ORIGINAL ARTICLE

Screening for chronic obstructive pulmonary disease in elderly subjects with dyspnoea and/or reduced exercise tolerance – A hospital based cross sectional study

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KEYWORDS
COPD; Elderly subjects; Dyspnoea; Exercise intolerance; Spirometry

Abstract Background: Chronic obstructive pulmonary disease (COPD) is a very common lung disease most often related to history of smoking. It becomes more prevalent with increasing age but remains under-diagnosed and under-treated in the elderly population. Under diagnosis of COPD is universal in elderly patients because of multiple pathology, difficulty with measurement of lung function, under-reporting of symptoms and reduced perception of dyspnoea. However the screening of the elderly (age > 60 years) is not performed routinely even when they are symptomatic.

Objective: The study was undertaken to screen elderly subjects with dyspnoea and/or reduced exercise tolerance for COPD.

Study design: A cross sectional hospital based study.

Methods: A total of 1000 elderly subjects were screened for COPD using standard spirometry as per GOLD guidelines. Diagnostic evaluation and classification of patients as “no COPD”, “new COPD” and “known COPD” were done by panel of experts which included a Pulmonologist, Cardiologist, General Physician and Physiotherapist. Subjects were categorized as mild, moderate, severe and very severe COPD based on FEV1 (forced expiratory volume in 1st sec) values.

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Results: Of the total 1000 elderly participants screened, 596 (59.6%) were classified as having no COPD, 228 (22.8%) with new COPD and 176 (17.6%) with known COPD. Among the total 228 of new COPD patients 27 (11.8%), 176 (77.4%), 5 (2.1%) and 20 (8.7%) were having mild, moderate, severe and very severe COPD respectively as per GOLD guidelines. Similarly of the total 176 subjects with known COPD, 9 (5.1%), 136 (77.3%), 0 (0%) and 31 (17.6%) were having mild, moderate, severe and very severe COPD respectively.

Conclusion: An active screening for COPD in elderly subjects with dyspnoea or reduced exercise tolerance leads to diagnoses of substantially more new patients with COPD.

Introduction

Chronic obstructive pulmonary disease (COPD) is a very common lung disease most often related to history of smoking. It becomes more prevalent with increasing age but remains under-diagnosed and under-treated in the elderly population [1]. All the studies conducted agree in predicting that both morbidity and mortality burden of COPD are rising globally. COPD is a progressive, partially reversible airflow obstructive condition and is a growing public health problem. By 2020, COPD is projected to cause over 6 million deaths annually worldwide. In its advanced stage, the disease causes severe disabilities and poor quality of life [2–4]. It was predicted that COPD will be the third leading cause of death worldwide by 2020 with Asian countries having three times the number of patients than the rest of the world [5–8].

The diagnosis of COPD is based on evidence of pulmonary obstruction, in combination with signs and symptoms suggestive of COPD and with history of smoking [9]. Pathophysiologically, it is well established that COPD can be partly considered as accelerated ageing of the lungs and thus its prevalence increases with age [10]. There is also accelerated decline in forced vital capacity (FVC) and forced expiratory volume in 1 s (FEV1) with natural ageing [11]. Ageing is associated with a progressive degeneration of the tissues, which has a negative impact on the structure and functions of lung tissue. Since the proportion of the world’s population aged > 60 years will double in the next four decades, this will be accompanied by an increased incidence of chronic age-related diseases like COPD that will place a huge burden on healthcare resources. Chronic pulmonary diseases represent an important component of the increasingly prevalent multiple chronic debilitating diseases, which are a major cause of morbidity and mortality, particularly in the elderly.

Screening subjects at risk, such as smokers, workers and populations exposed to environmental pollution, with serial measurements of FEV1 have been shown to identify COPD at an early stage, with a diagnostic yield that is significant even in asymptomatic individuals [12]. Under diagnosis of COPD is universal in elderly patients because of multiple pathology, difficulty with measurement of lung function, under-reporting of symptoms and reduced perception of dyspnoea [13]. However the screening of the elderly is not performed routinely even when they are symptomatic. Hence we undertook the study of screening symptomatic (dyspnoea and/or reduced exercise tolerance) elderly population (Age > 60 years) for COPD using spirometry as per GOLD guidelines [2].

Methodology

Source of data

Inpatient and outpatient departments of Pulmonary medicine, Internal Medicine, Cardiology and Geriatric departments at a tertiary care hospital.

Population

The study population included elderly subjects aged 60 years and above with dyspnoea and/or reduced exercise tolerance, registered in tertiary care hospital.

Study design

A cross sectional hospital based study.

Study period

Primary data were collected from Jan 2013 to August 2014.

Sample size

Total of 1000 elderly subjects (> 60 years) were screened for COPD using spirometry.

Inclusion criteria

(1) Both male and female subjects with dyspnoea and/or reduced exercise tolerance
(2) Age > 60 years.

Exclusion Criteria

1. History of chronic lung disease other than COPD.
2. Any congenital cardiac disease.
3. Systemic diseases which can cause dyspnoea and/or reduced exercise tolerance.
4. Chronic thromboembolic diseases.
5. HIV infection.
6. Subjects who could not perform spirometry.
7. Severe anaemia.
Screening for chronic obstructive pulmonary disease

Screening procedure

All participants in the study underwent a screening strategy, including history taking, physical examination, ECG, pre- and post-bronchodilator spirometry, blood tests, and echocardiography. History taking included a standardized questionnaire on symptoms, medical history, smoking history and current drug use. Physical examination was performed by an experienced physician in a standardized manner. Situations in which the patients were dyspnoeic were scored as 0 (never), 1 (only during strenuous exercise), 2 (walking fast or uphill), 3 (walking with people of same age), 4 (walking flat), 5 (at rest). Reduced exercise tolerance scores ranging from 0 to 4 based on responses to the questions “do you have a reduced exercise tolerance as compared to others of the same age?” “do you feel more tired than others of the same age?” “do you feel you need more recovery time after exercise than others of the same age?” and “do you feel your heart is pounding, or feel palpitations or feel agitated during activities such as walking, gardening or housework?” were recorded. Spirometric measurements were performed while patients were in a clinically stable condition with a RMS Helios 401 spirometer (Recorders and Medicare systems private limited, MEDSPIROR, India). FVC and FEV1 were measured before and 30 min after administration of ipratropium bromide by inhalation. All measurements were performed in a spirometry Laboratory at tertiary care hospital under supervision of Pulmonologist.

Panel diagnosis

All participants were evaluated by a consensus panel that decided after plenary discussion whether a diagnosis of COPD was present, possible or absent. Panel consisted of Pulmonologist, Cardiologist, General Physician and Physiotherapist. Diagnosis of COPD was confirmed as per the guidelines of The Global Initiative for Obstructive Lung Disease (GOLD) programme which provides standard diagnostic criteria, severity staging as well as recommendations for prevention and management of COPD [2]. Characteristics of the participants in the screening were tabulated against the COPD status defined as “no COPD”, “new COPD” and “known COPD”. Patients with the label “no COPD” did not have a prior diagnosis of COPD and had no COPD according to the panel. Patients with new COPD had no prior diagnosis of COPD but received such a diagnosis by the panel. The group “known COPD” were patients known with COPD that was confirmed by the panel [14].

Results

Of the 1000 elderly participants screened, 596 (59.6%) were classified as having no COPD, 228 (22.8%) with new COPD and 176 (17.6%) with known COPD (Table 1). Among the total 228 of new COPD patients 27 (11.8%), 176 (77.4%), 5 (2.1%) and 20 (8.7%) were having mild, moderate, severe and very severe COPD respectively as per GOLD criteria. Similarly of the total 176 subjects with known COPD, 9 (5.1%), 136 (77.3%), 0 (0%) and 31 (17.6%) were having mild, moderate, severe and very severe COPD respectively (Table 2).

Discussion

In our study, among elderly subjects with complaints of dyspnoea or with exercise intolerance, newly diagnosed COPD was detected in 22.8% of the patients and known COPD in 17.6% of subjects. This is in agreement with study by Bertens et al., which established that with an active search for COPD in community-dwelling frail elderly subjects with dyspnoea or reduced exercise tolerance, substantially more new patients with COPD can be detected than with care as usual (spirometry in suspected cases) [14]. In another study by Mourik et al. Community-dwelling frail persons aged > 65 years underwent a 2-step screening strategy. First, they received a questionnaire inquiring about dyspnoea and exercise tolerance. Those with exercise intolerance and/or dyspnoea were invited to visit their primary care physician’s office for a screening, including medical history taking, physical examination, blood tests, electrocardiography, spirometry, and echocardiography. The final diagnosis of every patient was determined by a panel consisting of 3 physicians. In this study previously unrecognized COPD was detected in 16.8% (95% confidence interval, 13.4–20.9%). In total, 165 patients (43.9%) received a new diagnosis of either heart failure, COPD, or both. The study concluded that unrecognized chronic diseases like COPD might be detected in community-dwelling frail elderly using a near-home screening strategy that is simple to implement [15]. Our study also included a panel of clinicians including Physician, Pulmonologist, Cardiologist and Physiotherapist and all the participants in the trial underwent vigilant

### Table 1 Demographic characteristics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No COPD</th>
<th>New COPD</th>
<th>Known COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects (n)</td>
<td>596 (59.6)</td>
<td>228 (22.8)</td>
<td>176 (17.6)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>72 ± 5.6</td>
<td>74.5 ± 6.2</td>
<td>76 ± 6.5</td>
</tr>
<tr>
<td>Males</td>
<td>331 (55.5)</td>
<td>109 (47.8)</td>
<td>92 (52.3)</td>
</tr>
<tr>
<td>Current/ex-smokers</td>
<td>345 (57.9)</td>
<td>136 (59.26)</td>
<td>124 (70.1)</td>
</tr>
<tr>
<td>Pack years</td>
<td>3.4 (0–19)</td>
<td>16.5 (0–32)</td>
<td>35 (16.5–50)</td>
</tr>
<tr>
<td>Asthma</td>
<td>36 (6.1)</td>
<td>35 (15.3)</td>
<td>13 (7.3)</td>
</tr>
<tr>
<td>MRC dyspnoea score</td>
<td>2 (2–3)</td>
<td>3 (2–4)</td>
<td>3 (2–4)</td>
</tr>
<tr>
<td>Exercise intolerance</td>
<td>1 (0–3)</td>
<td>2 (1–3)</td>
<td>3 (1–3)</td>
</tr>
<tr>
<td>Wheeze</td>
<td>85 (14.2)</td>
<td>94 (41.2)</td>
<td>86 (48.9)</td>
</tr>
<tr>
<td>Cough</td>
<td>109 (18.3)</td>
<td>106 (46.5)</td>
<td>85 (48.2)</td>
</tr>
<tr>
<td>Pre-bronchodilator</td>
<td>96.5 ± 15.8</td>
<td>70.8 ± 13.2</td>
<td>64.2 ± 17.2</td>
</tr>
<tr>
<td>FEV1 predicted</td>
<td>99.2 ± 16.2</td>
<td>75.6 ± 13.8</td>
<td>68.6 ± 16.9</td>
</tr>
</tbody>
</table>

### Table 2 Comparison between new and known COPD with its severity.

<table>
<thead>
<tr>
<th>GOLD criteria</th>
<th>NEW COPD</th>
<th>Known COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>27 (11.8)</td>
<td>9 (5.1)</td>
</tr>
<tr>
<td>Moderate</td>
<td>176 (77.4)</td>
<td>136 (77.3)</td>
</tr>
<tr>
<td>Severe</td>
<td>5 (2.1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Very severe</td>
<td>20 (8.7)</td>
<td>31 (17.6)</td>
</tr>
</tbody>
</table>
Many authors argue that screening for COPD would only result in the detection of cases with mild disease, which are often not considered clinically relevant. Especially in elderly patients, a decline in pulmonary function is a part of the natural ageing process and differentiating between a normal and abnormal decline becomes difficult. In our study, the majority of patients with newly detected COPD had mild-to-moderate disease based on airflow limitation. Significant number of subjects could be classified as having “more complaints” according to the updated GOLD criteria in newly detected cases. In current study there was no difference between new and known COPD groups as far as symptom scores, exercise intolerance and duration and pack years of smoking were concerned (Table 1). This screening however demonstrated that considerable numbers of subjects remain undiagnosed even when they were symptomatic. This does suggest that screening of elderly subjects with shortness of breath results in the detection of clinically relevant COPD.

It is relevant to note that in 2012, the world population reached 7 billion [16]. This notable population growth is the result of several factors: contributions from medical, technological and public health advances resulting in the control and treatment of communicable diseases; the control of pandemics; the end of large-scale wars; improvement in living conditions; and the agricultural revolution [17]. Because of these improvements, life expectancy has increased dramatically. In 1950, life expectancy at birth was 65 years in the more developed regions of the world and 42 years in the less developed regions of the world. Currently, life expectancy is 78 years in the developed world and 68 years in the developing world. At the same time, there has been a decline in population growth rate. Population growth rate peaked at 2.2% per year in the 1960s compared with the current estimate of 1.1% per year. It is estimated to decline further to 0.5% by 2050 [18].

The combination of decreasing population growth rate and increased life expectancies has led to a change in the demographics of the population with the strata of older individuals growing faster than the younger individuals. The United Nations Population Division reported that the global share of older people (aged 60 years or over) increased from 8% in 1950 and 9% in 1990 to 12% in 2013, and will continue to grow to an estimated 21% by 2050. By 2045–2050, life expectancy is projected to reach 83 years in the more developed regions of the world and 75 years in the less developed regions of the world [18]. There is another important “epidemiological transition”, which is the movement from communicable diseases towards noncommunicable diseases (NCDs) throughout the world [19]. Both population growth and ageing are increasing the number of deaths from NCDs. NCDs are characterized by slow progression and long duration; therefore, the clinical manifestation and burden disproportionally affects older adults. The most important chronic diseases include ischaemic cardiovascular disease, cerebrovascular disease, COPD, diabetes, cancer and depression.

Considering the change in the demographics of the world population and epidemiological transitions, there is justification for identifying elderly subjects with previously undiagnosed COPD. This kind of screening provides a window of opportunity to the clinicians for early diagnosis of COPD in subjects at risk. This would benefit patients because symptoms and quality of life would be improved, exacerbations and complications would be limited, and survival would be enhanced. Also development and progression of the disease would be prevented by intervention (e.g. smoking cessation) or pharmacological treatment at the earliest.

The power of or study are:

1. It focuses on a specific group of subjects at high risk of COPD: those who are symptomatic (dyspnoea and/or exercise intolerance) and elderly.
2. The screening was based not only on spirometry but also on a detailed individual assessment by a multidisciplinary panel (Pulmonologist, a General Physician, a Cardiologist and Physiotherapist) that took into account clinical history, risk factors, physical examination, blood tests, ECG, echocardiography, and pre-and post-bronchodilator spirometry.
3. The screening of the elderly population complaining of dyspnoea included careful assessment of heart failure and other causes of dyspnoea.

Limitations

The study is limited by the fact that it is a single centric cross section study and hence the outcomes of the trial cannot be generalized. Further studies with involvement of different geographic populations should be carried out. Also the impact of early initiation of treatment and the disease outcome may be studied, even in patients with a newly established diagnosis.

Conclusion

An active screening for COPD in elderly subjects with dyspnoea or reduced exercise tolerance leads to diagnoses of substantially more new patients with COPD. It is imperative to screen all elderly subjects (aged > 60 years) to avert progression of the disease, improvement in quality of life & reduction in mortality.

Conflict of interest

None.

References


