%
Proteus species	4	1.6%
Total	243	100%

Nine different types of bacteria were isolated. Of the 243 isolates, E.coli was isolated in 89 (36.6%) cases and found to be most common. This was followed by Staphylococcus aureus in 35 (14.4%).

Antimicrobial Susceptibility Pattern of Gram Negative Bacilli

Gram Negative bacteria were tested against thirteen antibiotics.

Escherichia coli was highly sensitive to Nitrofurantoin (91%) and Fosfomycin (84.2%) and showed high resistant to Cefuroxime (67.41%) and Cefepime (59.5%).

Klebsiella Species was highly sensitive Nitrofurantoin (82%), and Fosfomycin (74%) and showed high resistant to Ciprofloxain (56%) and Ceftazidime (53%).

Pseudomonas Species was highly sensitive to Nitrofurantoin (100%) and Tobramycin (100%) and showed high resistance to Amikacin (80%) and Meropenem (80%).

Proteus species was highly sensitive to Gentamicin (100%), Imipenem (100%) and showed high resistance to Ceftazidime (100%), Amoxyclav (100%).

Table 14: Antimicrobial Susceptibility Pattern of E.coli & Klebsiella pneumoniae

Group	Antibiotics	Escherichia coli (n=89)			Klebsiella species (n=39)		
		S	I	R	S	I	R
Aminoglycosides	Amikacin	68 (76%)	5 (5.6%)	16 (17.9%)	25 (64.1%)	6 (15%)	8 (20%)
	Gentamicin	71 (79.7%)	6 (6.7%)	12 (13.4%)	22 (56.4%)	4 (10%)	13 (33%)
	Tobramycin	61 (68.5%)	9 (10.1%)	19 (21.3%)	17 (43.5%)	5 (12%)	17 (43%)
Penicillin	Amoxyclav	49 (55%)	-	40 (44.9%)	12 (30%)	7 (18%)	20 (51.2%)
Cephalosporin	Ceftazidime	36 (40.4%)	-	53 (59.5%)	18 (46%)	-	21 (53%)
	Cefepime	21 (23.5%)	15 (16.8%)	53 (59.5%)	15 (38%)	6 (15%)	18 (46%)
	Cefuroxime	21 (23.5%)	8 (8.9%)	60 (67.41%)	21 (53%)	-	18 (46%)
Carbapenems	Meropenem	49 (55%)	6 (6.7%)	34 (38.2%)	16 (41%)	5 (12%)	18 (46%)
	Imipenem	32 (35.9%)	8 (8.9%)	49 (55%)	17 (43.5%)	2 (5.1)	20 (51%)
Quinolones	Ciprofloxacin	42 (47.1%)	9 (10%)	38 (42.6%)	14 (35%)	3 (7.6%)	22 (56%)
Folate pathways antagonist	Co-trimoxazole	52 (58.4%)	7 (7.8%)	30 (33.7%)	15 (38.4%)	6 (15%)	18 (46%)
Nitrofurans	Nitrofurantoin	81 (91%)	4 (4.4%)	4 (4.4%)	32 (82%)	1 (2.5%)	6 (15%)
Fosfomycin	Fosfomycin	75 (84.2%)	6 (6.7%)	8 (8.9%)	29 (74%)	3 (7.6%)	7 (17%)

Table 15: Antimicrobial Susceptibility Pattern of Proteus species

Group	Antibiotics	Proteus species (n=4)		
		S	I	R
Aminoglycosides	Amikacin	2 (50%)	1 (25%)	1 (25%)
	Gentamicin	4 (100%)	-	-
	Tobramycin	3 (75%)	-	1 (25%)
Penicillin	Amoxyclav	-	-	4 (100%)
Cephalosporins	Ceftazidime	-	-	4 (100%)
	Cefepime	2 (50%)	1 (25%)	1 (25%)
	Cefuroxime	3 (75%)	-	1 (25%)
Carbapenems	Meropenem	-	1 (25%)	3 (75%)
	Imipenem	4 (100%)	-	-
Quinolones	Ciprofloxacin	-	1 (25%)	3 (75%)
Folate pathways antagonist	Co-trimoxazole	-	1 (25%)	3 (75%)

Table 16: Antimicrobial Susceptibility Pattern of Pseudomonas species

Group	Antibiotics	Pseudomonas species (n=7)		
		S	I	R
Aminoglycosides	Amikacin	2 (28.5%)	1 (14.2%)	4 (57.1%)
	Gentamicin	4 (57.1%)	1 (14.2%)	2 (28.5%)
	Tobramycin	6 (85.7%)	-	1 (14.2%)
Cephalosporins	Cefepime	3 (42.8%)	-	4 (57.1%)
	Ceftazidime	6 (85.7%)	1 (14.2%)	-
Carbapenems	Meropenem	2 (28.5%)	2 (28.5%)	3 (42.8%)
	Imipenem	5 (71.4%)	1 (14.2%)	1 (14.2%)
Fluroquinolones	Ciprofloxacin	5 (71.4%)	1 (14.2%)	1 (14.2%)

Antimicrobial susceptibility Pattern of Gram Positive Cocci:

Table 17: Antibiotic Sensitivity Pattern of Staphylococcus aureus & Coagulase Negative Staphylococcus species:

Group	Antibiotics	Staphylococcus aureus (n=62)			CONS (n=12)		
		S	I	R	S	I	R
Aminoglycosides	Gentamicin	43(69.3%)	6(9.6%)	13(20.9%)	10 (83.3%)	1 (8.3%)	1 (8.3%)
Penicillin	Amoxyclav	23(37%)	8(12.9%)	33(55.2%)	1(8.3%)	1(8.3%)	10(83.3%)
Cephalosporin	Cefoxitin	35(56.4%)		27(43.5%)	12(100%)		
Tetracycline	Doxycycline	47(75.8%)	3(4.8%)	12(19.3%)	9(75%)	-	3(25%)
	Tetracycline	42(67.7%)	3(4.8%)	17(27.4%)	10 (83.3%)	1(8.3%)	1(8.3%)
Quinolones	Ciprofloxacin	22(35.4%)	9(14.5%)	31(50%)	8(66.6%)	1(8.3%)	3(25%)
Folate pathways antagonist	Cotrimoxazole	34(54.8%)	7(11.2%)	21(33.8%)	7(58.3%)	2(16.6%)	3(25%)
Macrolides	Erythromycin	16(25.8%)	8(12.9%)	38(61.2%)	-	2(16.6%)	10(83.3%)
Lincosamides	Clindamycin	19(30.6%)	23(37%)	20(32.2%)	4(33.4%)	6(50%)	2(16.6%)
Glycopeptides	Vancomycin	62(100%)	-	-	12(100%)	-	-
Oxazolidinones	Linezolid	62(100%)	-	-	12(100%)	-	-
Nitrofurans	Nitrofurantoin	55(88.7%)	2 (3.2%)	5(8.06%)	12(100%)	-	-

Table 18: Antibiotic Sensitivity Pattern of Enterococcus

Group	Antibiotics	Enterococcus species (n=21)		
		S	I	R
Aminoglycosides	High Level Gentamicin	15 (71.4%)	-	6 (28.5%)
Tetracyclines	Tetracycline	17 (80.9%)	-	4 (19.04%)
Quinolones	Ciprofloxacin	6 (28.5%)	3 (14.2%)	12 (57.1%)
Glycopeptides	Vancomycin	21 (100%)	-	-
Oxazolidinones	Linezolid	21 (100%)	-	-
Nitrofurans	Nitrofurantoin	16 (76.1%)	1 (4.7%)	4 (19.04%)
Fosfomycins	Fosfomycin	12 (57.1%)	2 (9.5%)	7 (33.3%)

Gram positive Bacteria were tested against fourteen antibiotics.

Staphylococcus aureus was highly sensitive to Vancomycin (100%), Linezolid (100%), Clindamycin (100%), and showed high resistance to Amoxyclav (67.3%) and Erythromycin (67.3%)

Coagulase Negative Staphylococcus species was highly sensitive to Vancomycin (100%), Linezolid (100%), Tetracycline (100%) and showed high resistance to Erythromycin (83.3%) and Amoxyclav (83.3%).

Enterococcus species was highly sensitive to Vancomycin (100%), Linezolid (100%), Nitrofurantoin (90%) and showed high resistance to Doxycycline (92.8%), Fosfomycin (87.5%) and Ciprofloxacin (85%).

Prevalence of MRSA (Methicillin Resistant Staphylococcus aureus) - Out of total 52 Staphylococcus aureus isolated, 18 were resistant to Cefoxitin. Cefoxitin was used as a marker of Methicillin Resistance. So, MRSA was present in 34.6%.

Discussion

The present study provides information on the distribution of bacterial isolates causing UTI along

with their antibiotic susceptibility pattern. The urine culture positivity rate found in our study was 25.7% which was comparable to rates reported by various other studies. The prevalence of UTI was found to be 24.5% in the study conducted by Maria Cristina Carrondo and 36.6% in the study conducted by Joaquim Jorge Moita in Department of Clinical Physiology, Polytechnic Institute of Castelo Branco, High School of Health Dr. Lopes Dias, Castelo Branco, Portugal (Carrondo MC, Moita JJ, 2017).

Our study showed a high frequency of UTI in females (66.9%) than in males (33.7%) which correlates with the study done by S. Sood and R. Gupta, 2012 at a tertiary care hospital in Jaipur, Rajasthan, which showed a high prevalence of UTI in females (73.57%) than in males (35.14%). The reason behind this high prevalence of UTI in females may be due to close proximity of the urethral meatus to the anus, shorter urethra, sexual intercourse, incontinence, and bad toilet (J. Ochei and A. Kolhatkar, 2007). In our study significant Pyuria (>5 Pus cells/hpf) was found in 27.24% and it was similar to 43.3% in the study conducted by Kolawole et al., 2009.

UTI in pregnant women was evaluated in present study to be 21.3%. Incidence of UTIs during

pregnancy has been evaluated to be 48.5% in study done by Okonko IO, Ijandipe LA, et al., 2009. UTI is more common during pregnancy because of changes in the urinary tract. The uterus sits directly on top of the bladder. As the uterus grows, its increased weight can block the drainage of urine from the bladder, causing an infection.

In our Study catheter associated urinary tract infection (CAUTI) was found in 22.85% of patients. This is lower than in the study conducted by Myrna MT and Tessa TT, 1999 which recorded incidence of catheter related UTI as 51.4%.

34.78% of the UTI patients from our study were associated with pre-existing chronic kidney disease condition such as Diabetes similar to 23.7% of the patients in study conducted by Tambyah PA, Knasinski V, Maki DG, 2002 and 25.3% of the UTI patients in our study were associated with history of renal stone which was similar to 18.57% in the study done by Mawhoob N. Alkadasi et al. 2014. In our study Gram positive cocci constitutes 38.6% of the total isolates, whereas it was 9.68% in the study conducted by D. Prakash and R. S. Saxena, 2019.

In our study Gram negative bacilli constitutes 54.3% of the total isolates, which was less than 90.3% of the total isolates in the study conducted by D. Prakash and R. S. Saxena, 2019. 6.9% cases of Candidal infection of UTI were found in our study which was similar to 9% of total isolates in study conducted by Lundstrom T and Sobel J, 2001

The most common bacterial pathogen isolated in our study was E.coli 36.6% and Klebsiella was found in 16.5% of total isolates. In the above study done in Nigeria, 2006 E.coli was found in 20% of total isolates which was lower than our total E.coli (36.6%) isolates. Most of the E.coli isolates was most sensitive to Nitrofurantoin (72.4%) whereas in the study conducted by Håkan Hanberger, José-Angel Garcia-Rodriguez, et. al, 1999 E.coli was most sensitive to Nitrofurantoin (91%) and Fosfomycin (84.2%). E.coli was highly resistant to Cefuroxime (67.41%) which was similar to the study conducted by Taiwo and Aderounmu, 2006 in which E.coli was highly resistant to Ceftazidime (65.5%).

In our study among the Gram-positive cocci Staphylococcus aureus was most common (14.4%) which was lower (47.1%) than the study conducted by Baral et al. 2013. Staphylococcus aureus was fully sensitive to Vancomycin (100%) and it was similar (100%) in the study conducted by Baral et al. 2013. It was most resistant to Erythromycin (61.2%) and it was similar (71.9%) in the study done by Baral et al. 2013. In our study Methicillin Resistant Staphylococcus aureus was found in 12% of total isolates and it was similar (31.1%) in the study done Rajadurai pandi et al., 2006.

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