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Clinical Characteristics and Socio-Demographic Profile of Community-Acquired Pneumonia in a Tertiary Hospital, Dhaka, Bangladesh

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ABSTRACT:

Background: *Community-acquired pneumonia (CAP) is the leading cause of morbidity and mortality among all age groups but specially among the elderly and patients with multiple co-morbidities. This study was performed to evaluate the clinical characteristics and socio-demographic features associated with the occurrence of CAP in a tertiary care teaching hospital.*

Methodology: *This is a hospital based cross sectional observational study done at Bangladesh Medical College Hospital, Dhanmondi, Dhaka with the study period of 1 year from January 2021 to December 2021. Total 287 patients of age group 20 years and above with clinical and radiological features of CAP were enrolled for this study purpose.*

Results: *Among 287 of CAP patients majority (53%) were males in the age group of 41-50 years (33.79%). Most of them residing in the urban locality (66.55%). (35.89%) overweight CAP patients were mostly associated with more than one comorbid conditions (51.57%). Diabetes mellitus (45.64%) and ischemic heart disease (33.79%) account the major corner among other comorbid conditions in our study group. (64.24%) male smokers developed CAP in comparison to the non smoker (84.55%) females. Patients presented to the hospital with CAP are mainly in the winter months. Fever (79.09%) and cough (76.31%) was their commonest presentation to us.*

Conclusion: *The ability to detect CAP at an earlier stages can be a keystone to alleviate its consequences on the healthcare systems as well as Intensive care units (ICU). To do so we need to establish preventive strategies, improvisation of the health care behaviour and standards of care for CAP.*

Keywords: *Community-acquired pneumonia, socio-demographic profile.*

I. INTRODUCTION

Community-acquired pneumonia (CAP) is a major public health problem and one of the leading cause of morbidity and mortality among all age groups in both developed and developing countries [1]. In spite of having various effective antimicrobials and promising vaccines it has still secured the leading cause of death among all the infectious diseases all over the world [2]. In Europe, the annual incidence of CAP is 1.6-10.6/1,000 adults [3]. Around 160,000 people with the age group of 15-59 years die in every year due to CAP in Asia [4]. During analysis of economical burden it was found that CAP associated with an annual cost of US

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$250.4 million which stands for the highest in comparison to diabetes mellitus, myocardial infarction, stroke and osteoporotic fractures [5,6].

CAP mostly remains underestimated as a disease burden as because majority of the cases treated empirically in the outpatient basis as well as inpatient settings. Pneumonia can be diagnosed on the clinical grounds but for confirmation of the causative agent it requires imaging (mostly chest x-ray), laboratory investigations and microbial cultures which are not usually available [7] all the time mainly in the developing countries like us due to financial in capabilities. But there are some other issues regarding this as the empirical use of antibiotics in the CAP treatment also creating antibiotic resistance in many cases. Over the last decade the microbiology of the CAP has remained the same although the introduction of successful vaccinations has bought some changes that are being noticeable now a day, that's why the emergence of empirical treatment is still considered mostly.

If we analysis various data it is clearly visible that the overall incidence, clinical profiles, usage of anti microbial and microbiological analysis are still less evident worldwide.

Therefore in our present study we tried our level best to evaluate the clinical features and socio-demographic profile of CAP patients attending to Bangladesh Medical College Hospital so that it can be utilised to make preventive strategies in the near future.

II. MATERIALS AND MEHODS

A. Study Design & Area:

This is a population based cross sectional observational study carried out in both outdoor and indoor Medicine department of Bangladesh Medical College Hospital (BMCH), Dhanmondi, Bangladesh.

B. Study Duration:

The study period was 1 year from January 2021 to December 2021.

C. Study Population:

All the confirmed cases of community acquired pneumonia were included here as the study population fulfilling the inclusion and exclusion criteria.

Definition of Pneumonia:

CAP was defined as symptoms consistent with pneumonia and pulmonary infiltrates on chest radiograph not known to be old, not acquired in a hospital or a nursing home residence. The following criteria had been used to define our study population:

(a) A new or progressive infiltrate on a chest X-ray at the time of disease

(b) 2 or more than two of the following criteria:

- cough, sputum production and dyspnoea
- Body temperature >38C or <36.1C
- Auscultatory findings consistent with pneumonia
- Leucocytosis > 10,000/cumm
- C-reactive protein >30mg/L [8],[9].

D. Inclusion Criteria:

- Patients were included in this study if the fulfils the above mentioned criteria.
- Age 20 years and above
- Informed written consent.

E. Exclusion Criteria:

- Cases of hospital-acquired pneumonia (pneumonia acquired >48 hours after hospital admission)
- Patients with ventilator associated pneumonia

- Patients who had been discharged from an acute care hospital
- HIV positive individuals
- COVID positive patients
- Pregnant women
- Patients unwilling to participate in the study
- Alteration in higher psychic function in critically ill patients.

F. Sampling Techniques:

Consecutive convenient (purposive) sampling method was applied in here.

G. Data Collection:

All the study subjects underwent thorough medical history, general clinical examination before enrolment. Patients provided the informed consent before they participated in the study. Once informed consent was obtained, all participants were asked to complete a questionnaire to collect basic demographics such as age, gender, area of residence,BMI, clinical characteristics, comorbidities and smoking history.

All the study participants visited to BMCH with symptoms like cough, fever, sputum production fulfilling the inclusion criteria underwent further investigations to enable appropriate disease diagnosis.

H. Data Analysis:

Data was recorded into semi-structured pre-tested pro forma. It was applied into Microsoft Excel and analysed using SPSS v 16.0. Summarisation of data was done according to data types and appropriate statistical tests were done Descriptive statistics included means, standard deviations, and percentages. Here, various modes of clinical presentation and demographic profiles were expressed as the total number of patients presenting with a particular presenting feature and then calculated as a percentage of the total number of patients. Statistical analysis was done by using appropriate statistical tool like 'chi-square' test, student 't' test, where applicable. The odds ratio (OR) and 95% confidence intervals (CIs) were calculated. A p value of <0.05 was considered to be statistically significant and p value of >0.05 was considered not significant statistically.

Informed consent was taken in all cases and records were kept confidentially.

III. RESULTS

A. Age and Gender distribution among the study population:

Among 287 CAP cases 151 were male and 136 female patients (Figure1). In our study more CAP patients were detected above the age of 40 years with majority (33.79%) in the age group of 41-50 years followed by (25.44%) were in there 51-60 years category. It was proven statistically significant in here (p<0.005) (Table 1).

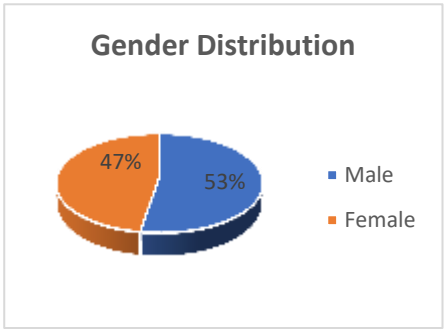


Figure 1: Gender wise distribution of study population

Age (years)	No of Patient (n=287)	Percentage (%)
20-30	17	5.92
31-40	31	10.8
41-50	97	33.79
51-60	73	25.44
>60	69	24.04
Total	287	100

Table 1: Age wise distribution of study group

B. Area of Residence among CAP patients

Majority of our study populations belonged from Urban locality (66.55%) in comparison to rural areas (33.45%) which was not found statistically significant in here (p>0.625) (Figure 2).

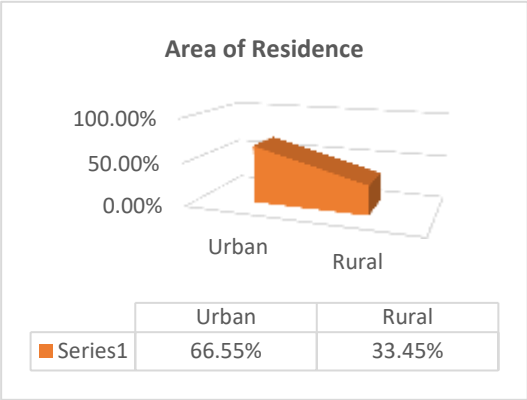


Figure 2: Area wise distribution of study population

C. Categorisation according to BMI among CAP patients:

Most (35.89%) of our CAP patients found to be overweight followed by Obese (25.09%) category. Obesity always known to be a risk factor for developing pneumonia which is also observed in here (Figure 3).

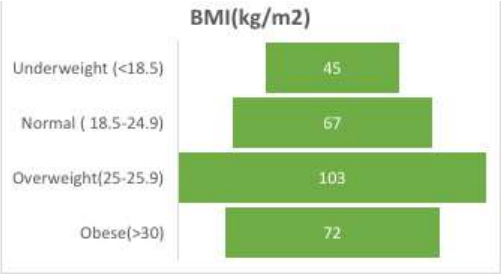


Figure 3: BMI categorisation among study group

D. Number of comorbid conditions among CAP patients:

Among 287 CAP patients 51.57% were associated with >1 comorbid conditions followed by 28.92% were affected by at least 1 comorbid conditions which was proven statistically significant in here (p<0.0002) (Figure 4).

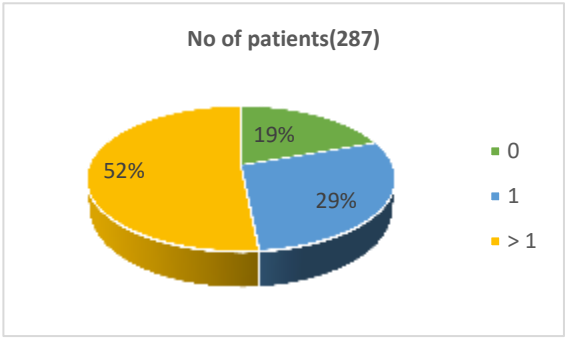


Figure 4. Percentage of comorbid conditions among CAP patients

E. Underlying diseases found in our CAP patients:

In our study we have observed that around 45.64% patients were diabetic followed by 33.79% had ischemic heart disease. Less 6.97% CAP patients were found among neoplastic cases (Table 2).

Underlying Diseases	**No of patients (287)**	**Percentage (%)**
Ischemic heart disease	97	33.79
Diabetes mellitus	131	45.64
Renal disease	66	22.99
Chronic obstructive pulmonary disease	71	24.73
Cerebrovascular disease	47	16.38
Liver disease	33	11.49
Neoplastic disease	20	6.97

Table 2: Underlying diseases among CAP patients

F. Smoking status among study group:

Mostly male (64.24%) CAP patients were found as smokers in our CAP patients in comparison to female (84.55%) which is probably due to social and religious aspects in our country.(Figure 5)

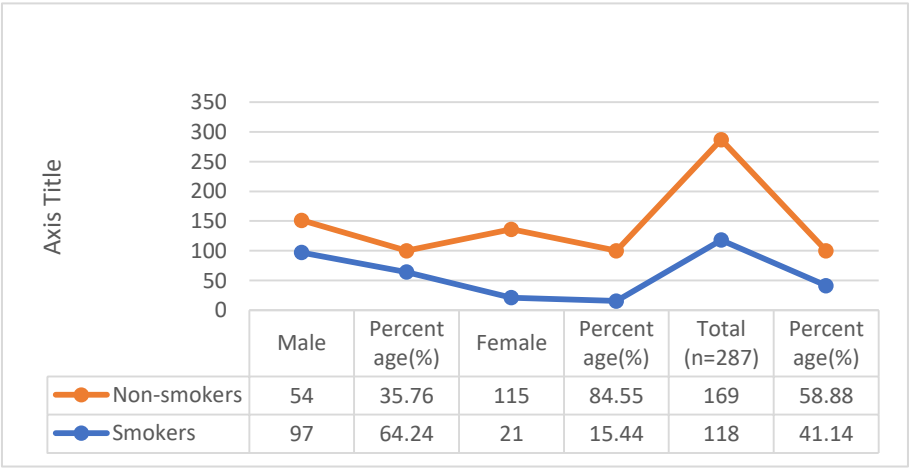
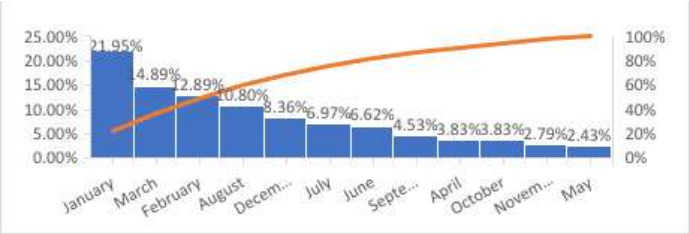


Figure 5: Smoking status among study group

G. Percentage of CAP patients according to the month of diagnosis:

21.95% CAP patients were found in the month of January followed by 14.98% in March. The prevalence was below 10% through the subsequent months and again a surge was found in August (10.80%) (Figure 6).

Figure 6: Percentage of CAP patients according to the month of diagnosis



H. Clinical Characteristics of study group:

During analysis of clinical characteristics of the study group it was found that majority (79.09%) of the patients presented to us with fever followed by cough (76.31%). We found tachypnea (89.19%) among most of the patients (Figure 7)

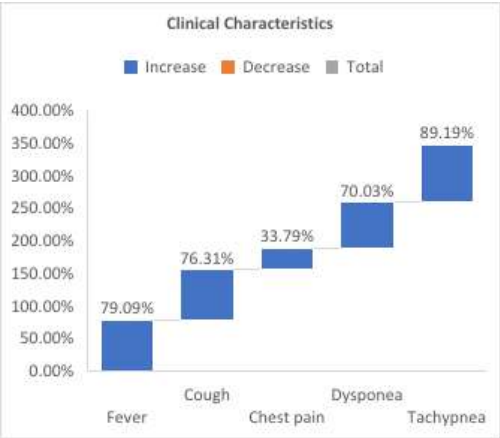


Figure 7: Clinical characteristics of study group

IV. DISCUSSION

CAP is still one of the leading cause of death worldwide under the infectious disease category. Many international researches have been done so far to predict its mortality and microbial response to various medicines but its socio-demographic profile is still under evaluated. In our country such data is not sufficient so far to come to a conclusion for taking preventive measures that's why in our study we tried to evaluate the clinical characteristics and socio-demographic profiles among CAP patients.

Age is an important risk factor if we analyse among CAP patients. Elderly patients get more affected by CAP than the younger ones. This picture is not different in our study as well. We found more CAP patients from the age group 40 years and above. There are also 2 more researches who have mentioned the similar findings in their articles [10,11]. Age can also modify several factors that can predispose to develop CAP as well.

Regarding gender analysis we found male predominant (53%) among our study group. But there is controversy regarding this factor as many studies mentioned gender is not a significant factor to consider for

CAP development. It also put emphasis on the fact that in our country many women don't put importance for seeking help from the health care system due to various social stigmata. However in one study it has mentioned about gender equality among elderly group of CAP in where the similar changes occur in the lung's defensive system during ageing [12].

Active smoking plays a vital role in the development CAP among both males and females both in direct or indirect way. Active smoking for prolonged period may lead to development of COPD among elderly which again predispose for pneumonia. 41.14% smokers develop CAP in our study among which majority were male group. Here, the non smokers group became majority because our female patients didn't have any smoking history. Although we have not evaluated the effects of passive smoking here. Only few studies who have taken the effects of passive smoking in consideration among CAP patients evaluation where they had found no significance of it [13,14].

Poor nutritional status has considered as a strong risk factor for the development of pneumonia which mainly encompassed hypoproteinemia, hypoalbuminemia, malnutrition and low BMI. But we have observed a different picture in our study where we found 35.89% overweight patients developed pneumonia followed by 25.09% in obese category.

In our study most of CAP patients associated with more than one comorbidities among which majority we found Diabetes mellitus(45.64%) and IHD(33.79%). Here, we found that 24.73% of chronic obstructive airway disease patients developed pneumonia. Many studies have been done so far focusing upon chronic airway diseases (COPD and Asthma) as a risk factor for developing CAP. Some studies have focused mainly inhaled drugs on the risk of developing CAP among COPD and Asthma patients [15,16]. Other comorbidities like liver disease, cancer etc had no effects , or no definitive conclusions could be drawn.

Seasonal variations has also got impact on pneumonia cases. We found majority (21.95%) of our cases in the winter months. The prevalence decreased in the peak of summer and again increased at the beginning of the winter months. Most of the other studies also got the similar findings in the winter months [17,18]. Although debates are still present regarding this on some studies.

Fever (79.09%) followed by cough (76.31%) were the predominant clinical presentation of our study group and tachypnea (89.19%) was our principle finding. Many studies mentioned about various presentation with specific feature to get highlighted.

V. LIMITATIONS OF STUDY

- The current study is a single-centre hospital based observational study
- Lack of microbiological diagnosis is a significant limitation in our current study
- There is lack of comparative group here
- Sample size was small also causes barriers to assess the risk factors for CAP
- There is also some limitations as we have not evaluated the usage of empirical antibiotics and its effects on our study group.

VI. CONCLUSION

Incidence of CAP in Dhaka city is increasing every year mainly in the winter months among elderly populations with multiple comorbidities. To combat this situation we should implement urgent preventive strategies, improvisation of health care facilities and qualities of care among Pneumonia patients.

VII. ACKNOWLEDGEMENT

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