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STUDY OF BACTERIAL FLORA IN PATIENTS WITH INDWELLING CATHETER AND ENDOTRACHEAL TUBES IN ICU AT TERTIARY CARE HOSPITAL IN CENTRAL INDIA

Microbiology

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ABSTRACT

Introduction :- The use of indwelling devices like Urinary catheter, Drain tubes, and endotracheal tubes has become routine practice in the medical field. Localized or systematic infection are frequent complications associated with extensive use of these devices, requiring its removal or may even be associated with life threatening consequences. **Objective :-** Current studies was microbial profiles of patients with indwelling catheter and endotracheal tubes in ICU these are essential to find out the susceptibilities of this pathogen against commonly prescribed antibiotics in any health care facility. **Methods :-** A total no. of 50 samples were collected, admitted patients in ICU, with various infectious with had indwelling catheter and endotracheal tubes. Antimicrobial susceptibility patterns of each isolate was carried out by the Kirby- Bauer disk diffusion method as per guidelines of CLSI. **Results:** Majority of isolates of Escherichia coli 15 (60%) were obtained followed by Klebsiella sp.03(12%). The isolated pathogens showed 100% sensitive to Polymyxin –B and Colistin. **Conclusion:** The results confirmed the occurrence of drug resistant strains of all isolated organisms. All the organisms had a poor susceptibility to Co-trimoxazole and Ceftazidime. The encouraging finding was its sensitivity to Polymyxin-B and Colistin as an effective antibiotic for the treatment. It therefore calls for a very judicious, rational treatment regimens prescription by the physicians to limit the further spread of antimicrobial resistance among the isolated strains.

KEYWORDS

Escherichia coli, antimicrobial sensitivity, indwelling catheters, endotracheal tubes.

Introduction

The therapeutic interventions that have been recognized as associated with infectious complications include-indwelling urinary catheters, sophisticated life support, intravenous fluid therapy etc. Bacterial resistance to commonly used antimicrobial agents is a commonly encountered problem in the ICU. A knowledge of the common bacterial flora of an ICU and their antibiotic susceptibility pattern helps in deciding a rational antibiotic policy. The use of indwelling devices has become routine practice in the medical field. Mechanical ventilation is a life saving intervention given to patients requiring airway support in the intensive care unit (ICU) [3]. The formation of bacterial colonies within these ETTs provides a vessel was infectious and bacteria become resistant to antibiotics. However, this intervention requires an endotracheal tube (ETT), which has been associated with an increased risk of ventilator-associated pneumonia (VAP)[3]. However, there are still impediments to widespread use, including concerns over antibiotic resistance and the relatively high costs. The purpose of the present study was to determine the common bacteria responsible for various catheter related nosocomial infections and to study their antibiotic susceptibility pattern.

MATERIALAND METHOD

The present prospective observational study was conducted in the Department of Microbiology, Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha, for the period of one year. All the admitted patients in ICU, with various infectious with had indwelling catheter and endotracheal tubes were included in the study. The samples like urine from catheter, catheter swabs, endotracheal secretions and endotracheal swabs were collected. Total no. of 50 isolates from various patients was included in the present study. All collected were inoculated on routine culture media like Nutrient agar, CLED agar, MacConkey's agar and blood agar. A battery of tests were performed that included Gram's staining, colony morphology, motility tests, sugar fermentation tests and biochemical tests such as oxidase test, urease and Phenyl puruvic acid test and IMViC (indole, methyl red, Voges-Proskauer and citrate) tests for the identification of different isolated organisms.

Susceptibility test: All isolated strains were subjected to antimicrobial susceptibility test by modified Kirby-Bauer disk diffusion method as per CLSI guidelines. A panel of antimicrobials of standard strengths as follows: Amikacin 30 µg/disc, Ciprofloxacin 5 µg/disc, Ceftazidime 30 µg/disc, Netillin 30µg/disc, Colistin 10µg/disc, Piperacillin-tazobactum 100/10 µg/disc, Nitrofurantion 300 µg/disc, vancomycin (30 µg/disc), erythromycin (15 µg/disc) and penicillin (10 units) Imipenem 10 mcg, Polymyxin-B 300 units/disc (Hi Media Laboratories Pvt. Ltd., Mumbai, India). *Escherichia coli* ATCC 25922, *S. aureus* ATCC 25923, *Pseudomonas aeruginosa* ATCC 27853 was used as control strain.

RESULTS:-

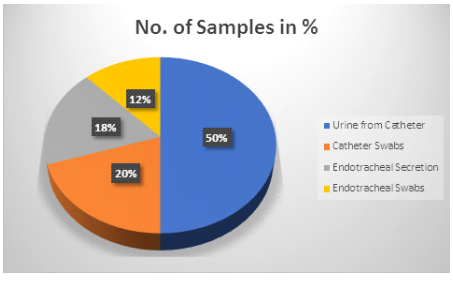
All these 50 patients admitted in ICU and with indwelling catheter and using endotracheal tubes included 40 males (80%) and 10 females (20%). So M/F ratio observed in the present group was 1.6:1. As shown in table no. 1.

Table No. 1 Showing Age and sex distribution of the ICU patients (n=50)

Age group	Male	Female
15 -30 Years	08 (20%)	02 (20%)
31 - 45 Years	08 (20%)	05 (50%)
46 - 60 Years	10 (25%)	02 (20%)
61 -75 Years	13 (32.5%)	01 (10%)
76 - 90 Years	01 (2.5%)	00 (0%)
Total (n=50)	40(80%)	10 (20%)

Amongst 40 males patients, Maximum no. of males patients 13 (32.5%) were in the age group of 61 to 75 Years.
Amongst 10 females patients, Maximum no. of females patients 05 (50%) were in the age group of 31 to 45 Years.

Graph No. 1 Showing Specimens collected from patients with infections (n=50)



Graph No. 1 showing that in 50 samples 50% were urine from catheter followed by catheter swabs 20%, Endotracheal secretion 18% and Endotracheal swabs 12%.
Maximum samples collected were urine from catheter samples 50%.

Table no. 2 Showing Isolated microorganisms from various specimens (n=50)

S.No.	Isolated Organisms	Samples			
		Urine from Catheter	Catheter Swabs	Endotracheal Secretion	Endotracheal Swabs
1	Escherichia coli	15 (60%)	04 (40%)	03(33.34 %)	02 (33.32%)

2	Klebsiella species	03 (12%)	02 (20%)	02 (22.22%)	01(16.67%)
3	Staphylococcus aureus	02 (8%)	01(10%)	02(22.22 %)	01(16.67%)
4	Enterococci species	03(12%)	02 (20%)	-	-
5	Pseudomonas aeruginosa	01(4%)	01(10%)	01 (11.11%)	01(16.67%)
6	Acinetobacter baumannii	01(4%)	-	01 (11.11%)	01 (16.67%)
Total(n=50)		25(50%)	10 (20%)	09 (18%)	06 (12%)

Table no. 2 It was observed that maximum no. of organisms 15 *Escherichia coli* (60%) were isolated from urine followed by 03 *Klebsiella species* (12%), 02 *Staphylococcus aureus* (8%), 03 *Enterococci species* (12%), 01 *Pseudomonas aeruginosa* (4%), 01 *Acinetobacter baumannii* (4%). It was observed that maximum no. of organisms 04 *Escherichia coli* (40%) were isolated from catheter swabs followed by 02 *Klebsiella species* (20%), 01 *Staphylococcus aureus* (10%), 02 Enterococci *species* (20%), 01 *Pseudomonas aeruginosa* (10%). It was observed that amongst 09 endotracheal secretions maximum no. of organisms 03 samples *Escherichia coli* (33.34%) were isolated from endotracheal secretion followed by *Klebsiella species* and *Staphylococcus aureus* in 02 samples respectively (22.22%). Nonfermenter bacterial flora observed was 01 *Pseudomonas aeruginosa* (11.11%), 01 *Acinetobacter baumannii* (11.11%) were isolated from endotracheal secretion. It was observed that maximum no. 02 samples *Escherichia coli* (33.32%) were isolated from endotracheal swabs followed by 01 *Klebsiella species* (16.67%), 01 *Staphylococcus aureus* (16.67%). Nonfermenter bacterial flora observed was 01 *Pseudomonas aeruginosa* (16.67%), 01 *Acinetobacter baumannii* (16.67%) were isolated from endotracheal swabs.

Table no. 3 Antibiotic sensitivity profile of various Isolated organism (n=50)

Antibiotics → / Isolated Organism ↓	Amikacin	Ciprofoxacin	Co-trimoxazole	Ceftazidime	Imipenam	Netilin	Piperacillin/Tazobactam	Nitrofurantoin	Polymyxin B	Colistin	Penicillin	Vancomycin	Erythromycin
Escherichia coli	50%	37.5%	0%	0%	100%	88%	90%	33.33%	100%	100%	NA	NA	NA
Klebsiella pneumoniae	62.5%	25%	0%	0%	100%	90%	93%	90%	100%	100%	NA	NA	NA
Staphyloccous aureus	NA	50%	33.33%	NA	NA	NA	NA	33.33%	NA	NA	0%	100%	33.33%
Enterococci Sp.	NA	40%	0%	NA	NA	NA	NA	40%	NA	NA	0%	100%	0%
Pseudomonas aeroginosa	25%	0%	0%	0%	100%	25%	0%	NA	100%	100%	NA	NA	NA
Acinetobacter spp.	33.33%	0%	0%	0%	100%	0%	33.33%	NA	100%	100%	NA	NA	NA

Table no. 03 showing that antimicrobial sensitivity pattern of *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa* and *Acinetobacter spp*. here the Imipenam, Colistin and Polymyxin B were 100% sensitive and 100% Resistant to Co-trimoxazole and Ceftazidime.

DISCUSSION

In this study, a total no. of 50 isolates were isolated and identified from admitted in ICU patient with indwelling catheter and using endotracheal tubes their urine samples, catheter swabs, endotracheal secretion and endotracheal swabs were collected. The age and sex distribution of these patients was studied. Total 40 (80%) were males and 10 (20%) were females. Male/Female ratio was 1.6:1. Siau *et al* (1999)[1] in their prospective study of 18 hospitalized patients reported Male/Female ratio 1.5:1, Prashanth *et al* (2006)[2] in a study of 43 hospitalized patients reported Male/Female ratio 1.4:1 is comparable to the studies.

In the present study 15 *Escherichia coli* (60%) were isolated from urine followed by 03 *Klebsiella species* (12%), 02 *Staphylococcus aureus* (8%), 03 *Enterococci species* (12%), 01 *Pseudomonas aeruginosa* (4%), 01 *Acinetobacter baumannii* (4%). Tullu *et al*.(1998)[4] reported urinary catheter were *E. coli* (46.43%), *Pseudomonas* (17.86%), *Klebsiella* (17.86%) and *Acinetobacter* (7.14%) were comparable. Also comparable with Pradhan *et al* (2013)[5] reported in urine sample *Staphylococcus aureus* (7.8%).

It was observed that maximum no. 02 samples *Escherichia coli* (33.32%) were isolated from endotracheal swabs followed by 01 *Klebsiella species* (16.67%), 01 *Staphylococcus aureus* (16.67%). Nonfermenter bacterial flora observed was 01 *Pseudomonas aeruginosa* (16.67%), 01 *Acinetobacter baumannii* (16.67%) were isolated from endotracheal swabs. It was comparable with Tullu *et al.* (1998)[4] reported organisms commonly isolated from endotracheal tube tips were *E. coli* (33.33%), *Klebsiella* (29.16%), *Pseudomonas* (11.46%) and *Acinetobacter* (5.21%).

CONCLUSION

Results of the present study clearly demonstrated the occurrence of resistance to various antimicrobial agents among the all isolates. Polymyxin-B and colistin was the only anti-microbial drugs against which all isolates were fully sensitive. We suggest a more restricted and a more rational use of this drug in this hospital setting. In addition, regular antimicrobial surveillance is essential for monitoring of the resistance patterns.

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