ORIGINAL ARTICLE

Clinical, Laboratory and Etiological Profile of Community Acquired Pneumonia in Elderly

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Abstract:

Background: Community Acquired Pneumonia (CAP) is third leading cause of death in older people worldwide. Apart from typical symptoms the elderly present with atypical symptoms. The diagnosis of pneumonia and its treatment poses a challenge for clinicians. *Aim and Objectives:* The study was undertaken to study clinical, radiological and bacterial profile of CAP in elderly (> 60years). *Material and Methods:* The elderly patient population consisted of 63 patients admitted with the diagnosis of CAP, as defined by British Thoracic society, were included in this prospective observational study over 24 months. *Results:* Among 63 patients, males were 38(60%) and females 25(40%), predominantly between the age group 60-74 years. Diabetes mellitus 12(19%) and anaemia 12(19%) were common co-morbidities. Cough 62(98%) was predominant presenting symptom. Patients presenting with atypical symptoms were 19(30%). *Staphylococcus aureus* was commonly isolated organism in 20(32%) patients on sputum examination. Left lower zone was commonly involved in 29(47%) on chest radiogram. The commonest complication was acute kidney injury in 9(15%).The overall mortality was 13% in this study group. *Conclusion:* CAP in elderly is a serious problem in clinical practice. In view of atypical presentation and associated co-morbidities, there is a delay in diagnosis, treatment initiation which may result in to high mortality. Early recognition, health education and awareness regarding pneumococcal vaccination are necessary.

Keywords: Community Acquired Pneumonia, Elderly, *Staphylococcus aureus*

Introduction:

Pneumonia is an inflammatory response in the lung caused by an infectious agent that involves alveoli and terminal bronchioles. It is manifested by increased weight of the lungs, replacement of normal lung sponginess by consolidation and alveoli filled with white blood cells, red blood cells and fibrin [1]. The clinical definition of pneumonia is a combination of symptoms (fever, chills, cough, chest pain, sputum) signs (hyper or hypothermia, increased respiratory rate, dullness on percussion, bronchial breathing, aegophony, crackles, wheeze, pleural friction, rub) and an opacity (opacities) on chest radiograph. In addition, laboratory findings such as increased white blood cell count and decreased level of oxygen saturation are considered [1].

Community Acquired Pneumonia (CAP) is defined as symptoms of an acute lower respiratory tract illness for less than one week with at least one systemic feature like temperature more than 37.7^{o}C, chills, rigors, malaise, new focal signs on examination having no other reason for illness and it occurs in a community setting and patient is not in hospital or health care set up [2].

CAP is third leading cause of death worldwide [3]. It is reported that the incidence varies between 1.3-11.6 cases per 1000 inhabitant year. It is noted that there is a rise in incidence of pneumonia from 15.4 cases per 1000 in people aged 60-74years to 34.2 for age group over 75 years [4].

There occur numerous structural and functional changes in old age with impaired defense mechanism in terms of impaired gag reflex, reduced mucocilliary function, nutritional and immunological deficits, and other associated co-morbidities which make them more susceptible for the infection [5-7].

Along with typical respiratory symptoms of CAP, various atypical features are observed in elderly. Atypical manifestations include an alteration of the patient's general condition, altered sensorium, confusion, headache, giddiness, gastrointestinal symptoms like pain abdomen, nausea, vomiting. In elderly, because of these atypical features, there will be delay in diagnosis of the disease and initiation of treatment causing increased rates of morbidity and mortality.

Sir William Osler quoted that, "In old age, pneumonia may be latent, coming on without chill; the cough and expectoration are slight, the physical signs ill defined and changeable, and the constitutional symptoms out of all proportion" [8]. Recovery is also delayed in older age group leading to high risk of functional decline because of bedsores, cognitive impairment, functional impairment, and reduced social activity [8]. The increasing number of elderly population is in need of utmost attention in order to reduce morbidity, disability and mortality. Hence this study is undertaken to study the clinical, radiological and sputum bacteriological profile of community acquired pneumonia in elderly. The present study was planned to find the clinical profile of community acquired pneumonia in elderly and to assess the bacteriological etiology and radiological presentation.

Material and Methods:

All the elderly patients irrespective of sex admitted with symptoms and signs suggestive of pneumonia and radiological features of consolidation were included prospectively over period of 24 months. The sputum was sent for Gram stain and culture sensitivity examination simultaneously before the patient being given first dose of antibiotic. The elderly who were on treatment for pulmonary tuberculosis, malignancy, retroviral disease and who took treatment for pneumonia prior to admission were excluded. A detailed clinical examination was carried out. Consent was taken from all the patients in format prescribed by ICMR before. A detailed clinical history was taken. History of co-morbid illnesses, history of immunization and habits like smoking and alcoholism, tobacco chewing was noted. Investigations like complete hemogram, urine examination, electro-cardiography, chest radiogram, renal function test and liver function tests were done. Sputum was collected for Gram stain, Ziehl Neelsen stain and culture and sensitivity in sterile container, before starting empirical antibiotic therapy. Sputum was also subjected to bacterial culture on blood agar and MacConkey's agar media. Leucocytos is defined as total leucocyte count more than 11,000/cum. Anemia is defined as Hemoglobin (Hb) less than10gm/dl. Data was presented using Mean ± Standard Deviation (SD), and association between variables was found by using Chi Square (X^2) test. For data entry and analysis SPSS software version 23 was used. The 'p' value of less than 0.05 is considered significant. The study was approved by Institutional Ethics Committee.

Results:

Age and Gender Distribution:

A total of 63 patients were enrolled as per inclusion criteria. The age group of patients varied from 60 to 99 years among of which 60% were males and 40% were females. Mean age was 71.14 ± 9.8. Patients in the age group 60-74 years constitute 55% as shown in Table 1.

Table 1: Distribution according to Age and Gender

Age (Yrs/Gender)	Male	Percent	Female	Percent	Total	Percent
60-74	21	55	17	68	38	60
75-84	9	24	8	32	17	27
≥85	8	21	0	0	8	13
Total	38	60	25	40	63	100

Chief Complaints:

Patients have presented with both typical and atypical symptoms. The common typical symptoms were cough in 62(98%), cough with expectoration in 54(86%), fever in 49(78%), chills in 25(40%), breathlessness in 32(51%), chest pain in 14(22%), and hemoptysis in 2(3%) patients. The atypical symptoms were nausea, vomiting and diarrhea in 4(6%), abdominal pain in 4(6%), back pain in 1(2%), giddiness in 4(6%), headache in 2(3%), altered sensorium in 1(2%) and convulsion in 1(2%) patient.

Co-morbid Conditions:

Among the co-morbid conditions, 12 (19%) had diabetes mellitus and 12(19%) had anemia. Other co-morbidities noted were ischemic heart disease in 11(17%) patients, chronic obstructive pulmonary disease in 6(10%), old healed pulmonary tuberculosis in 6(10%), hypertension in 5(8%), bronchial asthma in 3(5%), hypothyroidism in 1(2%), focal seizure in 1(2%), alcoholic liver disease in 1(2%). Multiple co-morbidities were noted in 9(14%) patients.

Distribution According to Habits:

Among habits, smoking was predominant and was seen in 12(19%) patients, tobacco chewing in 7(11%), alcohol consumption in 1(2%) patient. Multiple habits like alcohol consumption and smoking were noted in 8(13%), smoking and tobacco chewing in 7(11%), alcohol consumption and tobacco chewing in 1(2%) and smoking, alcohol consumption, tobacco chewing, all the three habits were seen in 1(2%) patients. Among 63 patients, 26(41%) patients had no habits.

Immunization:

All the 63(100%) patients included in this study were not immunized with pneumococcal and influenza vaccines in past.

Vital Signs:

In this study, tachycardia was noted in 19(30%) patients, hypotension in 21(33%), tachypnea in 43(68%), and fever in 38(60%) patients on admission.

Findings on Respiratory System Examination:

On palpation, the Tactile Vocal Fremitus (TVF) was increased in 46(74%) patients and on auscultation, bronchial breathing was heard in 43(68%), while absent in 2(3%) patients. Added sounds like fine crepitations being most commonly heard, in 41(65%), both rhonchi and crepitations were heard in 20(32%) patients on auscultation.

Laboratory Characteristics:

Leucocytosis was seen in 53(84%) patients. Mean total leucocyte count was 18926.Anemia was noted in 12(19%) patients; mean Hemoglobin was 10.97gm/dl. Erythrocyte Sedimentation Rate more than 20mm at 1 hour was noted in 44(70%) patients, mean ESR was 46.35mm.

Results of Sputum Gram Staining and Culture:
On Gram staining, sputum sample showed the presence of Gram positive cocci predominantly in 31(49%) patients, Gram negative bacilli in 6(10%), both Gram positive cocci and Gram negative bacilli in 17(27%).The AFB positivity was not observed in our study sample.

The predominantly isolated organisms on sputum culture (Table 2) were *Staphylococcus aureus* in 20(32%), followed by *Streptococcus pneumonia* in 14(21%), *Klebsiella pneumonia* in 5(8%) patients. The cough was not associated with expectoration in 9(14%) patients hence no sputum was given for examination.

Radiological Findings
The chest radiogram postero-anterior view done on day of admission, it was found that left lower zone is most commonly affected in 29(47%) patients, followed by right lower zone in 16(25%), left upper zone in 10(16%), right upper in 6(10%) and bilateral lung involvement and right middle zone was noted in 1(2%) patient each.

Complications:
The most common complication noted was acute kidney injury in 15%, septicemia in 11%, respiratory failure in 11% and parapneumonic effusion in 3% patients as shown in Table 3.

Table 2: Sputum Culture

Sputum culture	Frequency	Percent
Staphylococcus aureus	20	32
Streptococcus pneumoniae	14	21
Escherichia coli	6	10
Klebsiella pnemoniae	5	8
Streptococcus pyogen	4	6
Streptococcus pneumoniae and Pseudomonas aeruginosa	1	2
Streptococcus pneumoniae and Klebsiella pneumoniae	1	2
Klebsiella oxytoca	3	5
Total	54	86

Table 3: Distribution according to Complications

Complications	Number	Percent
Acute kidney injury	9	15
Respiratory failure	7	11
Septicemia	7	11
Parapneumonic effusion	2	3

Table 4: Prognostic Factors

Variables	Survived (n=53)	Succumbed (n=8)	Total (n=61)	P value
Age (Years)				
60-74	37	1	38	0.0075
75-84	12	5	17	
>85	4	2	6	
Pulse rate (per minute)				
60-100	40	2	42	0.0087
>100	13	6	19	
Septicemia				
Yes	4	3	7	0.0415
No	49	5	54	

Outcome:

Out of 63 patients, 53(84%) patients recovered, mortality was seen in 8(13%) patients and 2(3%) patients got discharged against medical advice.

Analysis of Prognostic Factors for Community Acquired Pneumonia in Elderly:

Statistical analysis was done to find the association between characteristics studied and the outcome (Survived n=53, succumbed n=8). Among 63 patients, two patients who got discharged Against Medical Advice (AMA=2) were excluded from prognostic factors analysis as shown in Table 4.

Statistical association was found significant between age, pulse rate and septicemia with respect to outcome ($p < 001$).

Discussion:

Community acquired pneumonia is a common infectious cause of hospital admission and mortality in elderly patients all over the world.

Age and Sex Distribution:

In this study, the age group of patients varied from 60 to 99 years. Majority of patients were in the age group 60–74 years which is similar to the study conducted by Abdulla *et al.* (2012) [9] where 64% of patients were between 65-75 years. Males were more affected, similar to a study conducted by Bochud *et al*. (2001) [10] in which 48.2% were males and 51.8% were females. This observation of incidence of pneumonia more in males in our study may be attributed to high rates of alcohol consumption and smoking in males in our geographic area and also due to the increased association of comorbid conditions like diabetes mellitus, anaemia, COPD and congestive cardiac failure in males.

Presenting Complaints

Elderly patients present with typical as well as atypical symptoms. In our study, cough was the commonest symptom, which is similar to the

study by Shah *et al*. (2010) [11] where in it was noted in 99%, Bochud *et al*. (2001) [10]. Productive cough in elderly was noted in 65% patients by Shah *et al*. (2010) [11], 52% patients by Bochud *et al*. (2001) [10] and 64% patients by Abdulla *et al*. (2012) [9]. Fever was seen in 78% patients in our study, 81% by Bochud *et al*. (2001) [10], 56% by Abdulla *et al*. (2012) [9] but Ruiz *et al*. (1999) [12] noted fever only in 27% of study population. Fever in pneumonia is usually associated with chills, which may not be seen commonly in elderly. In our study, chills were seen in 40% patients, which were similar to the study by Ruiz *et al*. (1999) [12], 41% patients and 59% in study by Bochud *et al*. (2001) [10]. Breathlessness was seen in almost half the study population, which was found similar in study by Bochud *et al*. (2001) [10], 46% patients but was observed only in 22% patients by Abdulla *et al*. (2012) [9]. Presentation with chest pain is found similar to the study by Abdulla *et al*. (2012) [9], 20% and Ruiz *et al*. (1999) [12] noted in 32%. But the study conducted by Shah *et al*. (2010) [11] had 75% patients with chest pain. Atypical symptoms involving gastrointestinal tract in 5.8% and neurological symptoms in 9% was reported by Bansal *et al*. (2004) [13], while headache was 58% in study by Bochud *et al*. (2001) [10]. Diabetes mellitus and anaemia were the commonest co-morbidities noted in our study, it was 46% in the study by Aslam *et al*. (2015) [14].

Habits:

Smoking was the commonest habit observed in 65% by Shah *et al*. (2010) [11], 35.3% by Bochud *et al*. (2001) [10], and 56% by Aslam *et al*. (2015) [14].

Examination:

Our study revealed tachycardia in only 30% of cases where in the study by Aslam *et al*. (2015) [14] showed tachycardia in 84% and 92% by Shah *et al*. (2010) [11]. Hypotension, tachypnea, fever were noted in similar number of patients in our study and the study by Abdulla *et al*. (2012) [9]. On palpation, increased tactile vocal fremitus was the major sign. Abdulla *et al*. (2012) [9] noted it in only in 20% patients. On auscultation, bronchial breath sounds were heard in 68% patients in our study, where as it is heard in only 24% patients by Abdulla *et al*. (2012) [9] and 4% patients by Bochud *et al*. (2001) [10]. Crepitations were heard in 97% patients in our study while in 98% in a study by Bansal *et al*. (2004) [13], 94% by Bochud *et al*. (2001) [10].

Laboratory Characteristics:

Leukocytosis was commonly observed. The study by Aslam *et al*. (2015) [14] also observed leukocytosis in 86% patients. Ruiz *et al*. (1999) [12] noted in 60% and Shah *et al*. (2010) [11] in 43% patients. In this study, *Staphylococcus aureus* was the most common etiological agent isolated. In the study conducted by Bansal *et al*. (2004) [15], *Streptococcus pneumoniae* constitutes about 35.8%, Ruiz *et al*. (1999) [12] while García-Ordóñez *et al*. (2001) [15] also noted as it was the commonest organism isolated. Nine patients were having mostly atypical pneumonia due to which there was minimal sputum and did not reveal a microbial etiology on gram stain or cultures.

The causative organisms of CAP are usually difficult to establish. The invasive methods are mostly effective and cannot be justified always and serological diagnosis is too late to be of any

therapeutic use. In spite of early diagnosis of pneumonia, it takes a few days to identify the causative microorganism in the blood or sputum samples and the etiology of many of the patients with CAP remains uncertain. Radiological data in our study showed a predominance of left lung involvement, which is found similar to the study by Bochud *et al*. (2001) [10] in 49% cases.

Complications:

Acute kidney injury was the commonest complication. Abdulla *et al*. (2012) [9] noted septic shock in 16% cases, pleural effusion in 12%, and respiratory failure in 4%. Bochud *et al*. (2001) [10] noted pleural effusion in 20% of study population. The mortality was similar to study by Aslam *et al*. (2015) [14]. Our study showed statistically significant association between age, pulse rate and septicemia. Study conducted by Abdulla *et al*. (2012) [9] showed similar association with tachycardia and septicemia but did not show any association between age.

Conclusion:

Community acquired pneumonia in elderly patients is a serious problem encountered in clinical practice. Our study showed that most of the older people especially men suffers from CAP and there is delay in medical assistance in view of atypical symptoms. Identifying bacteriological etiology is also challenging as sputum expectoration is less. Initiating empirical antibiotics from day one help reduce morbidity and mortality. Co-morbidities like diabetes mellitus and anaemia leads to delay in recovery. There is need to create awareness regarding immunization against influenza and pneumococci in elderly among clinicians and general public, which in turn can prevent pneumonia in them. World Pneumonia Day is observed on 12th November every year to create awareness about Pneumonia.

Limitations:

The study included the patients whose sputum showed organisms on culture. The number of patient enrolled may be less in view of delayed presentation and having received antibiotics before coming to us. The serology for atypical organisms and viral pathogens was not done. Serological evaluation for detection of organism was not done in this study.

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