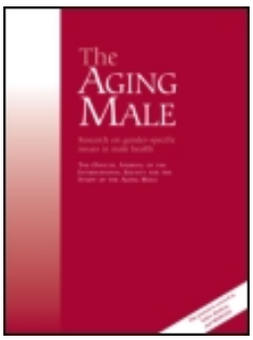

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ORIGINAL ARTICLE

Spirometric obstruction and tobacco exposure among male Turkish nursing home residents

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Abstract

Spirometric obstruction is a prevalent problem in older adults and related to life-style risk factors. Symptoms related to chronic-obstructive-pulmonary-disease (COPD) are also prevalent symptoms with diverse etiologies – not limited to pulmonary obstruction. Older adults may have unrecognized airway obstruction due to functional limitations or symptoms mis-attributed to age/other co-morbidities. Therefore, spirometric obstruction may clinically be over/under diagnosed. Over last few decades, the burden of smoking-related diseases has increased in older adults. Additional evidence regarding older adults is required. We aimed to study frequency of spirometric obstruction, its over/under diagnosis and tobacco exposure in a group of male nursing-home residents. For spirometric obstruction diagnosis, two different *thresholds* [(fixed value: 0.70) versus (age-corrected value: 0.65 in residents >65 years of age)] were compared for better clinical practice. One hundred and three residents with 71.4 ± 6.3 years-of-age included. Spirometric obstruction prevalences were 39.8 and 29.1% with fixed and age-corrected FEV1/FVC thresholds, respectively. Age-corrected FEV1/FVC threshold under-diagnosed COPD in 1.9% while fixed threshold overdiagnosed spirometric obstruction in 8.7%. Active smokers were 64.1%, ex-smokers 23.3% and non-smokers 12.6%. Our study suggests high prevalences of spirometric obstruction and smoking in male nursing-home residents in Turkey. We suggest the use of age-corrected FEV1/FVC threshold practicing better than the use of fixed FEV1/FVC threshold in this patient group.

Keywords

Chronic obstructive pulmonary disease, diagnosis, older adults, smoking, spirometric obstruction

History

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Introduction

Dyspnea and cough are among the prevalent symptoms in older adults. They may be due to various etiologies including but not limited to obstructive pulmonary disease. Due to common prevalence of chronic-obstructive-pulmonary-disease (COPD) in older adults [1], such patients might have been diagnosed as COPD without proper clinical work-up in the time limited daily practice. This may lead to overdiagnosis of COPD and unnecessary bronchodilator use with subsequent side effects and economical impact. On the other hand, some patients, relatives and/or health professionals with limited geriatric experience have the erroneous assumption of dyspnea to be one of the results of normal aging and may not ask for its evaluation. Futhermore, some older adults have physical or cognitive disabilities limiting their mobility which are common problems in nursing home setting. The lack of physical activity may cause obstructive pulmonary disease to remain asymptomatic in this subgroup. These two factors may result in underdiagnosis of pulmonary obstructive disease. On the other hand, there is the lack of a generally accepted definition or worldwide classification of airway obstruction [2]. The estimated prevalence rates of airway obstruction vary depending on the criteria used and the population studied [2]. Defining and diagnosing pulmonary obstruction using a fixed FEV1/FVC threshold <0.7 is suggested by Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease (GOLD) 2013 [1]. It is simple to use in clinical practice but might well result in underdiagnosis of COPD in younger subjects and overdiagnosis in older subjects [2]. Use of age-corrected FEV1/FVC threshold (<0.7 in subjects younger than 65 years but <0.65 in subjects 65 years or older) as a measure of airway obstruction is suggested to work better in some publications [2,3].

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In Europe, little attention has been paid on the monitoring of smoking prevalence in older adults [4]. This is particularly worrisome, given that over the last few decades the burden of smoking-related diseases in the older adults has become greater and greater. Few epidemiological studies assessed tobacco use among the older adults and additional evidence regarding older adults is still required.

In this report, we aimed to study the frequencies of spirometric obstruction with different aforementioned criteria, the overall under/overdiagnose of spirometric obstruction and tobacco exposure in a group of male nursing home residents from Turkey.

Materials and methods

Population and setting

Our study cohort was composed of the ≥60 years-of-age male residents of a nursing home in Turkey. The residents with past history of lung cancer/operation, mini mental state examination (MMSE) score <24, had not given informed consent and who had been uncooperated to the measurements were excluded. We examined only male residents because there were few female residents residing at that institution. Age, currently used drugs, history of tobacco use and other possible risk factor exposures as occupational air pollution or biomass exposures [1] were questioned and noted.

Measurements

Cognitive status was screened by MMSE and MMSE score <24 was accepted as suggestive for cognitive problem [5]. The height was measured when the residents were at a stand-up position and weights were measured with light clothes. Spirometric measurements were performed by portative spirometry (Spirolab II, MIR, Via del Maggiolino, 125-00155, Roma, Italy) cared for the ATS criteria [6]. Two measurements were undertaken from each resident. Measurements were performed at any time of the day. Two guidelines were used and compared for the definition and classification of airway obstruction: GOLD 2013 [1] and the Swedish National Guideline (SNG) [7]. GOLD defines COPD as FEV1/FVC < 0.7. We referred the GOLD spirometric obstruction criterion as fixed criterion. The SNG has recently been changed and now recommends using an age-corrected threshold as FEV1/FVC < 0.7 in subjects younger than 65 years but an FEV1/FVC < 0.65 in subjects 65 years or older in order to define COPD. We referred the SNG spirometric obstruction criterion as age-corrected criterion. Chronic OPD compatible clinical symptomatology/finding was defined as the presence of dyspnea and/or cough and/or sputum either episodically or continuous manner. COPD compatible risk factors were defined as ≥10 pack/year smoking, ≥1 years occupational air pollution exposure, ≥1 years in-house biomass exposure. An ex-smoker was defined as a person who used to smoke but had not smoked in the past 1 year. A clinical diagnosis of COPD was considered in residents with dyspnea, chronic cough or sputum production and a history of exposure to risk factors of the disease [1]. This study was conducted according to the guidelines laid down in the Declaration of Helsinki. Informed consent was obtained from all patients and/or their related conservators.

Statistical analysis

All data were entered into a database and were verified by a second independent person. Descriptive statistics were generated for all study variables, including mean ± standard deviation for continuous variables and relative frequencies for categorical variables. The statistical analysis was performed with the statistical package SPSS Version 15.0 for Windows (SPSS Inc, Chicago, IL).

Results

One hundred and three male residents were included in the study. Mean age was 71.4 ± 6.3 years (60–88). Age was normally distributed throughout the study population. In the study population, 10/103 (9.7%) were ≥80 years of age and 35/103 (34%) were ≥75 years of age.

Forty-one residents (39.8%) had spirometric obstruction according to GOLD criterion. The same residents were evaluated once more for the presence of spirometric obstruction according to age-corrected SNG criterion and found as 29.1% (30 residents). So, 11 more residents were diagnosed as having spirometric obstruction with fixed GOLD criterion. Among these 11 residents, two were symptomatic and had significant tobacco exposure aged 74 and 78 years old with FECV1/FVC of 67 and 67.5, respectively. Also, these two patients were regarded to have obstructive pulmonary disease. So, the 0.65 cut-off value underdiagnosed 2/103 residents (1.9%) having COPD compatible symptomatology and risk factor exposure, while 0.70 threshold overdiagnosed spirometric obstruction in 9/103 residents (8.7%) who were free of COPD symptomatology.

Among the residents without spirometric obstruction ($n = 73$), according to the age-corrected SNG criterion, 17 residents (23.2% of population without spirometric obstruction and 16.5% of the total study population) were on regular bronchodilatory therapy. Of the 17 residents, nine (52.9% of the residents without spirometric obstruction and 8.7% of the total study population) were identified as on unnecessary bronchodilatory therapy. Therefore, their therapies were withdrawn. Eight residents (47.1% of the residents without spirometric obstruction and 7.8% of the total study population) were symptomatic and therefore went on using bronchodilatory therapy.

Among the residents with spirometric obstruction with age-corrected criterion ($n = 30$), 12 (12/30: 40% of the spirometric obstruction residents and 11.7% of the total study population) were not on bronchodilatory therapy. Of the 12 residents, 10 (83.3% of the residents with spirometric obstruction without bronchodilatory treatment and 10.3% of the total study population) were clinically symptomatic and in need of bronchodilatory treatment. The remaining two residents were free of both symptom and risk factor exposure. Therefore, spirometric evaluations were repeated in another day and found normal. They were regarded as delayed airway hyperreactivity and scheduled for the follow-up. Among the 10 residents in need of bronchodilatory therapy, 7 (7/10) residents had clinical symptomatology but had been

mis-attributed to aging, 1 (1/10) had clinical symptomatology mis-attributed to congestive heart failure and 2 residents had no clinical symptomatology due to functional limitation but significant smoking history. Overall number of residents with COPD (number of symptomatic residents with age corrected criterion [residents already diagnosed correctly in the pre-study period and on bronchodilatory treatment ($n = 18$) + residents designated as symptomatic with the current study and started bronchodilatory treatment ($n = 10$)] + [symptomatic residents with spirometric obstruction with only GOLD criterion ($n = 2$)]) was 30, yielding a COPD frequency of 30/103 (29.1%). Sixty-six residents (64.1%) were active smokers and 24 (23.3%) were ex-smokers so that only 13 residents (12.6%) were non-smokers.

Discussion

We have found spirometric obstruction frequencies of – as high as – 39.8 and 29.1% with fixed FEV1/FVC and age-corrected FEV1/FVC cut-off values in this group of male nursing home residents from Turkey, respectively. COPD frequency was also as high as 29.1% (all except the two residents were from the age-corrected spiromertic obstruction group).

If we would use the fixed threshold as FEV1/FVC < 0.70 instead of <0.65 in older adults of >65 years of age – i.e. not performing the age-related correction for spirometric obstruction threshold – an extra 10.7% of the total study population would be diagnosed to have spirometric obstruction. When these subjects were assessed clinically, by applying 0.65 threshold, only1.9% of the population would be misdiagnosed as not having spirometric obstruction and COPD despite they have COPD symptomatology, that is the false underdiagnosis of COPD. On the contrary, by applying 0.70 threshold, 8.7% of the total study population would be misdiagnosed as having spirometric obstruction – despite they were free of COPD symptomatology, that is the false overdiagnosis of COPD. Therefore, our study suggests use of age-corrected FEV1/FVC threshold in >65 years-of-age patients as practically better than the use of fixed FEV1/FVC < 0.70 threshold also in the male Turkish nursing home residents. To our knowledge, there are few reports studying the better threshold to use in older adults [2,8–11] and none directly evaluating the male older adults or nursing home residents so far. From Iceland, among non-smoker older population including 150 male older adults out of the study population of 495 subjects (mean age: 77 years, range: 66–92 years), 29% were reported to have a fixed ratio FEV1/FVC < 0.70 and the prevalence of obstruction increased with age [9]. Similarly, from Norway, Hardie et al. reported on spirometry of 71 asymptomatic older adult non-smokers (age range: 70–96 years) and ~35% had FEV1/FVC ratio < 0.7. In the age group >80 years the corresponding prevalence rate was 50% [8]. They both concluded that GOLD guidelines for diagnosis and treatment of COPD falsely classifies a substantial number of healthy, non-smoker older adults as having COPD [8,9]. This phenomenon was more pronounced in older ages and was increasing as the age increased [8]. However, the mis-over-diagnosis was not such pronounced in our study: only 8.7% versus 29% and 35% in the aforementioned studies, respectively. Our study population had a mean age of 71.4 years which is younger than the two aforementioned studies and they were studies of non-smokers, while we had a very prevalent smoking history as non-smokers were only 12.6% and active smokers were as high as 64.1%. We suggest that this relatively less false over-diagnosis with fixed ratio of 0.70 in the present study may be due to younger age and higher smoking history of our study population. However, future studies on non-smoker older adult Turkish nursing home population are needed to comment more on. In a study from Sweden with a random sample of 574 older adults, ≥60-years-old age cohorts including 274 males, airway obstruction was noted as 22.5 and 14.1% according to fixed criterion and age-corrected criterion, respectively [2]. With similar lower age threshold, the frequency of spirometric obstruction was much higher in our study population (39.8 versus 22.5% and 29.1 versus 14.1% according to fixed and age-corrected criteria, respectively). In this Swedish study, 226 older adult males were evaluated for smoking habit and 17.7% were current smokers, 49.1% were ex-smokers and 31.9% were non-smokers. Again our population's smoking frequency was much higher in our study as 64.1% were active smokers, 23.3% were ex-smokers and 12.6% were non-smokers. We believe that the high smoking history of our study population stands for the higher frequency of spirometric obstruction in our study.

In Europe, little attention has been paid on the monitoring of smoking prevalence in older adults so far [4]. The study of ≥65-years-old conducted in 17 European countries reported current smoker, ex-smoker and non-smoker prevalences in males as 15.3, 33.9 and 50.8%, respectively. Smoking prevalence was highest in eastern/central Europe for men as 20.3 [12]. Another but larger study among aged ≥50 years in 11 western, central and southern European population reported current smoking prevalence for 70–79 years as 14% and the corresponding estimates for ≥80 years as 10% in men [13]. Current smoker, ex-smoker and non-smoker prevalences were estimated as 11.9, 24.4 and 63.7% among the older adult Koreans ≥65 years, respectively [14]. Current smokers were much more prevalent in men (23.3%) than in women (3.9%) but did not decline with advancing age in both genders [14].

The association between cigarette smoking and the risk of various diseases and shorter life expectancy has been widely demonstrated [15–17]. In older age, substantially higher mortality from cancers, respiratory and cardiovascular illnesses and other chronic conditions has been observed in smokers compared to non-smokers [17,18]. In a recent meta-analysis based on 17 cohort studies on the older adults, smokers had an 83% increased all causes mortality compared to non-smokers. Former smokers had a substantially lower excess risk (34%), which decreased with increasing time since stopping [19]. On the other hand, even a 60-year-old cigarette smoker could increase his life expectancy by 30% by stopping smoking [15]. Thus, smoking cessation, even at advanced age, has a major positive impact on human health [20–22]. In Europe, but little attention has been paid on the monitoring of smoking prevalence in older adults [4]. This is particularly worrisome, given that over the last few decades the burden of smoking-related diseases in the older adults has become greater and greater. Few epidemiological studies assessed

tobacco use among the older adults and additional evidence regarding older adults is still required [23]. Our study stands as the first example from a male nursing home in a developing country connecting Europe and Asia. Also, to our knowledge, this is the first study of smoking habitus prevalence in male nursing home residents. Our population had smoking frequency much higher than any of these aforementioned populations. Our study suggest the urgent need for investigating factors effective on this high smoking frequency and ways to decrease ongoing smoking in this population.

We conclude that our study suggests high prevalences of spirometric obstruction, COPD and also active and past smoking in male nursing home residents in Turkey. We suggest the use of age-corrected FEV1/FVC threshold in >65 years-of-age patients as practically better than the use of fixed FEV1/FVC < 0.70 threshold also in the male Turkish nursing home residents. Little attention has been paid on prevalences of spirometric obstruction, COPD and smoking in nursing home residents so far. Future studies from different countries are needed to have the global overview of this worldwide problem.

Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the article.

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