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Original Research Article

Risk factors of community acquired pneumonia among the elderly population: A study in a semi urban area

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ABSTRACT

Background: Pneumonia is defined as an infection and inflammation of the alveoli and the bronchioles. It is caused by microorganisms when the hosts' defences are overcome by their virulence. Community Acquired Pneumonia affects people of all age groups, though the elderly is especially susceptible.
Materials and Methods: This retrospective study was conducted on 56 patients above the age of 65 years who were admitted to our hospital for pneumonia. Demographic data of the patients such as age, sex, weight, temperature blood pressure etc. was taken. History of underlying disease, comorbidities, cardiopulmonary function was noted. Data on the laboratory investigations such as Complete Blood Picture, haemoglobin estimation, Blood glucose levels, Kidney function tests, liver function rests, electrolyte levels, CRP, D Dimer were noted. Details of chest X rays or Ultra sound, ABG analysis were also noted. Details of sputum culture and sensitivity and blood culture and sensitivity for the patients was also noted.
Results: the most common comorbidity was hypertension, followed by cerebrovascular diseases cardiopathy, COPD and diabetes. Klebsiella pneumoniae was isolated in 69.6%, Pseudomonas aeruginosa in 48.2%, Candida albicans in 51.8% and Acinetobacter baumanni in 44.6% cases in sputum culture and in blood culture Klebsiella pneumoniae was isolated in 16.1%) followed by Pseudomonas aeruginosa in 8.9% cases.
Conclusion: Community acquired pneumonia contributes significantly to the health burden of the world especially causing severe morbidity and mortality among the elderly patients. For a better prognosis, it is important to diagnose and identify the risk factors so that the severity of the infection can be prevented.

1. Introduction

Pneumonia is defined as an infection and inflammation of the alveoli and the bronchioles. It is caused by microorganisms when the hosts' defences are overcome by their virulence.

Community Acquired Pneumonia is defined as Pneumonia which occurs outside the hospital and remains an important cause of morbidity and mortality worldwide especially among the elderly.[1] It is the second main cause of hospitalization and it is estimated that around 6,00,000 people are hospitalized due to pneumonia in a year.[2,3] In the United states alone, around 4.5 million people are affected every year and require hospital consultation[4] and worldwide around 6.8 million people are hospitalised every year with around 1.1 million deaths.[5] It is the fourth common cause of death after ischemic heart disease, cardiac stroke and chronic obstructive pulmonary disease.[6] In Europe, the leading cause of death because of infection is CAP.[7] 23% of the global burden of CAP is seen in India.[8]

It affects people of all age groups, though the elderly are especially susceptible. Elderly more often require hospitalization due to pneumonia compared to the younger generation and result in longer hospital stays. In the elderly,

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pneumonia progresses very fast with poor prognosis. The main cause is respiratory insufficiency.[7,9]

In the elderly of more than 65 years, many a times there are comorbidities, which further increase their risk of CAP by 2 to 3 fold. The risk factors of CAP are said to be increase in age, asthma, alcoholism, smoking, immunosuppression, cardiovascular disease, COPD, cerebrovascular disease renal disease, hypertension and diabetes.[10–12] Neurodegenerative diseases such as Parkinson's disease and dementia also play a role in severity of CAP.[13]

The typical symptoms of CAP include cough with sputum production, fever, fatigue, decreased appetite, urinary incontinence, at times delirium, dyspnoea.

The common causes of CAP are bacterial and viral infection. The organisms enter the body through inhalation, which is the major means but another route of entry is the entry of the organisms through the reflux of the stomach or through the aspiration of the secretions from oropharynx.[14]

2. Materials and Methods

This retrospective study was done by the Department of Medicine and Microbiology at Mallareddy Institute of Medical Sciences from March 2018 to February 2020. 56 patients above the age of 65 years who were admitted to our hospital during the study period for pneumonia were included into the study. Data of these patients were retrieved from the case sheets from medical records department. They were confirmed as having pneumonia based on the chest radiogram before of within 48 hours of admission with history of cough with expectorant, with or without temperature, chest pain, dyspnoea. An ethical committee approval was obtained.

Case sheets of patients who were deceased during the study period were excluded from the study. All the case sheets whose clinical data was incomplete or whose treatment was not completed were also excluded from the study.

Demographic data of the patients such as age, sex, weight, temperature blood pressure etc. was taken. History of underlying disease, comorbidities, cardiopulmonary function was noted. Data on the laboratory investigations such as Complete Blood Picture, haemoglobin estimation, Blood glucose levels, Kidney function tests, liver function rests, electrolyte levels, CRP, D Dimer were noted. Details of chest X-rays or ultrasound, ABG analysis were also noted. Details of sputum culture and sensitivity and blood culture and sensitivity for the patients was also noted. In case where sputum was unavailable, Bronchoalveolar lavage (BAL) fluid was cultured. The gram stain for all the samples was also done.

Statistical analysis was done on SPSS software and the data was presented on tables and charts.

3. Results

A total of 56 patients were included into the study, who had all the required data in their case sheets. The number of males were 31(55.4%) and females were 25(44.6%). The most common comorbidity present among the patients was hypertension which was seen in 48(85.7%) of the patients, followed by cerebrovascular disease, in 41(73.2%), cardiopathy in 36(64.3%), Chronic Obstructive Pulmonary Disease in 33(58.9%) of the patients. 25(44.6%) of the patients had diabetes and 16(28.6%) of them had undergone a previous major surgery (Table 1).

Table 1: Comorbidities among patients with pneumonia

Comorbidity	Number	Percentage
Hypertension	48	85.7%
Cerebrovascular disease	41	73.2%
COPD	33	58.9%
Cardiopathy	36	64.3%
Diabetes	25	44.6%
Benign Prostatic Hyperplasia	13	23.2%
Surgery	16	28.6%
Electrolyte abnormalities	9	16.1%
Chronic neuropathy	3	5.4%
Others	6	10.7%

The most common bacterial organism to be isolated from the sputum cultures was Klebsiella pneumoniae in 39(69.6%), Psudomonas aeruginosa in 27(48.2%), Candida albicans in 29(51.8%) and Acinetobacter baumanni in 25(44.6%). In blood culture however, the most common organism to isolated was Klebsiella pneumoniae in 9(16.1%) followed by Pseudomonas aerugicosa in 5(8.9%) (Table 2)

Table 2: Bacterial organisms isolated in sputum and blood cultures

Organisms	Sputum Culture	Blood Culture
Acinetobacter baumanni	25 (44.6%)	-
Klebsiella pneumoniae	39 (69.6%)	9 (16.1%)
Pseudomonas aeruginosa	27 (48.2%)	5 (8.9%)
Streptococcus pneumoniae	18 (32.1%)	-
Staphylococcus aureus	26 (46.4%)	3 (5.4%)
E. coli	12 (21.4%)	4 (7.1%)
Candida albicans	29 (51.8%)	2 (3.6%)
Proteus mirabilis	3 (5.4%)	1 (1.8%)
Enterobacter spp	1 (1.8%)	-

27(48.2%) of the patients had thyroid dysfunction, mostly hypothyroidism. 21(37.5%) of the patients has more than 2 lobes of the lungs affected while 32(37.1%) had 2 lobes or less affected. Hydrothorax was observed bilaterally in 6(10.7%) of the patients and unilaterally in 7(12.5%) of them. 31(55.4%) of the patients had abnormal liver functions as observed in the laboratory investigations.

Suction was required for 14(25%) of the patients, 11(19.6%) of the patients were brought to the hospital in unconscious stage. Mechanical ventilator was needed in 8 (14.3%) of the cases and non-invasive ventilation was needed in 1 (33.9%) (Table 3).

Table 3: Clinical status of the patients

Clinical features	Number	Percentage
Thyroid dysfunction	27	48.2%
Lobes affected in lung		
≥3	21	37.5%
< 3	32	57.1%
Hydrothorax		
Unilateral	7	12.5%
Bilateral	6	10.7%
Abnormal liver function	31	55.4%
Unconscious	11	19.6%
Suction required	14	25%
Nasal feeding	21	37.5%
Gastrointestinal decompression	2	3.6%
Requirement of ventilator	8	14.3%
Vasopressors	12	21.4%
Non-invasive ventilation	19	33.9%

The mean haemoglobin level of the patients was 10.22 ± 2.18. Only 5 patients were anaemic and corresponding treatment was given during the course of their stay. The rest of the blood picture was in the normal range in general while the CRP levels were 10.23 ± 2.91 mg/dL (Table 4).

Table 4: Laboratory investigations

Investigations	Mean ±SD
Haemoglobin gm/dL	10.22 ± 2.18
White Blood Cells ($x10^9$/L)	9.73 ± 3.11
Neutrophil%	72.12 ± 11.2
Lymphocyte %	17.41 ± 5.28
Platelets	1.86 lakhs
BNP (pg/ml)	312.74 ± 91.22
CRP (mg/dL)	10.23 ± 2.91
Blood Glucose (mmol/L)	7.62 ± 3.69
D Dimer (ng/mL)	275.4 ± 62.19

4. Discussion

Pneumonia in elderly is comparatively difficult to diagnose than in the younger generation as they may not have classical symptoms. However, Community associated pneumonia is associate with severe morbidity and mortality. There are a few risk factors which should be kept in mind for a proper and early diagnosis such as smoking and alcoholism, altered sensorium, obesity, diabetes, hypertension, increase in age, COPD.

In the present study, the most common comorbidity was hypertension, followed by cerebrovascular disease, cardiopathy, COPD and diabetes. A study by Ramirez et al., reported COPD to be the most common comorbidity for pneumonia in United States.[15] Chronic lung disease, stroke, congestive heart failure, diabetes mellitus, immunosuppressive conditions, malnutrition were also reported as comorbidities influencing the presence of pneumonia in some studies.[13,15,16] Smoking an alcoholism was found to be an associated comorbidity in our study and this was corroborated by a study by Ramirez et al, where also they report smoking and overuse of alcohol to be a comorbidity. Torres et al and Almirall et al., in their respective studies also reported that smoking and over use of alcohol is associated with increased incidence of CAP.[13,15] Dysphagia was observed in 30-40% of the population in a study by Tagliaferri et al., which lead to malnutrition.[17]

Klebsiella pneumoniae was the most common bacterial organism (69.6%) to be isolated in the present study, 48.2% was Pseudomonas aeruginosa, 51.8% candida albicans, 44.6% Acinetobacter baumanni %) and 46.4% was Staphylococcus aureus. A study in Mumbai reported Streptococcus pneumoniae to be the most common organism isolated followed by Gram negative bacilli such as Pseudomonas and Klebsiella.[18] Another study from South East Asia also reported Streptococcus pneumoniae to be the most commonly isolated organism,[19] while Pseudomonas and multidrug resistant Klebsiella are a cause for worry.[20,21] In few other South east Asian countries, Burkholderia pseudomallei was found to be the most common pathogen.[22] Amongst the blood cultures the most common isolated organism was Klebsiella pneumoniae in 16.1% of the cases and 8.9% was Pseudomonas. In a study by Li et al, Acinetobacter baumanni was the most common organism isolated followed by MRSA and ESBLs.[23]

The CRP levels in our study was 10.23 ± 2.91mg/dL. Elevated levels of CRP are associated with CAP as reported in a study by Moberg et al.[24]. A study by Majumdar et al., reported that oxygen saturation of <90% helps in the diagnosis of CAP.[25] A study by Li et al reiterated the association of elevated CRP levels are a cause for higher risk in the elderly patients.[23] C reactive protein belongs to the pentraxin protein family and its elevation is considered to be nonspecific though they are very sensitive markers for inflammation. D Dimers are usually related to the coagulation factors thereby detecting lung damage which would be detected by elevated levels.[26]

37.5% of the patients had 3 lobes or more affected while 57.1% had less than 3 lobes affected. Hydrothorax was observed in 10.7% of the patients in both the lungs while in 12.5%, it was seen in one lung. Mechanical ventilation was needed in 14.3% of the cases and non-invasive ventilation was needed in 33.9%.

5. Conclusions

Community acquired pneumonia contributes significantly to the health burden of the world especially causing severe morbidity and mortality among the elderly patients. Thus, an early detection of the condition is essential. For a better prognosis, it is important to diagnose and identify the risk factors so that the severity of the infection can be prevented.

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8. Conflict of Interest

The authors declare that they have no conflict of interest.

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