International Journal of
Life Sciences
International Peer Reviewed Open Access Refereed Journal

Int. J. of Life Sciences, 2021; 9 (2):169-173
ISSN:2320-7817(p) | 2320-964X(o)

Research Article Open Access

Study of antibiotic resistance pattern of bacteria isolated from patients of urinary tract infections UT in Beed (M.S.), India.

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Manuscript details:

Received: 22.03.2020
Accepted: 27.04.2021
Published: 31.05.2021

Cite this article as:
Gulve RM (2021) Study of antibiotic resistance pattern of bacteria isolated from patients of urinary tract infections in Beed (M.S.), India, *Int. J. of Life Sciences*, 9 (2): 169-173.

Available online on http://www.ijlsci.in
ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

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ABSTRACT

Urinary tract infection is the second most common infection present in community practice. This study is aims to study the antibiotic resistance pattern of bacteria isolated from patients of urinary tract infection in Beed (M.S.), India. This study also revealed a significant association between gender and UTIs; female is more common to have UTIs they have a significant higher risk of UTIs than male. The prevalence of UTI was higher among female than male patients in a ratio of (3.1:1). Six isolates were isolated from 58 patients of UTI. In which E. coli (n=31, 53.44%); E. faeclis (n=11, 18.96%), *Styphylococcus aureus* (n=08, 13.79%), Klebsilla pneumoniae (n=03, 5.17%), and *Stapylococcus sapropyticus* (n=03, 5.17%). *Pseudomonas aerogenosa* (n=2, 3.44%). *E.coli* was the most prevalent organism causing UTI among patient studied. The overall percentage of resistance of all isolates to antimicrobials agents were found Amphicillin 65.51%, Cefotaxime 60.34%, ciproflaoxacin 29.31%, Amoxicillin 63.79%, Amikacin 6.89%, Nalidixic acid 51.2%, Imipenem 12.06%, Norofloxacin 22.41%, Gentamycin 12.06%, Ceftriaxone 41.37%, Chloranphenicol 79.31%. All six isolates show sensitivity to antibiotic Amikacin, Imipenem and Gentamycin.

Keywords: Urinary tract infection, Antibiotic resistance, Uropathogens, Antimicrobial agents.

INTRODUCTION

Urinary tract infection is the second most common infection present in community practice. Worldwide, about 150 million people are diagnosed with UTI each year (Schaeffer, 1999). Almost 95% cases of UTIs are caused by bacteria (Bishop *et al.,* 2007). Several studies show geographic variations in etiologic agents of UTIs and their resistant pattern to antibiotics (Gupta, 2003). A study carried by Theodore (2006)

in Nigeria found 141 out of181 (77.9%) urine samples gave significant growth and common isolates were *E. coli, K. pnenumonia, S. a ureus* (Thodore 2006, Ebie *et al.,* 2001).

Study of bacteriology and antibiotic resistance pattern of UTI bacteria from Iran shows most common isolates are *E.coli, K. pneumoniae* and *S.aureus, A. boumannii* and most isolates shows higher resistance to tested antibiotics (Youseti *et al.,* 2009; Al-Jebouri *et al.,* (2013). Al-Mijalli (2017) studied bacterial uro pathogens in urinary tract infections and antibiotic susceptibility pattern in Riyadh Hospital, Saudi Arabia. He concluded that old women were more affected by UTIs than men. *E.coli* is main causative agent. Most of the strains are *E.coli* and *Klebsilla* are resistant to antibiotics. Fluoroquinolones should only be used for the treatment of UTIs.

Gul *et al*. (2004) studied antibiotic resistance profile of indigenous bacterial isolates from UTIs patients. She isolated 65 bacterial isolates Gram Negative bacteria showed more resistance to those antibiotics as compare to Gram Positive organisms. Thus, it was concluded that UTIs pathogens should decreased susceptibility most of the antibiotics usually used for the treatments of UTIs. Study of antibiotic resistance pattern of *E. coli* isolated from urine specimens in eastern India and found that 45% isolated specimens were resistant to Ceftriaxone and 20% resistant to Piperacillin, 12.5% to Amikacin, 25% to gentamycin, 16% to Macrolide cases (Ray *et al*., 2015).

They isolated Gram Positive bacteria, Gram Negative bacteria and fungi from UTIs patients' urine and also observed that majority of positive cases fall between ages 21-30 years (Priyadharsini *et al*., 2014). However, it more appropriate to use an antibiotic with a narrow spectrum activity that affects only Gram Positive and Gram-Negative bacteria because of concerns about infection with resistant organisms. Moreover, the extensive uses of antimicrobial agents have invariably resulted in the development of antibiotic resistance which has become a major problem worldwide (Kumar *et al.,*2006).

MATERIAL AND METHODS

Isolation and identification of UTI isolates: 58 urine samples from UTI patients of known sex and age were collected from different pathological laboratories of Beed city. Mid-stream urine specimens were collected as aseptically as possible, in a sterile wide mouth container. All specimens were processed by the laboratory within two hours of collection or kept refrigerated at 4^0C until delivery to laboratory, and subsequently processed no more than 18 hours after initial collection.

For the isolation of UTI causing strain loop full of urine sample was streaked on to nutrient agar plate and incubated 37^0C for 24 hours. Next day individual colonies were selected and identified on the basis of morphological, cultural and biochemical characteristics (Cheesbrough, 2000).

For Identification of Gram negative bacteria:To check morphological characteristics, Gram staining, capsule staining (Manvals method) and motility test were performed. To check cultural characteristics and growth pattern, MacConkey's agar, Eosine Methylene blue agar, Endoagar (Hi –media) were used. For biochemical characteristics, sugar fermentation (lactose, glucose, mannitol, maltose, sucrose and xylose), TSI, IMViC and nitrate test were performed (Thomos, 1995).

For identification of Gram-Positive bacteria: To check morphological characteristics, Gram staining and capsule staining (Maneval's method) was performed. To check the growth pattern, different media including Nutrient agar, mannitol salt agar and blood agar were used. For biochemical characteristics, sugar fermentation, oxidase, catalae, coagulase test were performed (Thomas, 1995). Stock cultures were maintained in nutrient agar slants at 4^0 C.

Determination of antibiotic resistance profile by The Kirby Baur test: Identified UTI isolates were subjected to antibiotic resistance screening by Disk diffusion method. For this purpose, lawn of UTI isolates were made on Mueller-Hinton agar (Hi-media) with the help of wire loop. Then commercially available antibiotic disks were placed on lawn of culture and plates were incubated 37^0 C for 24 hours. Next day presence or absence of Zone of inhibition around the antibiotic disk was observed and measured. (Thomas, 1995). Antibiotics used for Antibiotic sensitivity test: Amhicillin, Cefotaxime, Ciproflaoxacin, Amoxicillin, Amikacin, Nalidixicacid, Imipenem, Norofloxacin, Ceftriaxone, Gentamicin, Chloramphenicol.

RESULT AND DISCUSSION

Urinary tract infections (UTIs) are among the most commonly prevalent infections in clinical practice. The purpose of the present study is to describe the susceptibility and resistance profile of multidrug resistant isolates from urinary tract infections.58 isolates from different pathological laboratories of Beed district city (M.S.) India, were isolated and identified by conventional methods. Identification of the causative organism and its susceptibility to antimicrobials is important, so that proper drug is chosen to treat the patient in early stage of UTI (Khan and Shan, 1981). Three Gram positive organisms *S.aureus, E. fecalis and S. saprophyticus* and three Gram negative isolates *E. coli, K. pneumoniae, P. aerogenosa* were isolated from 58 samples of urine.

In this study revealed a significant association between gender and UTIs female are more common to have UTIs they have a significant higher risk of UTIs than male. The prevalence of UTI was higher among female than male patients in a ratio of (3.1:1) and this was almost similar to that at AL –Nass *et al*. Woman are more prone to have UTI than men because in females, the urethra much shorter and closer to the anus than the males and they lack the bacteriostatic properties of prostatic secretions (Al-jebouri, 1989) (Table 1). Furthermore, these results shows a significant association between age group and UTIs Vulnerable age group is (21-30years) found.

All infections were mono cultures, no cases of multiple infections were observed. Following isolates were isolated E. coli (n=31, 53.44%) was the most commonly isolated microorganism, followed by E. faeclis (n=11, 18.96%), *Styphylococcus aureus* (n=08, 13.79%), *Klebsilla pneumoniae* (n=03, 5.17%), and *Stapylococcus sapropyticus* (n=03, 5.17%). *Pseudomonas aerogenosa* (n=02, 3.44%) (Table 2). However, *E. coli* was the most prevalent organism causing UTI among patient studied this conclusion was found elsewhere (Monikandan *et al.,* 2011).

The overall percentage of resistance of all isolates to antimicrobials agents were Amphicillin 65.51%, Cefotaxime 60.34%, ciproflaoxacin 29.31%, Amoxicillin 63.79%, Amikacin 6.89%, Nalidixic acid 51.2%, Imipenem 12.06%, Norofloxacin 22.41%, Gentamycin 12.06%, Ceftriaxone 41.37%, Chloranphenicol 79.31% (Table 3 and 4). Isolated uropathogens from patient's urine revels sensitivity to Amikacin, Imipenem and gentamycin antibiotics (Figure1).

Table 1: Distribution of UTI patients in relation to their age groups

Sr. No	Age group	No. of Male	No. of Female
1	1-10	-	02
2	11-20	-	08
3	21-30	05	17
4	31-40	01	09
5	41-50	02	05
6	51-60	05	03
7	61-70	01	00
		14	44

Table 2: Percentage of Gram Positive and Gram negative bacteria isolated from UTI patients.

Sr. No.	Bacterial Isolates	Total organisms	Total percentage of UTI
1	*E.coli*	31	53.44
2	*K.pnemoniae*	03	5.17
3	*P. aerogenosa*	02	3.44
4	*S.aureus*	08	13.79
5	*E. faecalis*	11	18.96
6	*S.saprophyticus*	03	5.17

Table 3: Antimicrobial susceptibility of Gram negative isolates to tested antibiotics

Antibiotics	*E.coli* Number (%)		*K.pnemoniae* Number(%)		*P.aerogenosa* Number (%)	
	S	***R***	***S***	***R***	***S***	***R***
Amphicilin	02(6.45)	29(93.54)	00(0)	03(100)	00(0)	02(100)
Cefotaxime	10(32.25)	21(67.74)	00(0)	03(100)	01(50)	01(50)
Ciproflaoxacin	16(51.61)	15(48.38)	03(100)	00(0)	02(100)	00(0)
Amoxicillin	04(12.90)	27(87.09)	00(0)	03(100)	00(0)	02(100)
Amikacin	30(96.77)	01(3.22)	02(66.6)	01(33.3)	02(100)	00(0)
Nalidixic acid	13(41.93)	18(58.06)	02(66.6)	01(33.3)	02(100)	00(0)
Imipenem	31(100)	00(00)	03(100)	00(0)	01(50)	01(50)
Norofloxacin	26(83.87)	05(16.12)	02(66.6)	01(33.3)	00(0)	02(100)
Gentamycin	28(90.32)	03(9.67)	03(100)	00(0)	02(100)	00(0)
Ceftriaxone	20(64.57)	11(35.48)	01(33.3)	02(66.6)	01(50)	01(50)
Chloramphenicol	01(3.22)	30(96.77)	00(0)	03(100)	00(0)	02(100)

S=sensitive, R-resistant

Table 4: Antimicrobial susceptibility of Gram positive isolates to tested antibiotics

Antibiotics	*S. aureus* Number (%)		*E. faecalis* Number (%)		*S.saprophyticus* Number (%)	
	S	***R***	***S***	***R***	***S***	***R***
Amphicilin	04(50)	04(50)	11(100)	0(0)	03(100)	0(0)
Cefotaxime	03(37.5)	05(62.5)	06(54.5)	05(45.4)	03(100)	0(0)
Ciproflaoxacin	06(75)	02(25)	11(100)	0(0)	03(100)	0(0)
Amoxicillin	05(62.5)	03(37.5)	09(81.8)	02(18.1)	03(100)	0(0)
Amikacin	08(100)	0(0)	09(81.8)	02(18.1)	03(100)	0(0)
Nalidixic acid	05(62.5))	03(37.5)	03(27.2)	08(72.7)	03(100)	0(0)
Imipenem	06(75)	02(25)	07(63.6)	04(36.3)	03(100)	0(0)
Norofloxacin	06(75)	02(25)	08(72.7)	03(27.2)	03(100)	0(0)
Gentamycin	07(87.5)	01(12.5)	08(72.7)	03(27.2)	03(100)	0(0)
Ceftriaxone	01(12.5)	07(87.5)	08(72.7)	03)27.2)	03(100)	0(0)
Chloramphenicol	03(37.5)	05(62.5)	05(45.4)	06(54.5)	03(100)	0(0)

S=sensitive, R-resistant

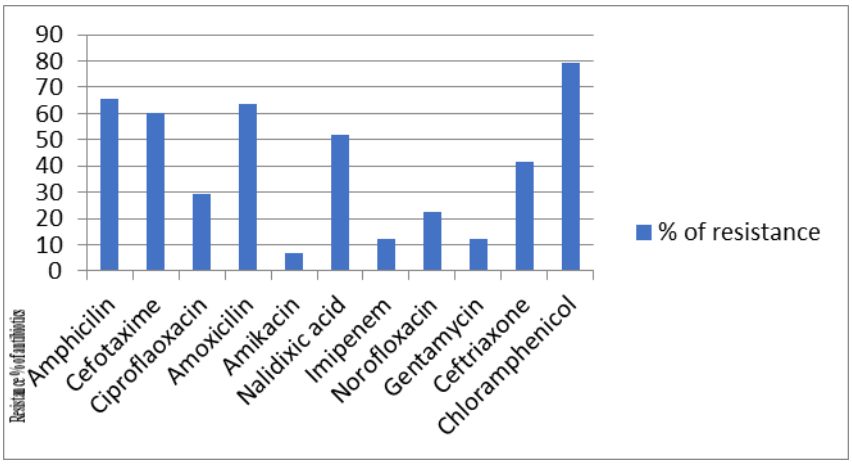

Figure:1 Percentage of resistance of bacterial isolates to antimicrobial agents.

CONCLUSIONS

This study indicates that *E.coli* is the most frequent uropathogen. Amhicillin, Cefotaxime, Ciproflaoxacin, Amoxicillin, Nalidixicacid, Norofloxacin, Ceftriaxone, Chloramphenicol did not have good in vitro coverage for many of uropathogens in this study. Isolated uropathogens revels sensitivity to Amikacin, Imipenem and gentamycin antibiotics. Updates on the knowledge of antibiotic resistance pattern of uropathogens is important for timely modifying the drug of choice for empirical therapy which is required for early and effective treatment of infection.

Acknowledgement

Author would like to express gratitude towards Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, (M.S.) India for financial assistance for this study.

Conflicts of Interest: The authors declare no conflict of interest.

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