THE MICROBIOLOGICAL PROFILE OF VENTILATOR ASSOCIATED PNEUMONIA.

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ABSTRACT: BACKGROUND- Nosocomial infections (NI) are responsible for increased morbidity and mortality in hospitalized patients. Hospital acquired pneumonia is the second most common nosocomial infection. **AIM :** To isolate and identify the organisms causing Ventilator associated pneumonia and to know their resistance pattern. **METHOD :** We conducted the study in the Intensive Care Unit of our Hospital over a period of one year. All patients on mechanical ventilation for more than 48 hours were included in this study. The pathogens were identified based on the standard bacteriological procedures including Gram's stain, colony morphology on Blood agar, MacConkey agar and SDA and biochemical reactions. **FINDINGS**- 50 out of 128 samples were culture positive, the incidence being 39.06%. Out of 50 cases, 33(45.2%) were males & 17(30.9%) were females. 50% of the cases ventilated for respiratory cause developed VAP while only 20.8% of the cases ventilated for non-respiratory cause developed VAP. Out of 50 cases, 20(40%) were early onset VAP cases, while 30(60%) were late onset VAP cases. **CONCLUSION :** P. aeruginosa was the predominant organism isolated followed by E.coli with maximum sensitivity to Imipenem.

KEYWORDS: Ventilator associated pneumonia, Pseudomonas aeruginosa, Imipenem.

INTRODUCTION: Ventilator associated pneumonia(VAP) is defined as pneumonia occurring after 48 hours of endotracheal intubation and initiation of mechanical ventilation. VAP is categorized as early onset VAP which occurs within four days of endotracheal intubation whereas late onset VAP occurs after four days of endotracheal intubation. Early onset VAP is caused by Str. pneumoniae, H. influenza, Moraxella catarrhalis, MSSA, etc. While Late onset VAP is caused by P. aeruginosa, Acinetobacter, Enterobacter species, MRSA, etc. VAP is frequently polymicrobial and Gram negative bacilli are the predominant organisms isolated.[3]

CLINICAL DIAGNOSTIC CRITERIA FOR VAP ARE:

Clinical suspicion of pneumonia with a new or progressive chest radiographic infiltrates after 48 hours of patient's mechanical ventilation and one of the following

Fever >38.3^{o}C

Leukocytosis > 12000/cmm or leukopenia < 4000/cmm

Purulent respiratory secretions with gram stain demonstration of bacteria and polymorphs

Cultures with growth >10^5 cfu/ml [3]

AIM: To isolate and identify the organisms causing Ventilator associated pneumonia and to know their resistance pattern.

METHODS:

SETTING AND SUBJECTS: We conducted the study in the Intensive Care Unit of our hospital over a period of one year from 1st July 2011 to 30th June 2012. All patients on mechanical ventilation for more than 48 hours were included in this study. Patients with pneumonia prior to mechanical ventilation or within 48 hours of mechanical ventilation were excluded.

STUDY DESIGN AND DATA COLLECTION: From each patient the following data was collected- Name, age, sex, primary diagnosis, date of admission in the hospital and ICU.

The patients fulfilling both the clinical and microbiological criteria were diagnosed to be suffering from VAP. Microbiological criteria included positive Gram stain (>10 polymorphonuclear cells/ low power field and ≥1 bacteria/ oil immersion field with or without the presence of intracellular bacteria). Clinical criteria included modified Clinical Pulmonary Infection Score (CPIS) > 6

CPIS points	0	1	2
Tracheal secretions	Rare	Abundant	Purulent
Leukocyte count (mm^3)	>4,000 and <11,000	<4,000 and >11,000	<4,000 or >11,000 + band forms
Temperature (°C)	>36.5 and <38.4	>38.5 and <38.9	>39 or <36
PaO_2/FIO_2 ratio (mmHg)	>240 or ARDS	-	≤240 and no ARDS
Chest radiograph	No infiltrate	Diffuse infiltrate	Localized infiltrate
Culture of tracheal aspirate	Negative	-	Positive

CPIS: Clinical pulmonary infection scoring

IDENIFICATION OF VAP PATHOGENS: The pathogens were identified based on the standard bacteriological procedures including-

- Gram's stain
- Colony morphology on Blood agar , MacConkey agar and SDA
- Biochemical reactions. [10]

FINDINGS

INCIDENCE: 50 out of 128 samples were culture positive, the incidence being 39.06%

Characterisics of the patients-

Incidence in males and females- Table I

Incidence differences due to various causes of ventilation- Table II

Incidence due to early onset and late onset pneumonia- Table III

DISCUSSION: The incidence of VAP in our study was 39.06% which was similar to a study conducted by Shalini et. al.(35.78%) and Rakshit et. al.[4][8] In males incidence of VAP was 45.2% and that in females was 30.9% which was similar to the study conducted by Gadani et. al.[11] 40% of cases were early onset VAP and 60% were late onset VAP which tallies to other studies conducted by Chastre et. al. and Kollef et. al.[5][6] Incidence in patients ventilated for respiratory cause was 50% and that due to non-respiratory cause was 20.83%, which co-relates to the study conducted by Akash Deep et. al.[7] Pseudomonas was the predominant organism in our study (31.48%) similar to that conducted by Joseph et. al. (21.3%) and Gadani et. al. (43.24%)[9][11]

CONCLUSION: Pseudomonas aeruginosa was the predominant micro organism isolated with maximum resistance to Tobramycin. E. coli was the second most common micro organism with maximum resistance to Ampicillin. While both were 100% sensitive to Imipenem. Microbiologial surveillance facilitates the monitoring of changes of dominant micro- organisms and antibiotic susceptibilities helping in the decision of empirical treatment regimes and as a result, selecting the right antibiotics.

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TABLE I:

Gender	No. of VAP cases	No. of cases in whom VAP absent	Total no. of cases
Male	33 (45.2%)	40 (54.8%)	73 (100%)
Female	17 (30.9%)	38 (69.1%)	55 (100%)

$X^2 = 2.69$

P value > 0.1 (not significant)

TABLE II

Cause of ventilation	No. of VAP cases	No. of cases in whom VAP absent	Total no. of cases
Respiratory cause	40 (50%)	40 (50%)	80 (100%)
Non respiratory cause	10 (20.8%)	38 (79.2%)	48 (100%)

$X^2 = 10.72$

P value <0.01 (highly significant)

TABLE III

Duration of ventilation	No. of VAP cases	Total no. of cases
Early onset	20 (40%)	50 (100%)
Late onset	30 (60%)	50 (100%)

$X^2 = 4$

P value < 0.05 (significant)

FIGURE 1 Causative Agents-

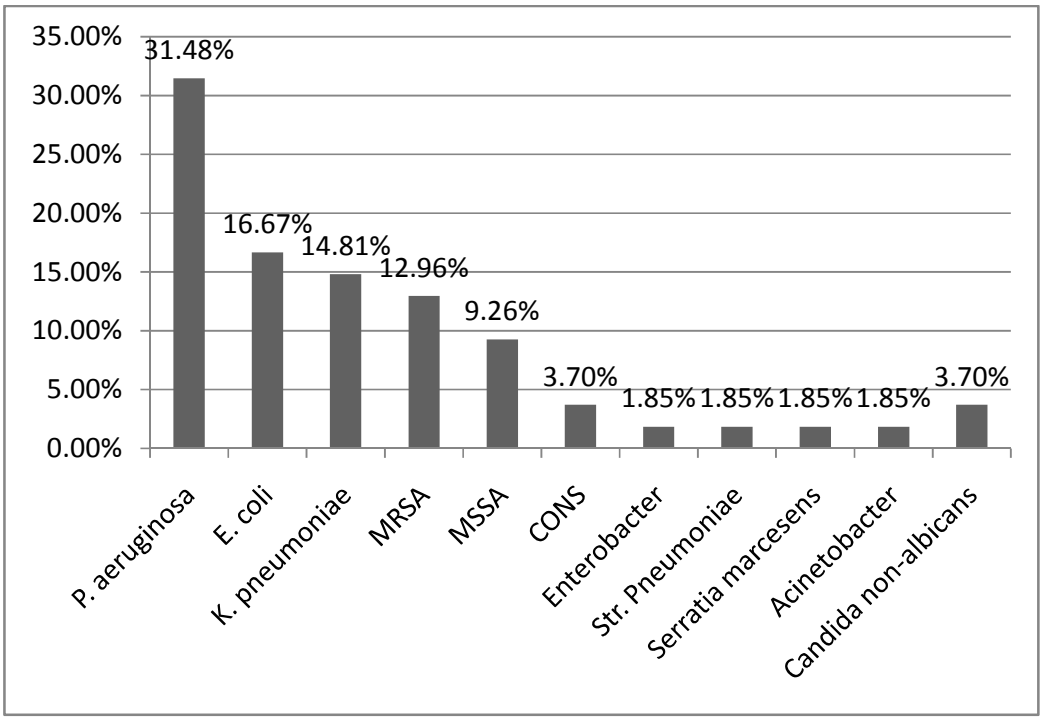


FIGURE 2

Resistance Pattern of P. aeruginosa-

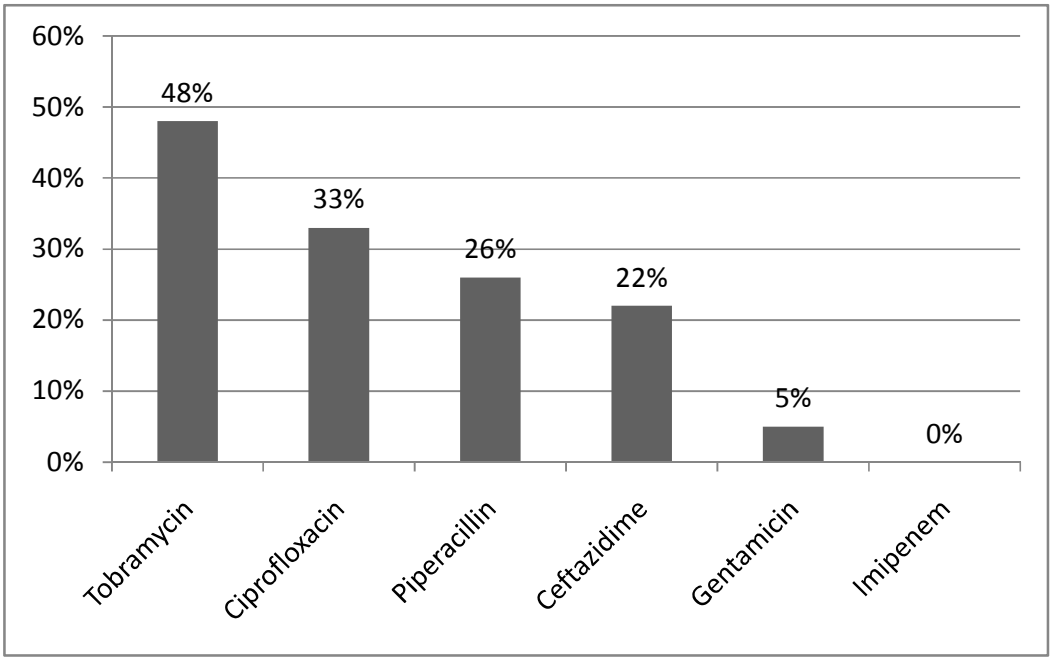
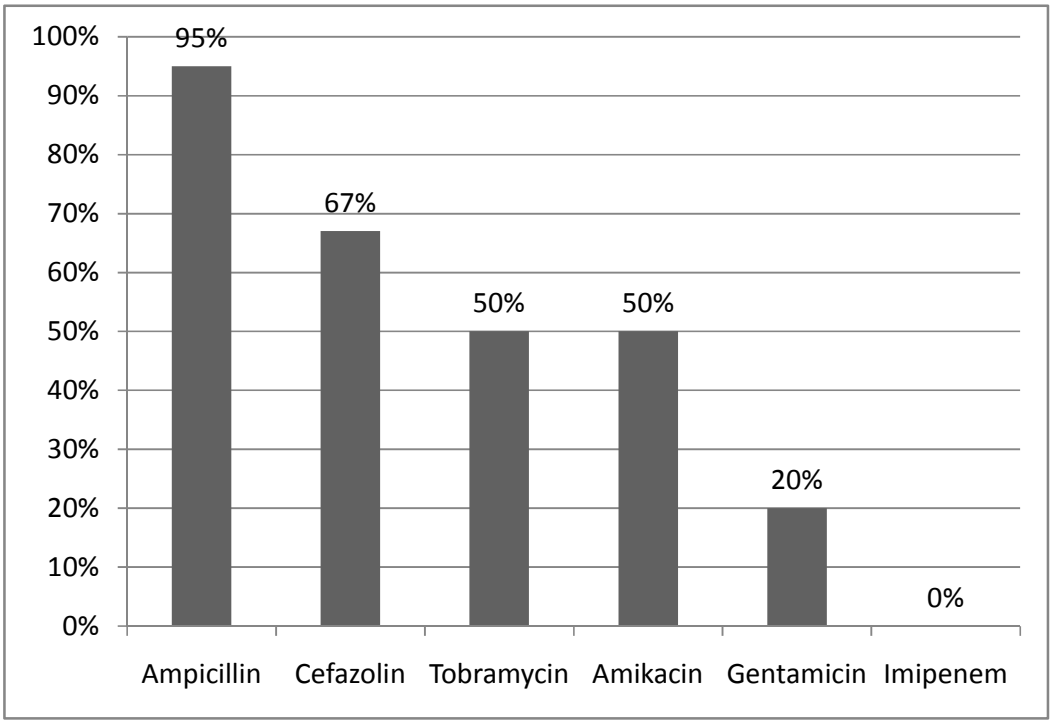


FIGURE 3

Resistance Pattern of E. coli



CONFLICT OF INTEREST: None

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