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Original Article

Assessment of ventilator associated pneumonia in hospitalized patients

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ABSTRACT:

Background: Ventilator-associated pneumonia (VAP) refers to bacterial pneumonia developed in patients who have been mechanically ventilated for a duration of more than 48 hours. The present study was conducted to assess ventilator associated pneumonia in hospitalized patients. **Materials & Methods:** 104 patients who developed pneumonia of both genders were enrolled. Parameters such as incidence of VAP, duration of mechanical ventilation and duration of hospital stay were recorded. **Results:** Out of 104 patients, males were 64 and females were 40. Diagnosis was meningitis seen in 11 VAP and 9 non VAP, GBS in 10 and 3, cardiogenic shock in 9 and 2, stroke in 7 and 1, malaria in 12 and 4, sepsis in 11 and 3, dengue shock syndrome in 8 and 5 and hepatic encephalopathy in 6 and 3 in VAP and non- VAP cases. There were 12, 8, 10, 6, 12, 8, 9 and 5 survivors cases in meningitis, GBS, cardiogenic shock, stroke, malaria, sepsis, dengue shock syndrome and hepatic encephalopathy respectively (P< 0.05). Apache II score in VAP was 21.3, in non- VAP was 15.2, in survivors was 14.2 and in non- survivors was 24.7, mechanical ventilation days was 12.6, 5.4, 7.3 and 9.5 in VAP, non-VAP, survivors and in non- survivors respectively. Mean hospital stay was 16.5, 8.1, 11.3 and 10.7 days in in VAP, non-VAP, survivors and in non- survivors respectively. The difference was significant (P< 0.05). **Conclusion:** Most common diagnosis was meningitis and Apache II score was higher among VAP patients as compared to non- VAP patients.

Key words: Meningitis, Sepsis, ventilator associated pneumonia

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INTRODUCTION

Ventilator-associated pneumonia (VAP) refers to bacterial pneumonia developed in patients who have been mechanically ventilated for a duration of more than 48 hours. It ranges from 6 to 52% and can reach 76% in some specific settings. Hospital-acquired pneumonia (HAP) is the pneumonia after 48 hours or more after admission, which did not appear to be incubating at the time of admission.[1] The presence of HAP increases hospital stay by an average of 7–9 days per patient also imposes an extra financial burden to the hospital. The risk of VAP is highest early in the course of hospital stay, and is estimated to be 3%/day during the first 5 days of ventilation, 2%/day during days 5–10 of ventilation and 1%/day after this.[2]

Risk factors include prolonged mechanical ventilation, reintubation after extubation. If the infection occurs within 48 -72 hrs of intubation then it is called early onset type and after 72 hrs of intubation it is called late onset type VAP respectively.[3] Delay in initiating appropriate antibiotic therapy can increase the mortality associated with VAP, and thus therapy should not be postponed for the purpose of performing diagnosis. This initial empirical antimicrobial therapy can be modified based on the knowledge of local microbiological data, patient characteristics, and sensitivity pattern of expected pathogens at the institution.[4]

The clinical diagnosis based on purulent sputum may follow intubation or oropharyngeal secretion leakage around airway, chest X-ray changes suspected of VAP may also be a feature of pulmonary oedema,

pulmonary infarction, atelectasis or acute respiratory distress syndrome.[5] The present study was conducted to assess ventilator associated pneumonia in hospitalized patients.

MATERIALS & METHODS

The present study comprised of 104 patients who developed pneumonia of both genders. All were enrolled after their relatives gave consent to participate in the study. Patients who developed pneumonia within 48 hours or those who were admitted with pneumonia at the time of admission and patients of acute respiratory distress syndrome were excluded from the study.

Information related to patients such as name, age, gender etc. was recorded. Elective tracheostomy was done in some of the patients who were thought to stay for a long period on mechanical ventilation to avoid re intubation. The severity of illness based on APACHE II score during first 24 hours of admission were noted. Clinical pulmonary infection score (CPIS) greater than six was used as diagnostic criteria for VAP. Endotracheal aspirate was preferred over protected specimen brush (PSB) sampling and bronchoalveolar lavage (BAL). Parameters such as incidence of VAP, duration of mechanical ventilation and duration of hospital stay were recorded. Results of the study were compiled and assessed statistically.

RESULTS

Table I Distribution of patients

Total- 104		
Gender	**Males**	**Females**
Number	64	40

Table I shows that out of 104 patients, males were 64 and females were 40.

Table II Clinical diagnosis of cases

Diagnosis	VAP	Non- VAP	P value	Survivors	Non- survivors	P value
Meningitis	11	9	0.05	12	8	0.04
GBS	10	3	0.04	8	5	0.15
Cardiogenic Shock	9	2	0.02	10	1	0.01
Stroke	7	1	0.01	6	2	0.05
Malaria	12	4	0.02	12	4	0.01
Sepsis	11	3	0.04	8	6	0.14
Dengue Shock Syndrome	8	5	0.12	9	4	0.11
Hepatic Encephalopathy	6	3	0.15	5	4	0.80
Total	74	30		70	34	

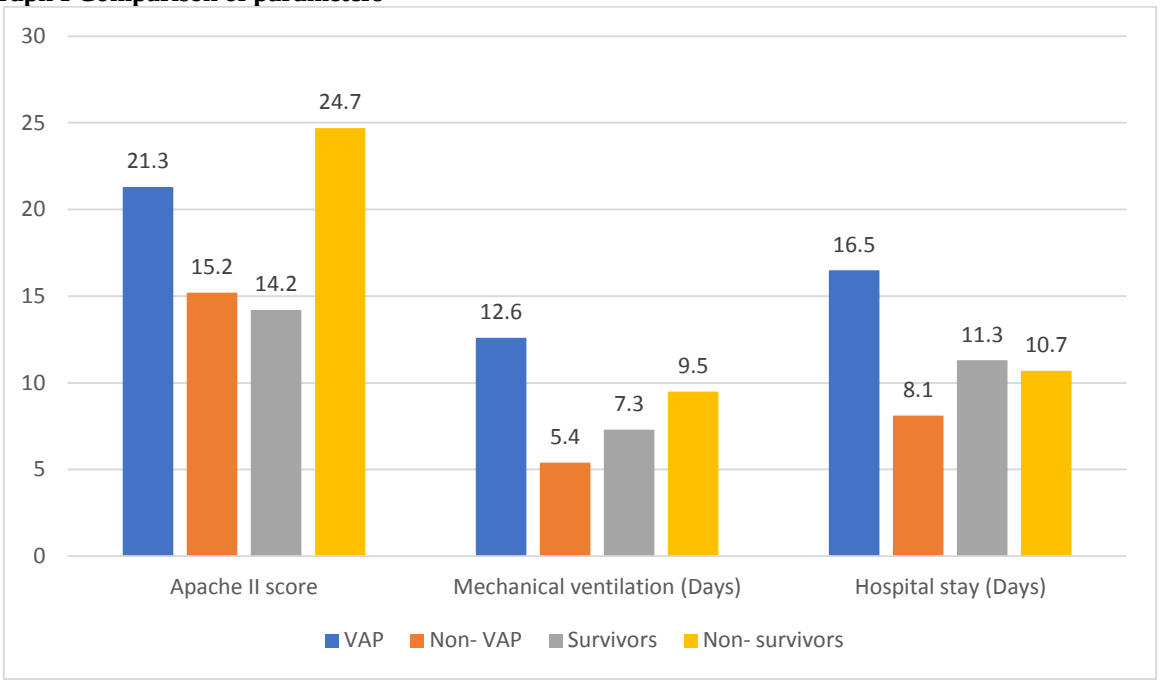
Table II shows that diagnosis was meningitis seen in 11 VAP and 9 non VAP, GBS in 10 and 3, cardiogenic shock in 9 and 2, stroke in 7 and 1, malaria in 12 and 4, sepsis in 11 and 3, dengue shock syndrome in 8 and 5 and hepatic encephalopathy in 6 and 3 in VAP and non- VAP cases. There were 12, 8, 10, 6, 12, 8, 9 and 5 survivors cases in meningitis, GBS, cardiogenic shock, stroke, malaria, sepsis, dengue shock syndrome and hepatic encephalopathy respectively ($P< 0.05$).

Table III Comparison of parameters

Parameters	VAP	Non- VAP	P value	Survivors	Non- survivors	P value
Apache II score	21.3	15.2	0.05	14.2	24.7	0.04
Mechanical ventilation (Days)	12.6	5.4	0.01	7.3	9.5	0.90
Hospital stay (Days)	16.5	8.1	0.02	11.3	10.7	0.87

Table III, graph I shows that Apache II score in VAP was 21.3, in non- VAP was 15.2, in survivors was 14.2 and in non- survivors was 24.7, mechanical ventilation days was 12.6, 5.4, 7.3 and 9.5 in VAP, non- VAP, survivors and in non- survivors respectively. Mean hospital stay was 16.5, 8.1, 11.3 and 10.7 days in in VAP, non- VAP, survivors and in non- survivors respectively. The difference was significant ($P< 0.05$).

Graph I Comparison of parameters



DISCUSSION

Hospital acquired pneumonia also known as nosocomial pneumonia, is defined as the onset of pneumonia symptoms more than 48 hours. after admission to the hospital.[6] Lack of a gold standard for diagnosis is the major culprit of poor outcome of VAP. Fever and leukocytosis are non-specific and can be caused by any condition that releases cytokines.[7] Although microbiology helps in diagnosis, it is not devoid of pitfalls. In fact, it was proven that colonization of airway is common and presence of pathogens in tracheal secretions in the absence of clinical findings does not suggest VAP.[8] The Clinical Pulmonary Infection Scoring (CPIS) system originally proposed by Pugin and others helps in diagnosing VAP with better sensitivity (72%) and specificity (80%). The CDC criteria for diagnosis are as follows- mechanical ventilation for greater than 48 hours, new or persistent or progressive radiographic infiltrates, fever greater than 38.5 c, leukocytosis or leukopenia and positive culture for endotracheal aspirate.[9] The present study was conducted to assess ventilator associated pneumonia in hospitalized patients.

In present study, out of 104 patients, males were 64 and females were 40. Mohanty et al[10] conducted a study on 100 patients. Endotracheal aspirates were obtained under strict aseptic precautions using a 22-inch Romson's 12F suction catheter with a mucus extractor. Gram staining and biochemical tests for identification and antimicrobial susceptibility test were performed. The patients were classified into four groups named VAP, NON VAP, SURVIVORS and NON SURVIVORS. The incidence of VAP in this study was 30%. The association between genders (p value-0.372), age (p value-0.929) and VAP infection was not found to be significant. There was no significant correlation between the primary disease and development of VAP (p value =0.24). Most common organism isolated was P. aeruginosa, (9 isolates) followed by MRSA (7 isolates) and most of them were resistant to commonly used antibiotics.

We found that diagnosis was meningitis seen in 11 VAP and 9 non VAP, GBS in 10 and 3, cardiogenic shock in 9 and 2, stroke in 7 and 1, malaria in 12 and 4, sepsis in 11 and 3, dengue shock syndrome in 8 and 5 and hepatic encephalopathy in 6 and 3 in VAP and non- VAP cases. There were 12, 8, 10, 6, 12, 8, 9 and 5 survivors cases in meningitis, GBS, cardiogenic shock, stroke, malaria, sepsis, dengue shock syndrome and hepatic encephalopathy respectively. Gadani et al[11] included 100 patients randomly, kept on ventilatory support for more than 48 hours. It was found that 37 patients developed VAP. The risk factor significantly associated with VAP was found to be duration of ventilator support, reintubation, supine position, advanced age and altered consciousness. Declining ratio of partial pressure to inspired fraction of oxygen (PaO_2/FiO_2 ratio) was found to be the earliest indicator of VAP. The most common organism isolated in our institution was Pseudomonas. The incidence of early-onset VAP (within 96 h) was found to be 27% while the late-onset type (>96 h) was 73%. Late-onset VAP had poor prognosis in terms of mortality (66%) as compared to the early-onset type (20%). The mortality of patients of the non-VAP group was found to be 41% while that of VAP patients was 54%. Targeted strategies aimed at preventing VAP should be implemented to improve patient outcome and reduce length of intensive care

unit stay and costs. Above all, everyone of the critical care unit should understand the factors that place the patients at risk of VAP and utmost importance must be given to prevent VAP.

Joseph et al[12] determined the incidence and the risk factors for development of VAP in critically ill adult patients. The incidence of VAP was 30.67 and 15.87 per 1,000 ventilator days in the two different ICUs. In our study 58.3% of the cases were late-onset VAP, while 41.7% were early-onset VAP. Univariate analysis indicated that the following were significantly associated with VAP: impaired consciousness, tracheostomy, re-intubation, emergency intubation, and nasogastric tube. Emergency intubation and intravenous sedatives were found to be the specific risk factors for early onset VAP, while tracheostomy and re-intubation were the independent predictors of late-onset VAP by multivariate logistic regression analysis.

CONCLUSION

Authors found that most common diagnosis was meningitis and Apache II score was higher among VAP patients as compared to non- VAP patients.

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