

ORIGINAL RESEARCH

Assessment of micro-organism in endotracheal tube aspirate and their sensitivity to drugs with patients on mechanical ventilation

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ABSTRACT

Background: The likelihood of contracting an infection while in a hospital depends on a number of factors, including the quality of the hospital's infection prevention measures, the health of the patient, and the prevalence of certain pathogens in the surrounding area. The present study was conducted to find micro-organism in endotracheal tube aspirate and their sensitivity to drugs with patients on mechanical ventilation.

Materials & Methods: 100 patients between the age of 18 to 65 years on mechanical ventilation admitted to department of Medicine, Gandhi Medical College and associated Hamidia Hospital Bhopal were included. Parameter such as system involved, micro-organism in endotracheal tube aspirate and their antibiotic sensitivity was recorded.

Results: The majority of the patients in our study belong to 51-60 (21%) and 61-70 (19%) years of age group followed by more than 70 years (15%), 41-50 years (12%), 31-40 years (12%), 21-30 years (12%) and less than 20 years (9%) of age. Majority of the patients in our study was male (72%) as compared to female (28%). Majority of the patients had neurological system involvement (41.6%) followed by respiratory (21.8%) and gastrointestinal system (21.8%). There were patients who had been involved renal (14.9%), with diabetes (21.8%) and cardiovascular system (3%) involvement. Most common microorganism isolated from culture was Klebsiella O (7%) and Acinetobacter (7%) followed by Pseudomonas (5%), Citro (2%), Klebsiella P (2%), Staphylococcus species (1%) and MRSA (1%) in our study. In terms of antibiotic sensitivity of ET tube aspiration sample, majority of the patients had bacteriological profile resistant to ampicillin (92.3%), nitrofurantoin (92.3%), cefotaxime (88.55), ceftriaxone (84.6%), cefepime (69.2%), gentamicin (69.2%), imipenem (69.2%), meropenem (69.2%), piperacillin and tazobactam (65.4%), ciprofloxacin (61.5%), amoxiclav (65.4%) and amikacin (42.3%).

Conclusion: Majority of the patients had neurological system involvement. Most common microorganism isolated from culture was Klebsiella O and majority of the patients had bacteriological profile resistant to ampicillin.

Key words: Acinetobacter, endotracheal tube aspirate, mechanical ventilation

INTRODUCTION

Infections contracted in a hospital by a patient admitted for a different reason, in whom the illness was not present or incubating at the time of admission and symptoms should appear at least after 48 hours of admission; these are known as hospital-acquired infections (HAI).¹ From 1995 to 2008, the global prevalence of HAI in industrialised nations ranged from 5.1 percent to 11.6 percent, as reported by the World Health Organization (WHO) in their report titled "The Burden of Health-Care Associated Infection Worldwide. Health care-associated infections are more common in high-risk populations and poor nations.² This includes hospitalised patients, especially those in intensive care, and newborns. Patient demography, immune state, underlying comorbidities like hypertension, diabetes, COPD, and chronic renal disease, and hospital location all play a role in the occurrence of HAIs in hospitalised patients. However, hospital administration and especially hospital infection control measures play significant roles.³

The likelihood of contracting an infection while in a hospital depends on a number of factors, including the quality of the hospital's infection prevention measures, the health of the patient, and the prevalence of certain pathogens in the surrounding area.⁴ The widespread use of broad-spectrum antibiotics among ICU patients causes selective antibiotic pressure, which in turn promotes the evolution of AMR among ICU microbes.⁵ The present study was conducted to find micro-organism in endotracheal tube aspirate and their sensitivity to drugs with patients on mechanical ventilation.

MATERIALS & METHODS

The present study comprised of 100 patients between the age of 18 to 65 years on mechanical ventilation admitted to department of Medicine, Gandhi Medical College and associated Hamidia Hospital Bhopal.

Data such as name, age, gender etc. was recorded. Parameter such as system involved, micro-organism in endotracheal tube aspirate and their antibiotic sensitivity was recorded. Results were tabulated and assessed statistically. P value less than 0.05 was considered significant.

RESULTS

Table 1: Age distribution

Age (years)	Frequency	Percent
≤20	9	9.0
21-30	12	12.0
31-40	12	12.0
41-50	12	12.0
51-60	21	21.0
61-70	19	19.0
>70	15	15.0
Total	100	100.0

Table 1 shows that the majority of the patients in our study belong to 51-60 (21%) and 61-70 (19%) years of age group followed by more than 70 years (15%), 41-50 years (12%), 31-40 years (12%), 21-30 years (12%) and less than 20 years (9%) of age.

Table 2: Gender distribution

Gender	Frequency	Percent
Female	28	28.0
Male	72	72.0
Total	100	100.0

Table 2 shows that majority of the patients in our study was male (72%) as compared to female (28%).

Table 3: System involved

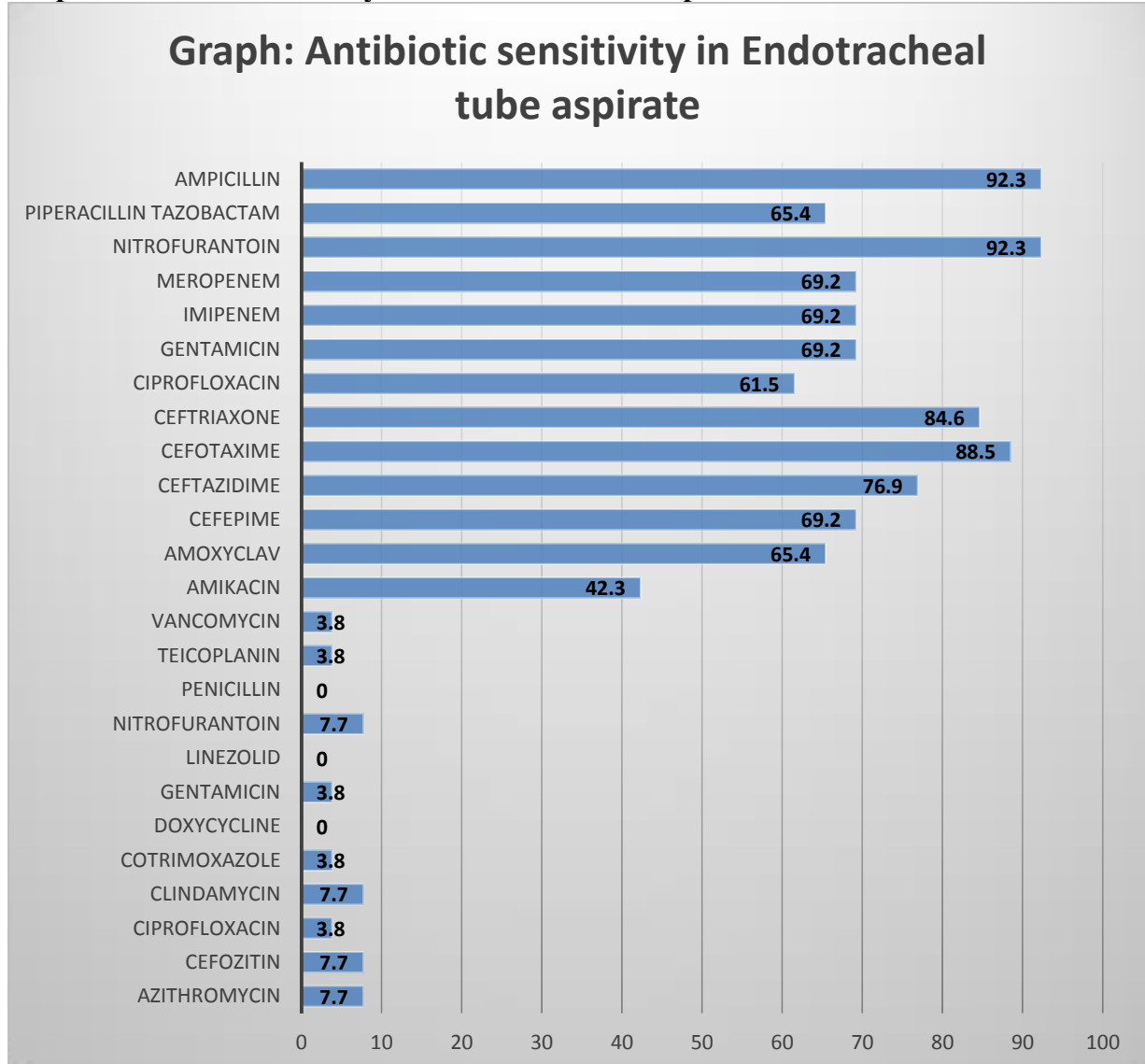
System	Frequency	Percentage
Respiratory	22	21.8
Gastrointestinal	9	8.9
Cardiovascular	3	3
Neurological	42	41.6
Diabetes	22	21.8
Nephrological	15	14.9

Table 3 shows that majority of the patients had neurological system involvement (41.6%) followed by respiratory (21.8%) and gastrointestinal system (21.8%). There were patients who had been involved renal (14.9%), with diabetes (21.8%) and cardiovascular system (3%) involvement.

Table 4: Micro-organism in endotracheal tube aspirate

Micro-organism	Frequency	Percentage
Citro	2	2
E Coli	1	1
Enterococcus	0	0
Klebsiella O	7	7
Klebsiella P	2	2
Pseudomonas	5	5
MRSA	1	1
Proteus	0	0
Staph	1	1
Acinetobacter	7	7

Table 4 shows that most common microorganism isolated from culture was Klebsiella O (7%) and Acinetobacter (7%) followed by Pseudomonas (5%), Citro (2%), Klebsiella P (2%), Staphylococcus species (1%) and MRSA (1%) in our study.

Graph I Antibiotic sensitivity in endotracheal tube aspirate

Graph I shows that in terms of antibiotic sensitivity of ET tube aspiration sample, majority of the patients had bacteriological profile resistant to ampicillin (92.3%), nitrofurantoin (92.3%), cefotaxime (88.55), ceftriazone (84.6%), cefepime (69.2%), gentamicin(69.2%), imipenem (69.2%), meropenem (69.2%), piperacillin and tazobactum (65.4%), ciprofloxacin (61.5%), amoxiclav (65.4%) and amikacin (42.3%).

DISCUSSION

Nosocomial infections, often known as healthcare-associated infections (HAI), occur in hospitals after a patient is admitted but before treatment begins. These infections are typically contracted during hospitalisation and become noticeable within the first 48 hours of being admitted.⁶ Centers like the National Healthcare Safety Network (NHSN) of the Centers for Disease Control and Prevention (CDC) keep a careful eye on the infections (CDC). The goal of this monitoring is to reduce the risk of HAIs and make the hospital environment safer for patients.⁷ Hospital-acquired infections include things like *Clostridium difficile* infections, hospital-acquired pneumonia, ventilator-associated pneumonia, and urinary tract infections caused by catheters (CDI).⁸The present study was conducted to find micro-organism in endotracheal tube aspirate and their sensitivity to drugs with patients on mechanical ventilation.

We found that the majority of the patients in our study belong to 51-60 (21%) and 61-70 (19%) years of age group followed by more than 70 years (15%), 41-50 years (12%), 31-40 years (12%), 21-30 years (12%) and less than 20 years (9%) of age. We observed that majority of the patients in our study was male (72%) as compared to female (28%). Chiwhane et al⁹ found mean age of 52 years in a total of 505 patients, of which 74.7% were male.

We found that majority of the patients had neurological system involvement (41.6%) followed by respiratory (21.8%) and gastrointestinal system (21.8%). There were patients who had been involved renal (14.9%), with diabetes (21.8%) and cardiovascular system (3%) involvement. According to a survey conducted by Tejerina et al¹⁰ among 2,897 patients in 361 intensive care units (ICUs) across 20 nations, male patients have a 1.3% higher risk of developing ventilator-associated pneumonia (VAP) than female patients. Sharpe et al¹¹ found that out of 854 individuals with post-traumatic VAP, 676 (79%) were male.

We observed that most common microorganism isolated from culture was Klebsiella O (7%) and Acinetobacter (7%) followed by Pseudomonas (5%), Citrobacter (2%), Klebsiella P (2%), Staphylococcus species (1%) and MRSA (1%) in our study. Sannathimmappa et al¹² observed that the majority of samples (118/154, 76.6%) exhibited monomicrobial growth, while the remaining samples (36/154, 23.4%) exhibited polymicrobial growth of two or more species of bacteria. Deepthi Gupta et al.⁹⁰ also discovered that the most common isolates were Gram-negative aerobic rods from the gastrointestinal tract, with K. pneumoniae being the most prevalent species.

We found that in terms of antibiotic sensitivity of ET tube aspiration sample, majority of the patients had bacteriological profile resistant to ampicillin (92.3%), nitrofurantoin (92.3%), cefotaxime (88.55), ceftriaxone (84.6%), cefepime (69.2%), gentamicin (69.2%), imipenem (69.2%), meropenem (69.2%), piperacillin and tazobactam (65.4%), ciprofloxacin (61.5%), amoxiclav (65.4%) and amikacin (42.3%). Results from a study by Sannathimmappa et al¹² showed that A. baumannii (85.7%), K. pneumoniae (73%), E. coli (67%), and P. aeruginosa (24%), were the most frequent MDR Gram-negative bacteria. Carbapenem resistance (CRE) was most commonly detected among K. pneumoniae (23/35), a member of the Enterobacteriaceae family, while ESBL production was highest among E. coli (3/4) and K. pneumoniae (6/35).

The shortcoming is that the present study only looked at one tertiary care centre, yet the bacterial profile still accurately reflects the surrounding community.

CONCLUSION

Authors found that majority of the patients had neurological system involvement. Most common microorganism isolated from culture was Klebsiella O and majority of the patients had bacteriological profile resistant to ampicillin.

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