

Clinical Presentation and Severity Assessment of Community Acquired Pneumonia in Adults Admitted to a Teaching Hospital

Muhammad Shakhawath Hossain,¹ Salma Islam,² Israt Zerin Eva,³ SK. Md. Abu Zafar,⁴ Dilruba Yeasmin,⁵ Kazi Fawzia Afreen,⁶ Md. Delwar Hossain⁷

ABSTRACT

Background & Objective: The purpose of the study was to evaluate the clinical presentation and severity of community acquired pneumonia in adults.

Methods: The present cross-sectional study was conducted in Sir Salimullah Medical College & Mitford Hospital, Dhaka over a period of 1 year. Patients admitted with the symptoms and signs suspected of pneumonia and confirmed by clinical examination and necessary investigations were the study population. The baseline characteristics, patients' behavioural factors, presenting complaints, co-morbidities, examination findings and investigations were recorded. Data were processed and analyzed using software SPSS (Statistical Package for Social Sciences), version 11.5. The test statistics used to analyze the data were descriptive statistics.

Result: In the present study, a large proportion of patients were 50 years or more than 50 years with mean age of the patients being 46.4 ± 13.3 years. A male predominance (58%) was observed in the series. Over half (56%) of the patients was smoker and 8% were alcoholic. Fever (90%) and purulent sputum (70%) were the common complaints. The second most common complaints were chest pain and haemoptysis (each of 44%). Thirty eight percent of the patients had dyspnoea and a very few had other symptoms. Eighteen percent of the patients had COPD, another 18% had diabetes and 4% had cardiac insufficiency. About one-quarter (24%) of the patients had agitation stupor, 88% bronchial breathing and 68% crackles. Right lower lobe (31%) and right middle lobe (26%) were commonly affected by pneumonia of the patients detected with a chest X-ray. Assessment of severity pneumonia by CURB-65 score shows that 83% of the patients had mild (score 0 – 1) CAP, 12% had moderate (score 2) and 5% had severe CAP (score 3 or more). Over two-thirds (68.5%) of the patients exhibited positive sputum for Gram's stain.

Conclusion: The study concluded that CAP is more likely to occur in older males with preexisting comorbidities like diabetes and COPD. Fever and purulent cough are the predominant presentation of CAP followed by chest pain and haemoptysis. Pneumonic consolidation on chest X-ray and +ve gram stain are diagnostic of CAP, while raised total count of WBC with neutrophilic leucocytosis are supportive to it. Assessing pneumonia severity by CURB-65 scoring system revealed that severe pneumonia (score 3 or more) is now a rarity. Patient evaluation should focus on severity of illness, patient age, comorbidities, clinical presentation, epidemiologic setting, and previous exposure. The majority of patients with CAP are treated empirically based on the most common pathogen(s) associated with the condition.

Key words: Community acquired pneumonia, clinical presentation, severity, adult etc.

Authors' information:

¹ Dr. Muhammad Shakhawath Hossain, Medical Officer, National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka.

² Dr. Salma Islam, Medical Officer, NITOR, Dhaka.

³ Dr. Israt Zerin Eva, Associate Consultant, National Healthcare Network.

⁴ Dr. SK. Md. Abu Zafar, Professor of Medicine (Retired), Sir Salimullah Medical College, Dhaka.

⁵ Dr. Dilruba Yeasmin, Assistant Registrar, National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka.

⁶ Dr. Kazi Fawzia Afreen, Asst. Prof, Respiratory Medicine, Sorkari Kormochari Hospital, Dhaka.

⁷ Dr. Md. Delwar Hossain, OSD, DGHS, Dhaka

Correspondence: Dr. Mohammad Shakhawath Hossain, Phone- 01673640085, Email: dr.shakhawathossain@gmail.com

INTRODUCTION:

Pneumonia is defined as an acute respiratory illness associated with recently developed radiological pulmonary shadowing which may be segmental, lobar or multilobar. The context in which pneumonia develops is highly suggestive of the likely organism(s) involved. Therefore, pneumonia is usually classified as community or hospital acquired or those occurring in immunocompromised hosts¹ Over the past one decade or two, however, patients presenting to the hospital are often found infected with multidrug-resistant (MDR) pathogens previously associated with hospital-acquired pneumonia. Factors responsible for this phenomenon include the development and widespread, indiscriminate use of potent oral antibiotics, earlier transfer of patients out of acute-care hospitals to their homes or various low care facilities, increased use of outpatient antibiotic therapy, general aging of the population and more extensive immunomodulatory therapies. Despite being the cause of significant morbidity and mortality, pneumonia is often misdiagnosed, mistreated and underestimated.²

Community-acquired pneumonia (CAP) is a term used to describe one of several diseases in which individuals who have not recently been hospitalized develop an infection of the lungs (pneumonia).² Community-acquired pneumonia occurs throughout the world and is a leading cause of illness and death. In United Kingdom an estimated 5-11/1000 adults suffer from CAP each year, accounting for around 5-12% of all lower respiratory tract infections. The incidence varies with age, being much higher in the very young and very old, in whom the mortality rates are also very higher.¹ CAP is usually spread by droplet infection and most cases occur in previously healthy individuals. The clinical presentation varies according to the immune state of the patient and the infectious agent.³ CAP occurs because the areas of the lung which absorb oxygen (alveoli) from the atmosphere become filled with fluid and cannot work effectively. CAP often presents with difficulty in breathing, fever, chest pain and a cough. Causes

of CAP include bacteria, viruses, fungi and parasites. CAP can be diagnosed by symptoms and physical examination alone, though X-rays, examination of the sputum and other tests are often used.⁴ But for the purpose of management of CAP, disease severity assessment is crucial. It guides therapeutic options, such as, the need for hospitalization or ICU admission, suitability for discharge home, the extent of investigation and choice and route of antimicrobial agent.^{5,6}

A disease severity assessment tool proposed by the British Thoracic Society (BTS) and modified by Neill and associates⁷ relies on four easily measurable clinical features. The tool was developed mainly as a means of identifying patients with severe CAP at high risk of mortality. The presence of two or more of the following features-mental confusion, respiratory rate ≥ 30 /min, diastolic blood pressure ≤ 60 mmHg and blood urea >7 mmol/L (CURB-65) -predicted mortality with an overall sensitivity and specificity of about 80%.⁸ As manifestation of CAP is protean, misdiagnosis and maltreatment of CAP is not unlikely. Therefore, differential diagnosis should be considered in all patients with acute respiratory symptoms. In this study the various presentations of CAP, disease severity of hospital admitted CAP patients by the CURB-65 scoring system were discussed so that clinicians are keen for developing suspicion, early diagnosis and treatment of pneumonia.

METHODS:

This cross-sectional study was carried out in Sir Salimullah Medical College & Mitford Hospital, Dhaka over a period of 1 year from June 2011 to May 2012. Patients with symptoms and signs suspected of pneumonia and confirmed by presence of consolidation on chest X-ray and/or presence of bacteria in the sputum were the study population. Patients aged >18 years, presented with clinical features suggestive of pneumonia, presence of consolidation on chest skiagram were included in the study. However, patients with pre-existing pulmonary tuberculosis, solid organ or haematological malignancies and HIV infection

were excluded. A total of 100 subjects who met the enrolment criteria were consecutively included in the study.

Having obtained ethical clearance from the Ethical Committee and verbal consent from the patients, the data collection began. The CAP was diagnosed with the presence of two or more of the 4 features-mental confusion, respiratory rate ≥ 30 /min, diastolic blood pressure ≤ 60 mmHg and blood urea >7 mmol/L (CURB-65).⁸ Statistical analysis was carried out using Statistical Package for Social Sciences, version 11.5 for Windows (SPSS Inc., Chicago, Illinois, USA). Categorical data were presented as frequency and percentage and continuous data as mean \pm SD. While categorical data were compared between groups using Chi-square (χ^2) Test, continuous data were compared between groups using Independent sample t-Test. For all analytical tests, the level of significance was set at 5% and p-value < 0.05 was considered significant.

RESULTS:

Over one-third (38%) of the patients was below 40 years of age, 12% between 40 – 50 years and 50% 50 or > 50 years old with mean age of the patients being 46.4 ± 13.3 (range: 25-70) years. Patients were predominantly male (58%) with male to female ratio being roughly 3:2. A large proportion of patients was housewife, followed by labourer (36%), businessman (12%) and farmer (10%). About three-quarters (74%) of the patients were poor (monthly income between Taka 3000-5000) with average monthly income being Taka 4960 ± 1271 (Table I). Over half (56%) of the patients was smoker and 8% alcoholics. Fever (90%) and purulent sputum (70%) were the common complaints of the patients. The second most common complaints were chest pain and haemoptysis (each 44%) followed by dyspnoea (38%). A few had other complaints as well (Table II). Eighteen percent of the patients had chronic obstructive pulmonary disease (COPD), another 18% had diabetes and 4% cardiac insufficiency (Fig. 1).

The mean pulse, systolic blood pressure and diastolic blood pressures, temperature and respiratory rate were 95 ± 18 beats/minute, 109 ± 14 mmHg and 67 ± 12 mmHg, 101.0 ± 1.2 °F and 24 ± 5 breath/minute respectively. About one-quarter (24%) of the patients had agitation stupor, 88% bronchial breathing and 68% crackles (Table III). Chest X-ray revealed involvement of right lower lobe (31%) and right middle lobe (26%) to be relatively common followed by right upper lobe (14%) left lower lobe (9%) and right upper and middle lobe (5%) (Table IV).

Investigations findings demonstrated that the mean total count of WBC, neutrophil, lymphocyte, eosinophil, monocyte, basophil and blood urea were 13850 ± 4278 /cu-mm of blood, $79.7 \pm 5.9\%$, $14.8 \pm 4.7\%$, $2.4 \pm 0.4\%$, $3.0 \pm 1.1\%$, $0.04 \pm 0.01\%$ and 5.5 ± 0.5 mmol/L respectively. Of the 100 patients 70 provided sputum for bacteriological examination. Of them 48 (68.5) were found positive for Gram stain bacteria (Table V). Assessment of severity pneumonia by CURB-65 score shows that 83% of the patients had mild (score 0-1) CAP, 12% had moderate (score 2) and 5% had severe (score 3 or more) (Table VI)

Table I. Distribution of patients by their demographic characteristics (n = 100)

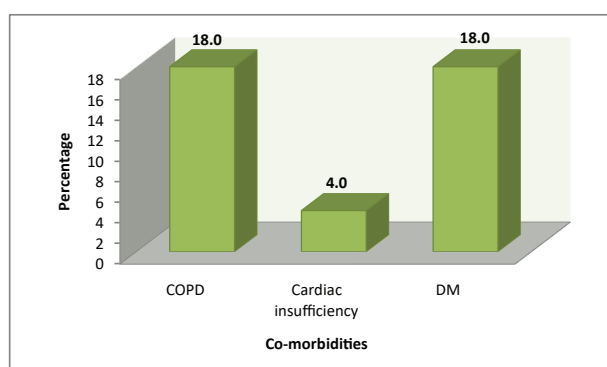
Demographic characteristics	Frequency	Percentage
Age (yrs)*		
<40	38	38.0
40-50	12	12.0
≥ 50	50	50.0
Sex		
Male	42	42.0
Female	58	58.0
Occupation		
Business	12	12.0
Farmer	10	10.0
Labor	36	36.0
Housewife	42	42.0
Monthly income (Taka) *		
3000 – 5000	74	74.0
6000 – 8000	26	26.0

* Mean age = (46.4 ± 13.3) years; range = (25 – 70) years.

* Mean income = (4960 ± 1271) Taka.

Table II. Distribution of patient's behavioral factors & Presenting complaints (n = 100)

Behavioral factors & presenting complaints	Frequency	Percentage
Patients' behavioral factors		
Smoking habit	56	56.0
Alcohol consumption	08	8.0
Presenting complaints		
Fever	90	90.0
Purulent sputum	70	70.0
Chest pain	44	44.0
Haemoptysis	44	44.0
Dyspnoea	38	38.0
Others	04	4.0

**Fig.1: Distribution of patients by co-morbidities (n = 100)****Table III. Distribution of patients examination findings (n = 100)**

Examination findings	Frequency %	Mean \pm SD
Pulse	-	95 \pm 18
Systolic BP	-	109 \pm 14
Diastolic BP	-	67 \pm 12
Temperature	-	101.0 \pm 1.2
Agitation stupor	24(24.0)	-
Bronchial breathing	88(88.0)	-
Crackles	68(68.0)	-
Respiratory rate	-	24.1 \pm 4.6

Table IV. Distribution of patients by pneumonic consolidation (n = 100)

Site of pneumonic consolidation	Frequency	Percentage
Right lower lobe	31	31.0
Right middle lobe	26	26.0
Right upper lobe	15	15.0
Left lower lobe	14	14.0
Left upper lobe	09	9.0
Right upper & middle lobe	05	5.0

Table V. Distribution of patients investigations (n = 100)

Investigations	Frequency %	Mean \pm SD
Total WBC	-	13850 \pm 4278
Neutrophil	-	79.7 \pm 5.9
Lymphocyte	-	14.8 \pm 4.7
Esinophil	-	2.4 \pm 0.4
Monocyte	-	3.0 \pm 1.1
Basophil	-	0.04 \pm 0.01
Blood urea	-	5.5 \pm 0.5
Sputum for Gram stain (n = 70)	48(68.50)	-

Table VI. Assessing severity of pneumonia using CURB-65 score (n = 100)

CURB-65 score	Frequency	Percentage
0 – 1	83	83.0
2	12	12.0
3 or more	05	5.0

DISCUSSION:

Despite many advances in medical science, the mortality rate from community-acquired pneumonia (CAP) has changed little in the past four decades. Death and adverse outcomes from CAP result from a complex interplay between the pathogen and the host. Newer information about the effect of pneumonia on comorbidity and underlying diseases, especially long term, suggests that this is an important additional axis that differs from the traditional triangular concept of pathogen, host defense, and antibiotic treatment.

In this study a large proportion of patients were 50 or more than 50 years with mean age of the patients being 46.4 \pm 13.3 years. Male patients outnumbered (58%) females with male to female ratio being roughly 3:2. Over half (56%) of the patients was smoker. Fever was the predominant (90%) complaint followed by purulent sputum (70%), chest pain (44%), haemoptysis (44%) and dyspnoea (38%). In terms of comorbidity, 18% had COPD, another 18% diabetes and 4% cardiac insufficiency. Physical examination showed that about one-quarter (24%) of the patients had agitation stupor, 88% bronchial breathing and 68% crackles. Chest X-ray revealed that about one-third of the patients had right lower lobe involvement (31%) followed by right middle lobe (26%) right upper lobe (14%) left lower lobe and right upper and middle lobe.

The classic findings of pneumonia (consolidation) caused by *S. Pneumoniae* is the presence of consolidation in the right lower lobe.⁹ Assessment of severity of pneumonia using CURB-65 scoring system demonstrated that majority (83%) of the patients' pneumonia were of mild nature (score 0 – 1) and were treatable as outpatient basis, 12% had score 2 and were considered as candidate for hospital supervised treatment and 5% had score 3 or more who were managed as cases of severe pneumonia in In-patient Department. Cunha¹⁰ in his study showed that patients with community-acquired pneumonia (CAP) due to typical bacterial CAP pathogens present with pulmonary symptoms, while patients with CAP due to atypical CAP pathogens present with a variety of pulmonary and extrapulmonary findings (e.g., CAP plus diarrhoea). Patients with bacterial CAP typically present with fever, usually with a productive cough and often with pleuritic chest pain. Andrews and associates¹¹ reported that common clinical symptoms of CAP include cough, fever, chills, fatigue, dyspnea, rigors, and pleuritic chest pain. Depending on the pathogens implicated, a patient's cough may be persistent and dry, or it may produce sputum. Other presentations may include headache and myalgia. Certain etiologies, such as legionella, also may produce gastrointestinal symptoms. Noreddin & Elkhatab¹² showed that patients who require hospital treatment for CAP are typically elderly persons; persons with underlying COPD, such as chronic bronchitis (not emphysema) and individuals with severe CAP related to underlying cardiopulmonary function, immune status, or pathogen virulence. In another study Lieberman et al¹³ reported that individuals with symptoms of CAP require further evaluation. Physical examination by a health provider may reveal fever, tachypnea, hypotension, tachycardia and/or changes in the amount of oxygen in the blood. Palpation and percussion to identify dull areas which do not resonate can identify areas of the lung which are consolidated. Examination of the lungs with the aid of a stethoscope can reveal several things a lack of normal breath sounds or the presence of rales. When the lungs are auscultated it can also indicate consolidation. Increased vibration of the chest when speaking (tactile fremitus) and increased volume of

whispered speech during auscultation of the chest can also reveal consolidation.

Of the 100 patients, sputum was feasible to collect from 70 patients for bacteriological investigations. Of them 48(68.5%) exhibited positive for Gram stain. Marrie & Huang¹⁴ found that Gram stain of sputum is reliable and diagnostic if performed on a well-collected specimen without many squamous epithelial cells (saliva/contamination) and a predominant organism is present. Gram stain shows few or no predominant organisms in patients with atypical CAPs. Bradley also in a recent study demonstrated that X-rays of the chest, examination of the blood and sputum for infectious microorganisms and blood tests are commonly used to diagnose individuals with suspected CAP based upon symptoms and physical examination. The use of each test depends on the severity of illness, local practices, and the concern for any complications resulting from the infection. Ambulatory CAP is the most common among young adults and is usually due to atypical CAP pathogens (e.g., *Mycoplasma pneumoniae*).¹⁵ People with underlying lung disease are more likely to develop CAP. Diseases such as emphysema or habits such as smoking result in more frequent and more severe bouts of CAP.¹⁶

All patients with CAP should have the amount of oxygen in their blood monitored with a machine called a pulse oximeter. This helps determine how well the lungs are able to work despite infection. In some cases, analysis of arterial blood gas may be required to accurately determine the amount of oxygen in the blood. Complete blood count (CBC) may reveal polymorphonuclear leucocytosis indicating an infection. Chest X-rays and chest computed tomography (CT) can reveal areas of opacity representing consolidation. In some cases, chest CT can reveal a CAP which is not detected on chest X-ray. However, CAP may not be seen on X-rays, because the disease is either in its initial stages or involves a part of the lung not easily seen by X-ray. X-rays can often be misleading, as many other diseases can mimic CAP such as heart problems or other types of lung damage.

CONCLUSION:

From the findings of the study, it can be concluded that older males are more vulnerable to develop pneumonia. Fever and purulent cough are the predominant symptoms of CAP followed by chest pain and haemoptysis with COPD and diabetes be the predisposing factors. Presence of pneumonic consolidation on chest skiagram and positive gram stain are diagnostic of CAP, while raised total count of WBC with neutrophilic leucocytosis are supportive to it. Assessing pneumonia severity by CURB-65 scoring system revealed that severe pneumonia (score 3 or more) is now a rarity. Patient evaluation should focus on severity of illness, patient age, comorbidities, clinical presentation, epidemiologic setting and previous exposure. The majority of patients with CAP are treated empirically based on the most common pathogen (s) associated with the condition. Further study is recommended to compare the findings of the present study.

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