

Original Research Article

Co-Morbidities in Hospital Acquired Pneumonia and Ventilator Associated Pneumonia

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Abstract: Nosocomial infections are common and can increase disease morbidity in patients. Hospital Acquired Pneumonia (HAP) and Ventilator Associated Pneumonia (VAP) are among the leading causes for nosocomial infections. They also constitute one of the leading causes for morbidity and mortality among the nosocomial infections. The present study was done to evaluate the presence of comorbidities in patients developing Hospital Acquired Pneumonia and Ventilator Acquired Pneumonia. The study was conducted on all patients above 16 years of age diagnosed with HAP and VAP admitted and treated at Yenepoya Medical College Hospital, Mangalore from October 2013 to October 2015. It is a descriptive study in which 50 patients of hospital acquired and ventilator associated pneumonia were observed for the presence of any comorbidities. In the 50 cases, it was observed that 72% of them had pre-respiratory illness, 42% had Diabetes Mellitus, 38% had Systemic Hypertension and 20% had Ischemic Heart Disease. It was observed that most of the cases of hospital acquired and ventilator associated pneumonias had pre-existing respiratory illness. However, the presence of comorbidities also increased the chance for HAP and VAP.

Keywords: Nosocomial infections, Pneumonia, pre-respiratory illness

INTRODUCTION

Pneumonia is an infection of the pulmonary parenchyma. It is a known fact that patients can acquire infection from hospital. These are known as hospital acquired or nosocomial infections. Pneumonia is the second most common nosocomial infection affecting 9-24% of critically ill patients [1]. It is one of the leading cause of morbidity and mortality among nosocomial infections [2]. Hospital acquired pneumonia (HAP) is pneumonia that occurs 48 hours or more after admission and did not appear to be incubating at the time of admission [3]. Ventilator associated pneumonia [VAP] is a type of nosocomial pneumonia that develops more than 48 to 72 hours after endotracheal intubation [4].

MATERIAL AND METHODS

The study was conducted in patients admitted in Yenepoya Medical College Hospital over a period of 2 years from October 2013 to 2015. The study included

50 patients diagnosed with nosocomial pneumonia. The patients were selected based on the criteria for diagnosis of nosocomial pneumonia according to the Modified Centers for Disease Control and Prevention (CDC) [5, 6].

Inclusion Criteria

All patients above the age of 16 years of age of both gender, who developed nosocomial pneumonia were included in the study. Diagnosis of HAP/VAP was made using the modified CDC Criteria: Chest radiographic opacities (new progressive or persistent infiltrate or cavitation) AND at least two of the following:

1. Fever >38°C or >100.4°F.
2. Leukopenia (<4000 WBC/μL) or Leukocytosis (>12,000 WBC/μL).
3. Altered mental status with no other recognized cause in the elderly.

4. New onset of purulent sputum, or change in character of sputum, or increased respiratory secretions, or increased suctioning requirements.
5. Worsening gas exchange (desaturation, increased oxygen requirements or increased ventilator demand).
6. New onset or worsening cough, or dyspnea, or tachypnea.
7. Rales or bronchial breath sounds.

Exclusion Criteria

Patients below the age of 16 were excluded from the study. Patients who developed respiratory

infections less than 48 hours of hospital admission. Those who were discharged from intensive care unit in less than 48 hours or died within 48 hours.

RESULTS AND DISCUSSION

The study included 50 patients with HAP/VAP. 6 patients between the age of 16 to 30, 25 were between the age of 31 to 60 years, 19 were above 60 years. There were 34 males and 16 female patients in the study. 20 patients developed Hospital Acquired Pneumonia while 30 patients developed Ventilator Associated Pneumonia.

Table 1: Comorbidities and HAP/VAP

Comorbidities	Nosocomial Pneumonia				Total	%
	HAP (n=20)		VAP (n=30)			
	Number	%	Number	%		
Diabetes Mellitus	10	50%	11	52.4%	21	42%
Systemic Hypertension	5	25%	14	73.7%	19	38%
Ischemic Heart Disease	2	10%	8	80.0%	10	20%
Pre-existing Respiratory Illness	16	80%	20	55.6%	36	72%

Out of the 50 patients studied 36 patients (72% had) pre-respiratory illness including COPD, 21 patients (42%) had Diabetes, 19 patients (38%) had Hypertension and 10 patients (20%) had Ischemic Heart Disease which showed that pre-existing respiratory illness is an important pre-disposing factor for the development of nosocomial pneumonia. This finding was consistent with a study conducted in JIPMER by Noyal Maria Joseph *et al* [7].

The finding in our study is comparable to the patient statistics in the study conducted by Kuo-Tung Huang where 42 patients of 838 patients with nosocomial pneumonia had ventilator associated pneumonia [8]. Our finding is consistent with the study conducted by Vasuki, who had 253 patients developing HAP of which 26% of IMCU admission were due to cardiac and pulmonary emergencies [9]. Simay Serin *et al.* conducted a study with 37 patients with VAP, trauma followed by pulmonary disease followed by CNS diseases were among the more common diagnosis at admission who developed VAP during hospitalization. Respiratory failure was seen in 34 cases of VAP [10].

Our study was not in consensus with the findings in the study conducted by Eirini Tsakiridou *et*

al who did not support the hypothesis that HbA1c to be associated with increased risk of VAP in the ICU [11].

In a study conducted by Ozlem Equils *et al* 448 patients enrolled in the study, 183 were diabetic [12]. Demosthenes Markis *et al.* studied the Impact of COPD on ICU Mortality in Patients with Ventilator and found that presence of COPD in VAP was an independent risk factor for ICU mortality [13].

Alp E, Güven *et al* in a prospective study on incidence, risk factors and mortality of nosocomial pneumonia in Intensive Care Units found Coma and COPD seen to contribute to the development of VAP [14] which is in understanding with our present study. Isabel Jimenez-Trujillo observed VAP incidence rates were higher among Type 2 Diabetes Mellitus patients. Mortality was higher for older patients and those with more co-morbid conditions [15]. In a study conducted by Nikhil Sinha it was observed that the prevalence of VAP was more in patients with medical illnesses like diabetes, hypertension and CRF than patients without them [16]. Pneumonia are common to diabetics' due to colonization in the nasal and oral flora by pathogenic organisms [17]. Co-morbid conditions contributed to development of VAP and increase mortality. Co-morbidities like alcoholism, diabetes, hypertension, chronic renal failure was found to be significant statistically [18].

CONCLUSION

It is important to have history of the patients' co-morbidities and any immunosuppressive disease and of medications that could predispose the individual to nosocomial infections. In such situation, it would help in anticipating the patients' treatment and use of prophylactic measure in preventing nosocomial infections which would potentially complicate the morbidity of the patients and thus increase mortality.

REFERENCES

1. Girish L, Dandagi, Issac Mathew, Gaude G S. Nosocomial Pneumonia in Critically Ill patients in India- A Clinical Study. *International Journal of Scientific Research*. 2013; 2(2):2277-8179.
2. Tablan OC, Anderson LJ, Besser R, Bridges C, Hajjeh R. Healthcare Infection Control Practices Advisory Committee, Centers for Disease Control and Prevention Guidelines for preventing Healthcare-associated Pneumonia, 2003; recommendations of the CDC and the Healthcare Infection Control Practices Advisory Committee. *MMWR Recomm Rep*. 2004; 53(RR-3):1-36.
3. Guidelines for the management of adults with hospital acquired, ventilator-associated, and healthcare-associated pneumonia. *Am J Respir Crit Care Med*. 2005; 17:388-416.
4. This official statement of the American thoracic society was adopted by the ATS Board of Directors, American thoracic Society. Hospital-Acquired Pneumonia in adults: Diagnosis, Assessment of Severity, Initial Antimicrobial Therapy, and Preventive Strategies. A Consensus Statement. *Am J Respir Crit Care Med*. 1995; 153:1711-25.
5. Horan TC, Andrus M, Dudeck MA. CDC/NHSN Surveillance Definition of Health Care-Associated Infection and Criteria for Specific Types of Infection in the Acute Care Setting. *Am J Infect Control*. 2008; 36:309-32.
6. Rello J, Diaz E.; Pneumonia in the Intensive Care Unit. *Critical Care Medicine*. 2003; 31(10):2544-51.
7. Charles MP, Easow JM, Joseph NM, Ravishankar M, Kumar S, Umadevi S. Incidence and risk factors of ventilator associated pneumonia in a tertiary care hospital. *The Australasian Medical Journal*. 2013; 6(4):178-182.
8. Huang KT, Tseng CC, Fang WF, Lin MC. An Early Predictor of the Outcome of Patients with Ventilator-Associated Pneumonia. *Chang Gung Med J*. 2010;33(3):274-82.
9. Vasuki V. Clinical Profile of Hospital Acquired Pneumonia in A Tertiary Care Hospital, South India. *Int J Res Med Sci*. 2016; 4(6):1841-1844.
10. Erbay RH, Yalcin AN, Zencir M, Serin S, Atalay H. Costs and risk factors for ventilator-associated pneumonia in a Turkish University Hospital's Intensive Care Unit: A case-control study. *BMC Pulmonary Medicine*. 2004; 4:3.
11. Tsakiridou E, Makris D, Chatzipantazi V. "Diabetes and Hemoglobin A1c as Risk Factors for Nosocomial Infections in Critically Ill Patients," *Critical Care Research and Practice*. 2013; 2013; 9.
12. Equils O, da Costa C, Wible M, Lipsky BA. The effect of diabetes mellitus on outcomes of patients with nosocomial pneumonia caused by methicillin-resistant *Staphylococcus aureus*: data from a prospective double-blind clinical trial comparing treatment with linezolid versus vancomycin. *BMC Infectious Diseases*. 2016;16(1):476.
13. Markis D, Desrousseaux B, Zakyntinos E, Durocher A, Nseir S. The Impact of COPD on ICU Mortality in Patients with Ventilator-Associated Pneumonia. *Respiratory Medicine*. 2011; 105(7):1022-1029.
14. Alp E, Güven M, Yıldız O, Aygen B, Voss A, Doganay M. Incidence, risk factors and mortality of nosocomial pneumonia in Intensive Care Units: A prospective study. *Annals of Clinical Microbiology and Antimicrobials*. 2004; 3:17.
15. Jiménez-Trujillo I, Jiménez-García R, de Miguel-Díez J, de Miguel-Yanes JM, Hernández-Barrera V. Incidence, Characteristic and Outcomes of Ventilator-Associated Pneumonia Among Type 2 Diabetes Patients: An Observational Population-Based Study in Spain. *Eur J Intern Med*. 2017; 40 72-78.
16. Sinha N, Ghanekar J, Mehta A, Sandagiri A. Profile of Patients with Ventilator Associated Pneumonia. *International journal of current medical and applied Sciences*. 2016; 12(1):26-30.
17. Ljubić S, Balachandran A, Pavlić-Renar I, Barada A, Metelko Ž. Pulmonary infections in diabetes mellitus. *Diabetologia Croat*. 2005; 33(4):115-124.
18. Dhadke VN, Dhadke S, Bhoite V. To Study Ventilator Associated Pneumonia Incidence, Risk Factors and Outcome in Patients on Mechanical Ventilation in Medical Intensive Care Unit. *Int J Curr Res Aca Rev*. 2015; 3(10): 35-53.