Comparing community acquired pneumonia between elderly population and others

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ABSTRACT

Background: To evaluate the manifestations and outcome of community acquired pneumonia in elderly population and compare it with other adults in two teaching hospitals.

Patients and methods: A prospective study including all patients over 14 years of age admitted to our hospitals with community acquired pneumonia, was carried out over a period of 12 months. All adult patients and over 65 years old (elderly patients) diagnosed with pneumonia were examined and followed by two of the authors distinctly. Analysis was performed, using chi square, in order to find correlations between signs and symptoms of pneumonia and age.

Results: Totally, 183 patients (103 elderly) were studied. The mean age of the participants (±SD) was 59±24 years. The main manifestations of pneumonia in elderly patients were as follow: tachypnea (64%), cough (62%), and fever (34%), respectively. Our results showed that the frequency of fever (p=0.04), chest pain (p=0.001), and pleuritic pain (p=0.001) decrease with aging, however, mental status changes (p=0.015), and CHF (p=0.02) increase with aging. Thirty one patients (17%) died, of whom 29 were over 65 years of age (p=0.001).

Conclusion: The clinical presentations of pneumonia in the elderly population can be different from those in younger patients, therefore, it is important to be familiar with these differences to avoid unnecessary delays in prompt diagnosis.

Keywords: Elderly population; Respiratory tract infection; Community-acquired pneumonia.

INTRODUCTION

Geriatric Medicine differs from Internal Medicine, not in quality, but rather in the probability structures of diagnosis and outcome, presentation of illness and the need for explicit determination of aim of intervention. This fact is especially true in the case of infectious disease, because of age-associated impairment of immune system functions, which is an important cause of increasing mortality of the infections (1).

Pneumonia, is a common problem in older adults and is associated with substantial morbidity and mortality and considered as the leading cause of death due to infectious disease in the elderly (2). According to a study, the mortality rate of pneumonia during 18 months after effective therapy is approximately 24% (3). As seen in several national registration systems, the morbidity and mortality due to pneumonia have obviously increased in the older population in the past 10 years, despite all the improvements and studies done in this area (4).

There are not any general agreements on the clinical presentations of this disease, however,
symptoms such as elevated respiratory rate, cough, fever and sputum have been noted as the most common clinical manifestations of pneumonia in the elderly in different studies (1,5). Nevertheless, pneumonia can be difficult to diagnose in this age group, since clinical signs and symptoms are often muted (6).

Only 24% of the articles in the literature regarding “respiratory tract infections” satisfy the criteria of applicability while none of these reviews specify the methods used to identify and select the patients, or validate the included information (7,8).

Considering the importance of this topic and the mentioned problems, unavailability of sufficient information and lack of similar studies in our country Iran, this study was carried in two teaching hospitals, with the aim of identifying clinical manifestations of community acquired pneumonia (CAP) in the elderly population while comparing it with other adults, from the point of clinical, laboratory and outcomes.

The results should be used to perform an advanced planning system, in organizing elderly medicine, offering suitable health care services in this area, encouraging the positive points and resolving the weak points of this new branch of medicine, and finally, promoting level of health in Geriatrics and economizing the expenses in this field.

**PATIENTS and METHODS**

A prospective study including all patients over 14 years of age admitted to two teaching hospitals with CAP, was carried out from May 2007 to May 2008. All patients aged 14-65 years (non-elderly patients) and over 65 years (elderly patients) diagnosed with CAP were examined and followed by two of the authors distinctly. Community acquired pneumonia was defined by the presence of at least one clinical sign (body temperature >37.8°C, chest pain, cough, purulent sputum, crackles during auscultation) and one radiologic sign suggestive of pneumonia (alveolar or interstitial infiltrates with or without pleural effusion) associated with favorable outcome following antibiotic therapy.

All patients with unresolved pneumonia and hospital acquired pneumonia were excluded. All personal information, clinical manifestations (symptoms and signs), underlying and chronic disease, laboratory findings (leukocytosis), outcome and other necessary data were recorded in special data sheets.

Patients have also been grouped according to criteria of American Thoracic Society (CURB-65 score= Confusion, Urea>7mmol/l, Respiratory rate>30/min, Low blood pressure, and being ≥65 years old) (9).

Fever was defined as a body temperature above 37.8°C, tachypnea as a respiratory rate >24/minute, tachycardia as a heart rate >100/minute, and leukocytosis as a WBC count over 10,000/µl. The ethics committee of the faculty of medicine, Iran University of Medical Sciences has approved the protocol for the research project.

SPSS soft ware (version 13, SPSS Inc., Chicago, USA) was used for data analyses. Central tendency indices, consisting of mean, median, mode and dispersion indicators consisting variance and standard deviation were used to evaluate the results and analytical statistic such as chi-square was used to find correlations among variables. Fisher’s exact test was utilized where sample sizes were small. P<0.05 (with α=0.05, confidence interval 95%) was considered statistically significant.

**RESULTS**

During the study period, a total of 279 patients having pneumonia were admitted to 2 educational centers. After the initial evaluation, a total of 183 patients were qualified to participate in the study.

Of 183 patients, 103 (56%) were elderly and 80 (44%) were belonged to non-elderly patients (<65
The most common findings of physical examination in the elderly population were as following: tachypnea (64%), crackles (58%), fever (34%), wheezing (25%), tachycardia (18%) and signs of congestive heart failure (CHF) (17.5%). On the other hand, the most important findings in the non-elderly population were tachypnea (57%), tachycardia (49%), fever (47%), crackles (46%), and wheezing (15%).

In 61% of patients, respiratory rate was more than 24 breaths per minute, at the time of admission. This was seen in 64% of the elderly and 57% of the others. A total of 41% of patients had leukocytosis at the time of admission (45% in the non-elderly and 36% in the elderly population).

For all subjects chest radiography was ordered among whom 83% (100% of non-elderly patients) had confirmatory results. Meanwhile, 17% of patients (all belonged to elderly group) performed chest CT scan, all confirmed the disease (OR=2, 95%CI=0.9-3.2, p<0.05).

### Table 1. Different underlying diseases in the elderly and non-elderly populations

<table>
<thead>
<tr>
<th></th>
<th>Elderly patients</th>
<th>Non-elderly patients</th>
<th>OR(95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>43*</td>
<td>11</td>
<td>2.5(0.9-4.2) 0.03</td>
<td></td>
</tr>
<tr>
<td>diseases (CHF, MI, unstable angina)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>42</td>
<td>14</td>
<td>2.8(0.8-4.5) 0.03</td>
<td></td>
</tr>
<tr>
<td>Neurologic disease</td>
<td>20</td>
<td>1</td>
<td>3.5(1.6-5.1) 0.01</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>18</td>
<td>25</td>
<td>&lt;1(0.9-2.1) NS</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>17</td>
<td>12</td>
<td>&lt;1(0.8-1.9) NS</td>
<td></td>
</tr>
<tr>
<td>COPD &amp; Asthma</td>
<td>16</td>
<td>13</td>
<td>&lt;1(0.8-2) NS</td>
<td></td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>0</td>
<td>2</td>
<td>&lt;1(0.7-1.9) NS</td>
<td></td>
</tr>
</tbody>
</table>

* Figures are in percentage
CI: confidence interval, COPD: chronic obstructive pulmonary disease, CHF: congestive heart failure, MI: myocardial infarction

The prevalence of different underlying disease and co-morbid factors in the elderly and non-elderly populations and the clinical, laboratory and outcome findings of the patients are demonstrated in tables 1 and 2.

Totally, 73 old patients (70.9%) and 72 adults patients (90%) were classified in group one (CURB-65 class 2), and 30 old patients (29.1%) and 8 adult patients (10%) were classified in group two (CURB-65 class ≥3) (p=0.05).

### Table 2. Clinical, characteristics, laboratory and outcome data of 183 patients with pneumonia

<table>
<thead>
<tr>
<th></th>
<th>Elderly Non-patients elderly patients</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachypnea</td>
<td>64*</td>
<td>&lt;1(0.7-1.5) NS</td>
</tr>
<tr>
<td>Cough</td>
<td>62</td>
<td>&lt;1(0.6-1.9) NS</td>
</tr>
<tr>
<td>Crackles</td>
<td>58</td>
<td>&lt;1(0.7-1.8) NS</td>
</tr>
<tr>
<td>Sputum</td>
<td>52</td>
<td>&lt;1(0.5-1.6) NS</td>
</tr>
<tr>
<td>Fever</td>
<td>34</td>
<td>&lt;1(0.7-2.8) 0.04</td>
</tr>
<tr>
<td>Weakness</td>
<td>26</td>
<td>&lt;1(0.6-NS 1.1)</td>
</tr>
<tr>
<td>Mental status</td>
<td>20</td>
<td>3.8(0.6-6.2) 0.01</td>
</tr>
<tr>
<td>Chills</td>
<td>19</td>
<td>&lt;1(0.4-1.1) NS</td>
</tr>
<tr>
<td>CHF signs</td>
<td>17.5</td>
<td>4.2(0.8-5.9) 0.02</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>18</td>
<td>5.7(0.6-7.2) 0.001</td>
</tr>
<tr>
<td>Respiratory distress</td>
<td>14</td>
<td>&lt;1(0.8-NS 1.9)</td>
</tr>
<tr>
<td>Sweating</td>
<td>8</td>
<td>4.2(1.2-6.1) 0.01</td>
</tr>
<tr>
<td>Weight loss</td>
<td>8</td>
<td>&lt;1(0.5-1.2) NS</td>
</tr>
<tr>
<td>Anorexia</td>
<td>5</td>
<td>2(0.6-3.8) 0.01</td>
</tr>
<tr>
<td>Chest pain</td>
<td>4</td>
<td>3.5(1.4-7.4) 0.001</td>
</tr>
<tr>
<td>Pleuritic pain</td>
<td>3</td>
<td>4.1(0.9-7.2) 0.001</td>
</tr>
<tr>
<td>Leukocytosis</td>
<td>36</td>
<td>&lt;1(0.6-NS 1.8)</td>
</tr>
<tr>
<td>Mortality</td>
<td>28.1</td>
<td>4.1(0.6-6.8) 0.001</td>
</tr>
</tbody>
</table>

* Figures are in percentage
NS: not significant

Unfortunately, 31 patients (17%) died, of whom 29 belonged to elderly group as compared with 2 cases in the other group. Indeed, a significant correlation was found between the mortality rate, age and CURB-65 score; as 94% of the patients who died of pneumonia, were over 65 years of age.
(OR=4.1, 95%CI=0.6-6.8, p=0.001) while all were grouped in CURB-65 class ≥3. Moreover, mortality rate was not correlated with gender, even though it had significant correlation with patients’ condition of life. Nevertheless, 93% of patients who died of pneumonia lived in nursing homes, health care centers or were being cared by their children or relatives due to their inability to live independently (p=0.001).

**DISCUSSION**

In the present study, patients’ age was 59±24 years with a median of 70 and 90 percentile of 83 years. Prior investigators have implied prevalence of acute pneumonia in early 50s to end 60s (10,11). From the point of age average, there is not a significant difference between patients of this study and the mentioned statistics, however, from the point of patients’ dispersion rates in different age groups pneumonia’s peak of prevalence was between 65 to 80 years of age, in this study. Hence, need for hospitalization is probably lower in the younger patients. Furthermore, our findings regarding underlying disease were comparable to others (12).

The comparative study between the two populations (older and younger than 60 years), found few clinical differences; dyspnea was more frequent in elderly versus feverish chills more in younger; considering auscultation, crackles were more frequent in older subjects (13); but in our setting there was no significant differences between two groups when considering crackle.

At admission, 34% of the elderly and 47% of the others had oral temperature higher than 37.8 degrees centigrade. Compared with the previous studies, the incidence of fever was lower in this study (14) and apparently, the prevalence of fever was decreased while the age increased. Previous studies showed that in the elderly population, cough and sputum were less common in comparison with the non-elderly patients (14-16).

Moreover, 60% of the study population (64% of the elderly and 57% of the others) had tachypnea at the time of admission (RR>24min), which shows no significant difference with the previous studies (45-56%) (17-20).

In contrary with other studies, we could not find significant correlation between leukocytosis and infection in the elderly subjects (16).

The treatment results of this study reveal a mortality rate of 17% during hospitalization. Previous studies demonstrated pneumonia-associated mortality rates of 6% on each admission episode and one month after treatment (3). Considering the present criteria, mortality rates in patients with severe pneumonia who need intensive care, are reported 20 to 53% (21). Mortality rates of CAP were higher in this study, compared with the previous studies, which might be due to inappropriate management, delay in patients' referral to the physicians, the older age group, living in nursing home, or greater prevalence of underlying disease. Nursing home acquired pneumonia is thought to be clinically distinct from community acquired pneumonia and mortality is higher (22).

CURB-65 provides a simple tool that can identify patients who are at high risk for mortality and who might benefit from early ICU admission (23). All of our dead patients belonged to CURB-65 class ≥3.

The infectious disease mortality rate in patients 65 years and older is high. That comparative mortality is nine times the rate in patients between 25 and 44 years. Comparing with other studies, our data revealed significant correlation between mortality and aging (24,25).

In conclusion, we recommend establishing diagnostic and management protocol for pneumonia for elderly and non-elderly populations, meanwhile, Geriatric Medicine should be considered more seriously in the educational and therapeutic health care centers.
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REFERENCES


