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The reality of COPD in old age

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Dr Nabil Jarad,
Consultant Respiratory Physician –
Bristol Royal Infirmary,
Bristol BS2 8HW.
E mail: Nabil.Jarad@uhbristol.nhs.uk

Introduction:

Chronic obstructive pulmonary disease (COPD) is a progressive disease characterised by a combination of airflow obstruction and pulmonary and systemic inflammation which is manifested by respiratory and systemic manifestations that lead to premature death [1]. COPD is caused in the majority of patients by cigarette smoking that leads to lung damage due to oxidative stress, impaired apopotosis and impairment of the balance between trypsin and anti-trypsin.

COPD is currently a major health concern worldwide and, unlike most chronic diseases where future prevalence is expected to decline, the prevalence of COPD will increase and in 2020, COPD will be the 3rd cause of death worldwide [2] (figure 1).

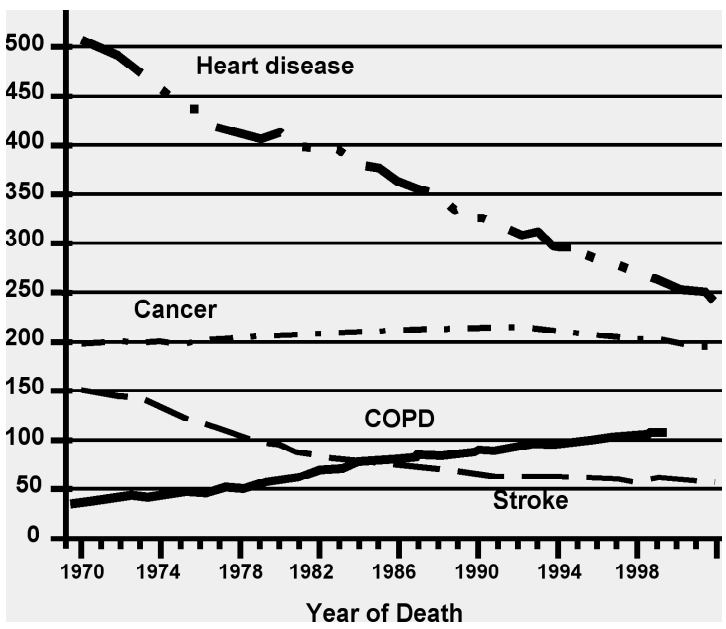

Figure 1: Causes of death per 100,000 populations from different common diseases.

The systemic manifestations of the disease are discussed in detail elsewhere. The cardiovascular and the musculoskeletal problems are the main comorbidities and death. Cardiovascular manifestations are attributed to COPD as well as to cigarette smoking and the musculoskeletal complications are attributed to lung disease as well as to reduced mobility and the chronic use of oral and inhaled corticosteroids [3].

COPD and old age

In a cross sectional study we did not find any evidence that the severity of lung disease as measured by FEV 1 in old COPD patients is greater than those of younger age. In addition, the study demonstrated that the degree of obstruction as measured by FEV1/FVC ratio, the frequency of annual acute COPD exacerbations and COPD assessment test (CAT) score are similar in the old and 'young' COPD patients.

However, the literature outlined several important differences for COPD in old age to those for younger patients. These differences are summarised under the following six subheadings:

1. Increased prevalence of COPD in non-smokers

It is estimated that at least 25% of all patients with FEV1/FVC ratio of <70% which fulfils the GOLD criteria for definition of COPD have not smoked.

In developing countries the minority are attributed to lung damage due to pulmonary tuberculosis or from undiagnosed post-infective bronchiectasis. But the majority are for undiagnosed post-infective bronchiectasis. But the majority are due to conventional features of COPD.

Two reasons are put forward for this increase:

1. Passive inhalation of cigarette smoke (passive smoking) and exposure to indoor airborne pollutant in particular fumes emitted during the burning of biomass fuel [5].

Biomass fuel is used in heating and cooking in large proportion of houses in India, China, Southeast Asia and South America. Even in the western world the decline in use of biomass fuel in Western US states and Canada has levelled, probably due to raise in cost of petrol.

2. Another reason is that old age by itself is associated with increase airflow obstruction. In one study in non-smoking Norwegian asymptomatic persons, the rate of obstructive defect on spirometry increased with age. Spirometry in 50% of those over 80 years showed FEV1/FVC ratio of < 70% [6]. As most of those patients did not have respiratory symptoms, the authors of the study proposed that, in order to obviate over diagnosis of COPD, the cut off point for defining airflow obstruction should increases with age- for example 65% for over 70 years and 60% for over 80 years.

2. High prevalence of age-related and non-respiratory components of COPD:

Physical limitations which adversely affect quality of life (QoL) scores increase with age. Evidence shows that QoL correlates poorly with FEV1(figure 2) [7].

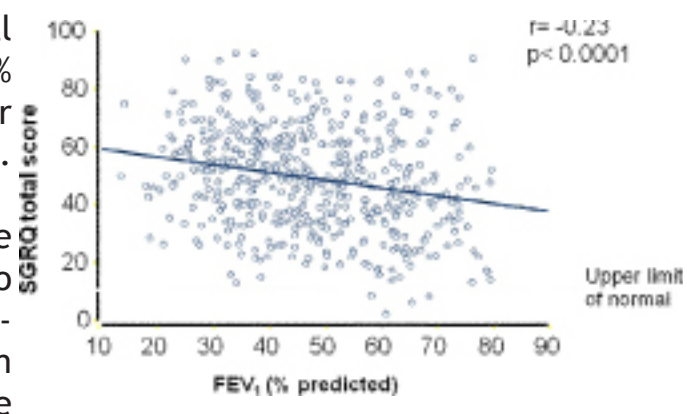

Figure 2: Correlation between FEV1 and score of St George's quality of life questionnaire

Other functional impairment increases with old age. In a prospective cross-sectional study , a group of COPD patients those who were over 70 years had impairment of cognitive status, reduced mobility and tendency to live alone compared with those aged under 70 years.

In addition, the rate of urinary incontinence in this group was 36% for patients who are over 70 compared to 16% for historical data in patients without COPD [8, 9].

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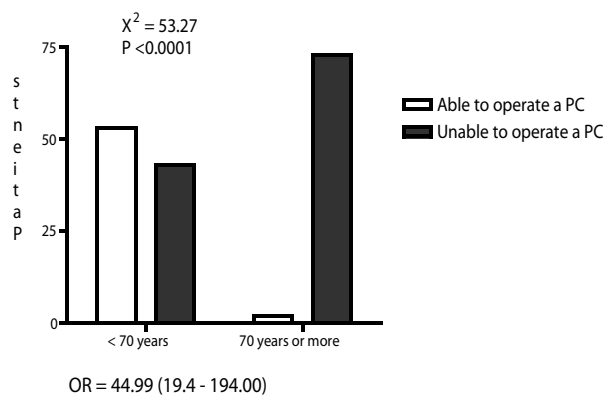
Familiarity with modern technology was also an important difference between young and old COPD patients. Mastery of operating personal computer (PC) and ownership of mobile (cellular) phone fell sharply in patients over the age of 70 in comparison to those who are under 70 years (figure 3).



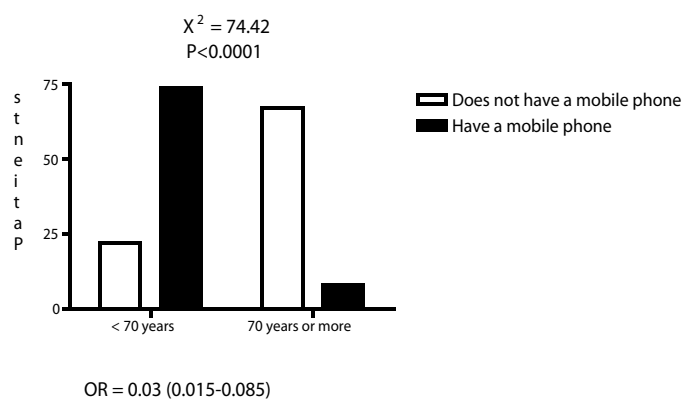


Figure 3: The use of modern methods of communication in COPD patients who are over 70 compared to those who are under 70 years.

3. Lack of evidence for effectiveness of pharmacological agents in large multi-centre trials.

Since the early 90's respiratory medicine has witnessed the publication of several large multi-centre trials particularly in COPD. Almost all of these trials are sponsored by pharmaceutical industry. The pitfalls of these trials are discussed in details by Halpin [10]. The paragraph below discusses the contribution of old age to the results of these trials.

The age limit in clinical trials varied, but on the whole, more recent the trials aimed at including older patients than older trials (table 1). Despite this, the actual mean age of patients included remained around 72 years of age.

The reason for this is that the exclusion criteria may have implicitly ruled out COPD patients with complications. These included those with neuropsychological and locomotors co-morbidity.

As a result, the outcome of these trials may not be applicable on face value on the older population. In any case, the outcome of intervention in older patients with COPD needs to encompass aspects other than improvement of respiratory components such as rate of COPD exacerbations and FEV1.

4. Inability of the elderly to understand and to use inhaled therapy[19].

Many studies have shown that the elderly population with lung disease do not understand the purpose of taking their inhalers and the role of each inhaler they are taking (figure 4).

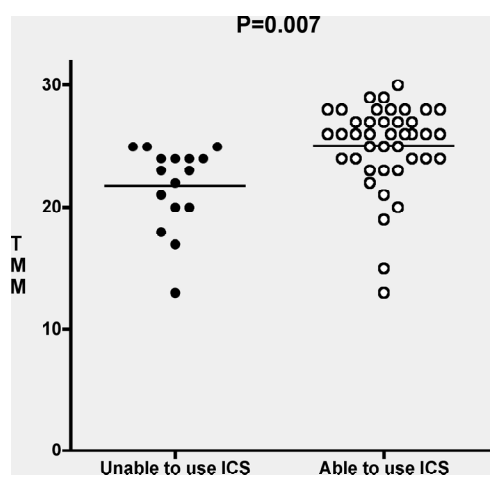


Figure 4: Reduced mini-mental Test (MMT) score in patients who are unable to use inhaled corticosteroids (ICS) compared to those who are able to use them [Walsh K et al [20]].

Table 1: COPD trials, year of publication, age limit as identified by the protocol and mean age for patients actually included in the trial.

Trial	Product examined	Age limit-protocol	Year published	Mean age-publication
EUROSCOP[11]	Budesonide	30-65	1999	52
Copenhagen City[12]	Budesonide	30-70	1999	59
ISOLDE [13]	Fluticasone	40-75	2000	64
TORCH [14]	Fluticasone, Salmeterol, Fluticasone+salmeterol	40-80	2007	65
INSPIRE [15]	Fluticasone+salmeterol v Tiotropium	40-80	2008	64.5
UPLIFT [16]	Tiotropium	40 years or more	2008	65
Roflumilast [17,18]	Roflumilast	> 40 years	2009	64

Similarly, over one third of patients were unable to use metered dose inhalers. Newer devices using dry powdered inhalers have improved inhalation techniques only marginally. The main factors causing poor inhaler delivery in the elderly fall into 4 categories:

1. Inability to co-ordinate actuation with inhaling the drugs
2. Physical impairment resulting in reduced manual dexterity
3. Concomitant small joint disease
4. Cognitive impairment.

In a post hoc analysis of the TORCH trial taking less than 80% of the inhalers was shown to be associated with nearly doubling in all cause mortality rate in COPD patients included in the trial [21]. Not taking inhaled medications therefore has more serious consequences in patients with moderate to severe COPD than previously thought.

5. Poorer outcome of acute COPD exacerbations (AECOPD):

Acute exacerbations of COPD are associated with significant impairment of quality of life, accelerated decline in lung function and increased mortality rate.

Old age has been shown to be an independent factor for poor outcome of COPD exacerbations in the areas outlined below:

i) Old age is associated with increased in frequency of AECOPD [21].

ii) The role of infections as a cause of AECOPD requiring hospital admissions in the elderly is greater (78%) than in younger COPD patients (51%) [22].

iii) There is a 3 fold increase in 90 days mortality rate for old COPD patients after discharge [23].

iv) Older patients have a greater length of stay for COPD exacerbations than younger ones [24].

v) Old age has been identified as an independent factor for increased 1 year rehospitalisation from COPD [25].

Apart from old age adverse factors associated with poorer outcome of COPD exacerbations include cardiovascular or musculoskeletal co-morbidities, poorer lung function tests, previous admissions with COPD exacerbations and poor physical mobility and social isolation (living alone) [26].

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6. Need for different emphasis in assessment and management of COPD in the elderly [27]

The conference identified that the nature of the disease and the need of the elderly population with COPD significantly differ from the need of younger patients. The evidence provided demands different methods of assessment, different set of actions and different outcome measures than the conventional methods designed to younger patients.

The role of multidimensional assessment and multi-disciplinary intervention is well-recognised in geriatric population [28]. Its applicability to COPD has been advocated [27]. Multidimensional intervention in COPD patients requires a multidisciplinary team input. As well as managing respiratory symptoms, multidimensional interventions emphasis is on managing on physical mobility, management of low mood and sleep disturbance, addressing social isolation and identifying and treatment of urinary incontinence as well .

Markers of success in older COPD population need also to be different from those in younger patients. For example, achieving independence in activity daily living should be regarded to be more important than improvement of FEV1.

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