WWJMRD 2021; 7(11): 70-74
www.wwjmrd.com
International Journal
Peer Reviewed Journal
Refereed Journal
Indexed Journal
Impact Factor SJIF 2017: 5.182 2018: 5.51, (ISI) 2020-2021: 1.361
E-ISSN: 2454-6615
DOI: 10.17605/OSF.IO/XRJQ8

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Antibiotic Resistance Pattern of Pseudomonas Aeruginosa Isolated from Urine Samples of the Urinary Tract Infections Patients

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Abstract
Objective: The aim of this study was to evaluate the antibiotic resistance pattern of Pseudomonas aeruginosa and its prevalance in patients with urinary tract infection (UTI) for effective treatment.
Methods: This is an observation study conduct for a 1-year microbiolgy laboratory of the Santosh Hospitals, Ghaziabad. A total of 100 urine samples of UTI patients were collected. Antibiotic susceptibilty testing was performed by kirby- Bauer technique use.
Results: P.aeruginosa was isolated in Ceftazidime (99.6%), Ofloxacin (99.5%), Cottrimoxazole(99.2%), Ciprofloxin (80.6%) were most resitance.
Conclusion: …….

Keywords: Antibiotic Resistance, UTI, Hospitals

Introduction

P. aeruginosa is a versatile Gram-negative bacterium that grows in soil, marshes and coastal marine habitats, as well as on plant and animal tissues[1]. It forms biofilms on wet surfaces such as those of rocks and soil.[2] It is partly this metabolic flexibility that enables P. aeruginosa to succeed as an opportunistic pathogen. P.aeruginosa is a common cause of both community-acquired and hospital-acquired infections with impacts ranging from mild to life-threatening. P.aeruginosa is also responsible for much of the morbidity and mortality in patientswith the recessive genetic disorder cystic fibrosis (CF) (Burns et al., 1998)P. aeruginosa is a hardy bacterium that can be grown easily in a wide variety of conditions and temperatures.[3] Urinary tract infections (UTIs) are one of the most common bacterial infections affecting humans throughout their life span. [4,5] UTIs are the second most common infection of any organ system and the most common urological disease. These infections are more common in females than in men. Incidence in women in the age of 20—40 years ranges from 25 to 30% whereas in older women above 60 years of age it ranges from 4 to 43%. UTI infection in male 10-12%. [9,11]

Urinary tract infection being the most common bacterial infection with considerable morbidity especially in geriatric patients. 108 patients studied, 72.2 % were males and 27.7% were females,

87.03% of bacterial isolates. E. coli was the predominant uropathogen seen in 68.5% of case followed by Klebsiella sp. 12.9% and Pseudomonas sp. 5.5%. [12] Acute community – acquired UTIs (CAUTIs) are very common accounting for more than 7 million office visits annually. 100 cases of CAUTI, 24% were males and 76% were females.

Majority were in 18-30 years age group 40%. E. coli 70%, Citrobacter koseri 12%, Klebsiella pneumonia 10 %, Pseudomonas aeruginosa 4%, Proteus mirabilis 2% and Enterobacter spp

2%.[13] Pseudomonas aeruginosa is an important uropathogen that causes complicated UTI.[2–4,42] These bacteria specifically lead to potentially fatal sepsis from serious UTI in older patients or compromised hosts whose general conditions are worse or in a lowered immunity state because of diabetes or treatments with steroids or anticancer chemotherapy drugs .[43]

Multi-drug resistant (MDR) bacteria havebeen defied as 'resistant to one agent in three or more antibiotic categories[44]. Our study focues on the prevlance and antibiotic resistance pattern of P. aeruginosa.

Methods

Research subject and design:

It was a cross sectional study. Isolates of P.aeruginosa. 100 urine samples were collected and processed in microbiogy laboratory of Santosh Hospitals, Ghaziabad. Midsteam specimen of urine, preferably of frist morning void was collected all age group patients.

Antimicrobial resistance testing: Antimicrobial resistance testing was performed and analyzed by Kirby Bauer technique on Mueller –Hinton agar plats.

Result

Table.1: Percentage prevalence of infected patient among study population.

Sr.no	Growth	Female	%	Male	%	Total
1.	Growth present	42	61.76%	18	56.25%	60
2.	Growth absent	26	38.23%	14	43.75%	40
Total n =100		68	61.76%	32	56.25%	100

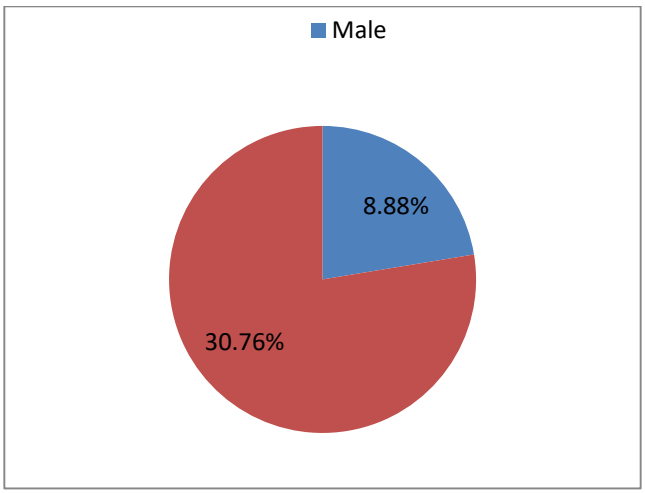
Table no: 1 shows out of 68 female 42 (61.76%) were found culture positive. out of
male 18(56.25%) were found culture positive.

Table. 2: Age group wise infected patients.

S. n	Agegroup(Inyear)	Total female patients	Noof infected female patients	%	Total male patiens	No of infected male patients	%
1.	0 - 20	9	4	44.45%	4	2	50%
2.	21 – 40	37	26	70.27%	16	10	62.5%
3.	41 - 60	19	11	57.89%	9	4	44.44%
4.	61 - 80	3	1	33.33%	1	1	100%
5.	81 – 100	00	-	-	2	1	50%
Total n=100		68	42	61.76%	32	18	56.25%

Table no: 2 shows among 100 patients studied maximum no.of patients were found in the age group 21- 40 yearfemale (70.27%)and male(62.5%). minimum no of patients belonged to age group 41-60 years. Out of 100 patients 68(61.76%) infected female and 32(56.25%) infected males.

Pie chart -1: Sex wise percentage prevalence of Pseudomonas aeruginosa.



Pie chart: Pie chart shows Pseudomonas aeruginosa was found in (30.76%) females and (8.88%) males.

Table. 3: Showing percentage prevalence of uropathogens isolated in urine samples.

Sr.no	Name of organism	Number of the patients	
		No. of Female	No. of Male
1.	E. coli	17	4
2.	Pseudomonas	13	11
3.	Klbesiella	7	1
4.	S.aureus	4	2
5.	CONS	1	00
No of organism isolated		42	18
Total n=100		68	32

Table no 3. Shows the commonest isolate in female and male patients was found Pseudomonas =24(40%). The second commonest isolate was E. coli in female and male patients n= 21(35%).

Table. 4: Antibiotic susceptibility patterns of gram-negative organism isolated.
n= 23

Sr.N	Antibiotic disk	Sensitive	Percentage	Intermediate	Percentage	Resistant	Percentage
1.	Amipcillin	13	56.52%	0	0%	6	26.08%
2.	Piperacillin	18	86.95%	1	4.30%	0	0%
3.	Ceftriaxone	2	8.69%	1	4.34%	0	0%
4.	Ceftazidime	5	21.73%	0	0%	9	39.13%
5.	Tetracycline	7	30.43%	0	0%	1 0	43.42%
6.	Nitrofurantion	8	34.78%	2	8.69%	2	8.69%
7.	Ciprofloxacin	1	4.34%	1	4.34%	4	17.30%
8.	Amikacin	13	56.13%	1	4 .34%	0	0%
9.	Ljjh levofloxacin	3	13.04%	2	8.69%	4	17.30%
10.	Contrimoxazole	6	26.08%	0	0%	5	21.70%
11.	Meropenem	2	8.69%	1	4.34%	4	17.30%
12.	Imipenem	3	13.04%	1	4.34%	0	0%
13.	Cefoperazone sulbactum	12	52.17%	2	8.69%	0	0%

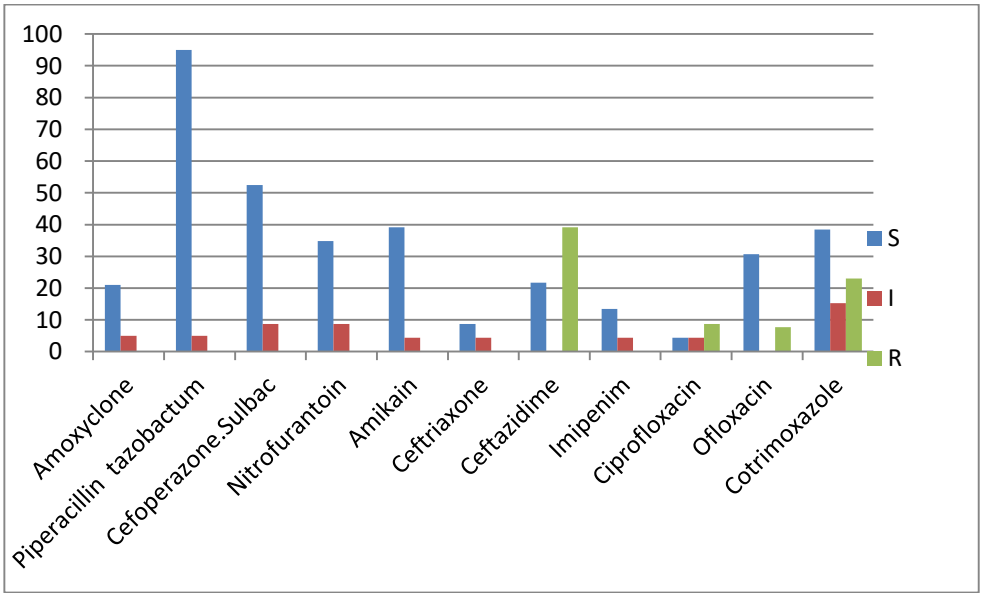
Table no: 4 Antibiotic susceptibility pattern of gram negative organisms isolated in our study.
The table shows Piperacillin tazobactum was found most sensitive antibiotics n = 18 (86.95%), followed by Ampicillin sulbactum n=13(56.52%) and Cefoperazone sulbactum n = 12 (52.1%), Nitrofurantion n = 8(34.7%),Tetracyclin n= 7 (30.4%) and Cotrimoxazole n = 6 (26%).

Table. 5: Antibiotic susceptibility pattern of gram postive organisms isolated.
n=13

Sr.No.	Antibiotic disk	Sensitive	Percentage	Intermediate	Percentage	Resistant	Percentage
1.	Amoxicillin	2	15.38%	0	0%	0	0
2.	Cotrimoxazole	5	38.46%	2	15.30%	3	23.07%
3.	Ofloxacin	4	30.76%	0	0%	1	7.69%
4.	Linezolid	9	69.23%	0	0%	0	0%
5.	Vancomycin	2	15.38%	1	7.69%	0	0%
6.	Ampicillin sulbactum	10	76.92%	0	0%	1	7.69%
7.	Tetracycline	11	84.61%	0	0%	1	7.69%
8.	Piperacillin tanzobactum	1	7.69%	0	0%	0	0%
9.	Ciprofloxacin	9	69.20%	1	7.69%	1	7.69%

Table: 5 Depicts the Antibiotic susceptibility patterns of gram-positive organism isolated in our study.
The table show Piperacillin Tazobactum was found most sensitive antibiotics n=13(100%),
Followed by Tetracycline n=11(84.61%), Ampicillin sulbactum n=10(76.92%), Linezolid n=9(69.2%) and cotrimoxazole n=5(38.46%)

Antibiotic Sensitivity Pattern of Pseudomonas aeruginosa



Graph: shows the Antibiotic sensitivity pattern of Pseudomonas aeruginosa.

The Graph showed Piperacillin tazobactum, cefoperazone. Sulbactum, Amikacin, Nitrofurnation, were most sensitive antibiotic. The Graph also showed Ceftazidime, Ofloxacin, Cottrimoxazole,Ciprofloxacin were most resistance.

Discussion

The present study was undertaken to antibiotic resistance pattern of Pseudomonas aeruginosa isolated from urines sample of Urinary Tract Infection. The urine R/M and culture sensitivity

testing techniques were used for diagnosis of urinary tract infection. In our study the prevalence of infected patient was 60% as. Marcus N et al. (2008)[103] showed a low prevlance 8%. (table1)

The patients were from the age group between 0-100 years. The highest prevalence was in the age group of 21-40 years (78.33%) while the lowest prevalence was found in the age group of 81-100 year (1.66%) (table 2). Dania A Shan et al(2015)[104] found the highest prevalence in the age group 61-80 years (81.1%) and the lowest prevalence in the age group 81-100 years(7.1%). The most probably reason because women of this age group are more sexually active and prone to developed UTI, probably due to the characteristic anatomy of the urethra and effect of the normal physiological change that affects the urinary tract – short urethra, its proximity to the anus, urethral trauma during intercourse dialitation of urethra and stasis of urine durimg pregnancy.

The sex wise percentage prevalence of p. aeruginosa shown in the pie chart shows female 30.76% and male 8.88%. Oye Kalale Oluwalana et al. (2014)[107.] found were male 8.6% and female were 12.8%.

The percentage prevalence of uropathogen shown table 3 shows Pseudomonas aeruginosa was found the commonest isolate both in female and male followed by the E. coli. The other organism was Klebsiella, S. aureus and CONS. Out of total isolate of Pseudomonas aeruginosa was 40 % and Ecoli was 35%. Dania Aijaz Shah et al (2015).[105] found P.aerugionsa was 5.4%. The reason for this could be the patients invomed in their study.

In our study gram negative bacteria were isolated more in comparision to gram positive bacteria (table -4). The gram negative bacteria were found more sensitive to antibiotic Piperacillin tazobactum, Ampicillin sulbactum, cefroperazone sulbactum. The similar result were found the study of Verin A Javiya et al. (2008). [108]

The gram positive were found more sensitive to antibiotic Piperacillin tazobactum, Tetracycline, Ampicillin sulbactum, Linezolid similar result were found by other studies.

The most effective antibiotic for the Pseudomonas aeruginosa isolate was found to be Piperacillin tazobactum, Cefoperazone- Sulbactum, Amikacin, Nitrofurantoin. Verin A Javiya et al. (2008)[109.] was found were study to Amikacin, Amoxyclone.

In our study Pseudomonas aeruginosa Ceftazidime, Ofloxacin, Cotrimoxazole,Ciprofloxacin. Our results were not similar to Philip D Lister et al (2009). [110] They found Imipenem, Levofloxacine, Cotrimoxazole resistance to Pseudomonas aeruginosa.

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