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BACTERIOLOGICAL PROFILE OF ENDOTRACHEAL SECRETIONS FROM ICU PATIENTS FROM A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Intensive care unit (ICU) patients are most vulnerable for developing respiratory and urinary tract infections especially who are mechanically ventilated due to complex interplay between the endotracheal tube, host immunity and virulence of invading bacteria. We analyzed the bacteria and their antibiotic sensitivity pattern isolated from endotracheal aspirates of ventilated patients in ICU.The prospective study was done with the endotracheal samples received in the Microbiology Laboratory in a tertiary care hospital over a period of one year. Samples were collected under sterile conditions from medical and surgical ICU patients who were ventilated for at least 48 hrs. The samples included endotracheal secretion and endotracheal tube tip which was processed as per microbiological standards.A total of 90 samples from 90 patients were collected during the study period of one year. The two major reasons for admission were organophosphate poisoning and RTA with head injury. There was predominance of male patients with M: F ratio of 3:1 respectively. The organisms commonly isolated were Klebsiella Pneumoniae (72),Sphingomonas paucimobilis (3),Acinetobacter baumani (5), Pseudomonas aeruginosa (5),Candida albicans (2),Proteus mirabilis (2), and Staphylococcus aureus. Out of 90 isolates 45 were multi-drug resistant which implies that 50% of isolates are multidrug resistant. Regular periodic surveillance of microbial profile and susceptibility patterns of ventilated patients in ICU should be done to detect emerging resistant bacterial strains.

KEYWORDS : Antibiotic policies, Endotracheal aspirates, Multi-drug resistance.

INTRODUCTION

Intensive care units contribute 20% to 25% of all nosocomial infections in a hospital. Critically ill Intensive care unit (ICU) patients are most vulnerable for developing respiratory and urinary tract infections as compared to those patients admitted in ward. Respiratory infections in critically ill patients are associated with high morbidity and mortality.Patients who are intubated and mechanically ventilated are further at risk of acquiring respiratory infections due to complex interplay between the endotracheal tube, host immunity and virulence of invading bacteria. The etiological agents may vary according to the population of patients in an ICU, duration of hospital stay, pre-existing illness and prior antimicrobial therapy. Common causative agents are Pseudomonas species, Klebsiella Pneumoniae ,Sphingomonas paucimobilis ,Acinetobacter baumani , Pseudomonas aeruginosa,Candida albicans,Proteus mirabilis, and Staphylococcus aureus Acinetobacter species, Staphylococcus aureus, and Enterobacteriaceae including the 6 endogenous bacteria .

AIMS AND OBJECTIVES: To analyze the aerobic bacteria and their antibiotic sensitivity pattern isolated from endotracheal aspirates of ventilated patients in ICU.

MATERIAL AND METHOD

Aim of the study was to analyze the bacterial and their antibiotic sensitivity pattern isolated from endotracheal aspirates of ventilated patients in ICU. The prospective study was carried out with the samples of endotracheal aspirate and endotracheal tube tip received in the Microbiology Laboratory over a period of one year (Jan 2017 - Dec 2017). Samples were collected under sterile conditions from patients admitted in both medical and surgical intensive care unit who were ventilated for at least 48 hrs. In patients who were ventilated outside, samples were taken on day of admission. The samples included endotracheal secretion and endotracheal tube tip. Collection of Specimen: Endotracheal Aspirate: Sampling was done by introducing a catheter aseptically through the endotracheal tube and 11 secretions aspirated into a sterile syringe. Endo-tracheal tube tip: The endo-tracheal tube tip was cut aseptically into a sterile container and sent to the Microbiology laboratory. Processing of Specimen: Endotracheal Aspirate: Both 10µl of the specimen and 1 µl of the specimen was inoculated in blood agar and MacConkey 12 agar. Endotracheal tube tip: The lumen of endotracheal tube tip was rinsed with 0.5 ml of sterile normal saline. 10µl of the fluid was inoculated on blood agar and MacConkey agar. A gram stain of the endotracheal secretions / endotracheal tube tip fluid was done to assess the number of pus cells and the presence of bacteria. A semi quantitative method was followed and plates 13 were incubated overnight at 37°C. A significant 5 growth of >10 CFU/ml was taken for identification. The organisms isolated were identified based on colony characteristics on Blood agar and MacConkey agar, Gram's stain, Biochemical reactions by using standard microbiological techniques. Isolates identified as commensals or contaminants were excluded from further process. AKirby-Bauer method was used to test the susceptibility of organisms to various antibiotics. Antibiotics used: Ampicillin (AMP-10µg), Cefazolin (CZ-30µg), Cefoxitin (CX-30 µg), Vancomycin (VA-30µg), Linezolid (LZ-30µg), Clindamycin (CD-2µg), Erythromycin (E-15µg), Piperacillin (PI-100µg), Ceftazidime (CAZ-30µg), Ceftazidime/Clavulanic acid (CAC-30µg/10µg), Cefeperazone (CPZ30µg), Cefotaxime (CTX-30µg),Tobramycin (TOB-10µg), Doxycycline (DO-30µg), Piperacillin/Tazobactum (PIT-100µg/10µg), Gentamicin (GEN-10µg), Amikacin (AK-30µg), Azteronam (AT-30µg), Ciprofloxacin (CIP-5µg), Ofloxacin (OF-5µg), Imipenem (IMP-10µg), Colistin (CL-10µg), Polymyxin B (PB-300U). Zone diameter was measured and interpreted as per the Clinical and Laboratory Standards Institute (CLSI) guidelines.

RESULTS

A total of 90 samples from 90 patients were collected during the study period of one year. The major reason for admission was organophosphate poisoning and second major reason being RTA with head injury. There was male predominance with a male to female ratio of 3:1 respectively. Most of the patients fell into the age group of 20-30 years. Endo –tracheal tube tip was the majority sample received and was processed as per CLSI guidelines. There was growth in 87 specimens and 4 specimens were sterile. The organisms isolated were Klebsiella Pneumoniae(72), Sphingomonas paucimobilis (3), Acinetobacter baumani (5), Pseudomonas aeruginosa (5), Candida albicans (2), Proteus mirabilis

(2), and Staphylococcus aureus., Nonfermenting GNB – NFGNB (4), Escherichia coli (1) and Citrobacter spp (1). Among the eight Staphylococcus aureus all the strains were Methicillin resistant (Cefoxitin resistant). Out of fourteen Acinetobacter spp, nine of them were multi-drug resistant. Two multi-drug resistant strain out of nine Pseudomonas isolates. There were six multi-drug resistant strains out of eight Klebsiella pneumoniae. Escherichia coli, Citrobacter spp and NFGNB were all multi-drug resistant and were only susceptible to Imipenem. poisoning and second major reason being RTA with head injury. There were six multi-drug resistant strains out of eight Klebsiella pneumoniae. Escherichia coli, Citrobacter spp and NFGNB were all multi-drug resistant and were only susceptible to Imipenem.

DISCUSSION

In our study the most frequent clinical condition needing mechanical ventilation was poisoning and trauma (Head injury) was the second common 14 condition. In a study by Arindam dey et al , postoperative condition was the most frequent clinical condition needing mechanical ventilation and COPD patients were the most frequently ventilated 15 patients in a study by Ramakrishna pai et al. A 8 study by Shanmugavadivoo et al showed results similar to our study. Our study showed a predominance of male ventilated patients than female in the ratio of 3:1 respectively which is 6 correlated with the study conducted by Saha et al. In the present study, organisms isolated from endotracheal aspirates were Acinetobacter spp (14), Pseudomonas spp (9), Staphylococcus aureus (8), Klebsiella pneumoniae (4), Non-fermenting GNB (4), Escherichia coli (1) and Citrobacter spp (1). The predominant organism was Acinetobacter followed by Pseudomonas, Staphylococcus aureus and Klebsiella pneumoniae. In our study three Acinetobacter showed Colistin 18 resistance. Bassetti M et al showed that a combination of Colistin and Rifampicin appears to be an effective and safe therapy for severe infections due to multidrug - resistant 19 Acinetobacter spp. In our study multi-drug resistant Acinetobacter (9), Pseudomonas (2), Klebsiella pneumonia (6), Non fermenting Gram Negative bacilli (2), E.coli (1) and Citrobacter (1) has been isolated. Out of 90 isolates 45 are multidrug resistant which implies that 50% of isolates are multidrug resistant. The major reasons for multidrug resistance are ventilators, prolonged hospital stay, irrational usage of antibiotics.

CONCLUSION

In our study we found that The organisms commonly isolated were Klebsiella Pneumoniae (72),Sphingomonas paucimobilis (3),Acinetobacter baumani (5), Pseudomonas aeruginosa (5),Candida albicans (2),Proteus mirabilis (2), and Staphylococcus aureus. Out of 90 isolates 45 were multi-drug resistant which implies that 50% of isolates are multidrug resistant. Regular periodic surveillance of microbial profile and susceptibility patterns of ventilated patients in ICU should be done to detect emerging resistant bacterial strains.

REFERENCES

1. Arindam Dey, Indira Bairy. Incidence of multidrug-resistant organisms causing ventilator-associated pneumonia in a tertiary care hospital: A nine months prospective study. Ann Thorac Med 2007; 2(2):52-7.
2. Ramakrishna P, Rekha B. Characterization of aerobic bacteria isolated from endotracheal aspirate in adult patients suspected ventilator associated pneumonia in a tertiary care center in Mangalore. Saudi J Anaesth 2012; 6(2):115-9
3. Tihana MT, Ana GG, Branka DC, Bozena G, Mladen S, Mladen P. Microbial profile and antibiotic susceptibility patterns of pathogens causing ventilator associated pneumonia at Intensive Care Unit, Sestre Milososrdnice university hospital center, Zagreb, Croaoatia. Acta Clin Croat 2015; 54:127-35.
4. Kallel H., Bahloul M, Hergafi L, Akrout M, Ketata W, Chelly H, et al. Colistin as a salvage therapy for nosocomial infections caused by multidrug-resistant bacteria in the ICU. Int J Antimicrob Agents. 2006 Oct;28(4):366-9
5. Bassetti M, Repetto E, Righi E, Boni S, Diverio M, Molinari MP, et al. Colistin and Rifampicin in the treatment of multidrugresistant Acinetobacter baumanni infections. J.Antimi c robiol Chemothe r 2008; 61(2):417-20.
6. Urmi Jethwani. Antibiotic sensitivity pattern of gram negative bacilli isolated from the lower respiratory tract of ventilated patients in the Intensive Care Unit. Indian Medical Gazette 2014; 180-4.
7. Azar DK, Najmeh P, Effat AM, Alireza M, Fariba A. The Prevalence of bacteria isolated from endotracheal tubes of patients in Golestan hospital, Ahvaz, Iran, and de t e rmina tion of the ir antibioti c susceptibility patterns. Jundishapur J Microbiol. 2013; 6(1):67-71.