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Factors associated with Chronic Obstructive Pulmonary Disease among the elderly

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Abstract *This study aimed to identify factors associated with Chronic Obstructive Pulmonary Disease (COPD) among non-institutionalized elderly people. It involved a cross-sectional study conducted on the basis of a household survey, followed by spirometry. People diagnosed with COPD were compared with those with normal spirometry, through bivariate analysis, followed by multivariate regression analysis. We identified 53 elderly people were identified with COPD. After multivariate analysis, the following factors associated with COPD were identified: past or current smoking (OR: 3.74; 95% CI: 1.65-8.46), presence of chronic sputum (OR: 4.92; 95% CI: 2.03-11.95), pulse oximetry at rest ≤ 90% (OR: 8.74; 95%CI: 1.27-60.07), self-reported asthma (OR: 3.41; 95% CI: 1.01-11.57). The results reveal associated factors that highlight the need to review the selection criteria for patients at risk of COPD among the elderly.*

Key words *Chronic Obstructive Pulmonary Disease, Elderly, Risk factors*

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Introduction

Chronic Obstructive Pulmonary Disease (COPD) is known worldwide as a common cause of morbidity and mortality[1]. The clinical picture in the initial phases show the symptoms being attributed to smoking in which cough and the presence of chronic sputum is common, which makes it necessary to obtain a diagnosis by establishing a correlation with the presence of an obstruction to the air flow using the spirometry[2-4]. Wheezing and tightness of the chest are unspecific symptoms and they can vary throughout the day being more common in the elderly and in periods of exacerbated infections[1].

In Latin America, some studies describe the important prevalence of the illness and reiterated the importance of identifying the associated risk factors, making reference to sub-diagnosis[5-7]. Amongst these risk factors classically discussed as associated with COPD, is that which has been highlighted namely smoking (being current or in the past) and the exposure to smoke such as from a wood stoves and coal[1,8].

It is important to highlight that, many times, the diseases' symptoms are not given value and show a progressive gravity of the obstruction of the air flow which can be determined by the measurement known as the spirometry test from the final expiratory volume forced in the first second of the post-bronchodilator (VEF1%-PBD)[9]. For the elderly, other factors are also cited as possible complicators and thus increase the mortality chances associated with COPD. These are a person's nutritional state, the reduced capacity to carry out physical exercise and the presence of a chronic diseases such as osteoporosis, cardiovascular diseases, diabetes *mellitus* and depression[2].

It is important to highlight that even if in the population of elderly people the presence of cardiovascular alteration, osteoarticular and neurological problems can become sub-clinical COPD symptoms as a consequence of the limitations in physical activities or can overlap in relation to similar symptoms, this can be the case for other chronic diseases. Facing the sub-diagnosis of the COPD in an elderly person, the need for new studies for this group was highlighted[2].

The works published in Brazil on COPD were carried out in the capitals and cities with populations of over 500,000 inhabitants[7,10]. There is not much data on COPD in the country's inner states. The northern region of Minas Gerais showed socio-demographic characteristics and cultural ones that contain risk factors for COPD as the use of domestic wood stoves[11] and a population with many elderly people, since age is a risk factor connected to COPD[1]. In the face of the particularities in the diagnostics of COPD in elderly people, this study had the objective of identifying the factors associated with COPD in non-institutionalized elderly people being a population based study in a city that is a part of a wider region.

Methods

This was a transversal study where the participants were selected randomly based on a household epidemiological survey which was a part of a study on the health conditions of elderly people in Minas Gerais.

The selection of the individuals was conducted inside of a wider analysis of the health conditions of elderly people in the municipality. In the initial stage the selection was a random sample in two stages. In the first stage, we used a unit sample from a census area where we randomly selected 42 census areas amongst 362 urban sectors in the municipality. In the second stage, we set the number of households to be used according to the population density of individuals aged ≥ 60 years. In this stage the calculation of the number of households to be in the random selection was done based on the expected average of elderly people per household (ratio people/household), in other words, the sectors with higher numbers of older people had more households allocated which created a more representative sample. Older people whose carers/family members considered them to be unable to fill in the questionnaire form in the study, were excluded.

For the interview, a form was used with instrumental questions that had been previously validated[10,12] and that was applied by the team made up of three nurses especially trained with the aim of identifying the individuals that filled the selection criteria: 60 or older, smoking or exposure to smoke with a cough affecting the respiratory system, wheeziness or dyspnea.

Were identified 403 elderly people based on the aforementioned criteria from a sample that had 686 elderly people and all of them were invited to appear at the specialist outpatient unit to evaluate their pulmonary function and the collection of anthropometric data and oximetry pulse data. From the spirometry exams that were conducted, the elderly with or without COPD were identified.

The spirometry test was conducted with the device that was duly calibrated (KoKo®) by technicians who had been trained in its use and how

to follow the standards from the Brazilian Society for Pneumology and Tisiology[13] and it was done by an experienced pulmonologist. All the patients were submitted to the bronchodilator test using the criteria for the definition of fixed obstruction with the presence of a list covering Forced Expiratory Volume in the first second divided by the Force Vital Capacity (VEF1/CVF) being below the lesser limit of normalcy after the use of the bronchodilator and having as a reference, data from the Brazilian population[13]. The oximetry in rest test was conducted with the pulse oximetry device that is portable (*Onyx II® values9550; Nonin Medical, Inc., Plymouth, MN, USA)* and that was put on the indicator finger for 5 minutes for the stabilization of the sensor and the measurement was noted down before the use of the spirometry. None of the patients used supplements for oxygen.

Socio-demographic data was collected as well as the following information: the presence of respiratory symptoms such as coughing, wheeziness, chronic sputum without having a cold or dyspneia, in addition to information on the loss of weight (yes x no) annual flu vaccines (yes x no), the use of more than 5 medications or polypharmacy (yes x no), self-perception of health state (Really bad, bad, Regular x Very good, good), the presence of depression measured by the Geriatric Depression Scale the reduced version Geriatric Depression Scale or GDS-5 (presence x absent), reports on been hospitalized in the last year (yes x no), the carrying out of the spirometry test previously (yes x no), the category of health service that is most used (the Brazil Nation Health Service x private health care), self-perception of systematic arterial hypertension, diabetes mellitus, osteoporosis, asthma and Arthritis / Osteoarthritis, smoking (smoker and ex-smoker x never smoked), exposure to smoke from wood stove, coal, burning grass / straw or corn cob (yes x np) and pulse oximetry in rest (SatO2 ≤ 90% *x* SatO2 > 90%). The quantified load of the cumulative exposure in relation to smoking was estimated using the relation between age\pack of cigarettes (the number of cigarettes smoked per day multiplied by the number of years that the person has smoked for divided by 20). The load of exposure to smoke from wood stoves was calculated using the number of years of contact with wood fire smoke multiplied by the number of hours of daily exposure (hours\years).

The age of the elderly was described by means and standard deviation The categorical variables or the categorized were described by the distribution of frequencies, absolutes and relative distributions. Bivariate analysis was conducted to check for any associations between the independent variables and the variable outcomes *(COPD confirmed by the spirometry* χ^2) through the chi-squared test (χ^2).

In the final analysis of the associated factors the multiple regression model was used and the variables that presented descriptive levels from up to 25% ($p < 0.25$) in the bivariate analysis was included in this step. For the multiple regression model, the procedure known as Backward stepwise was adopted and what remained in the final model was just the variables that showed descriptive levels of up to 5% ($p < 0.05$) registering the Odds Ratios and the respective intervals of confidence as 95%. To evaluate the quality of the adjustment of the model, the Hosmer & Lemeshow and the Pseudo-R^2 test was used. All of the analysis was conducted using the statistical program *Statistical Package for the Social Sciences*- 18.0 (SPSS Inc., Chicago, IL, USA).

All of the steps of the study followed the ethical principles for research on human beings pursuant to Resolution 466/2012 of the National Council for Health. The study was approved by the Ethics Committee on Research at the institution where the research took place. The participants filled in and signed a consent form when being recruited to take part. Those that were unable to or did not know how to sign the form agreed to participate in the research through the registering of a finger print.

Results

Out of the 403 elderly that met the criteria for conducting the spirometry test, 203 turned up. Amongst these, three did not consent to the carrying out of the exam after the procedure was explained. One case was excluded because the person had asthma (with a diagnosis after the spirometry test) and 20 were excluded for not managing to reach the acceptable and reproductive curves on the spirometry. The analysis of the data was completed consequently with a total of 179 elderly.

Table 1 shows a comparison between demographic and social variables related to health and problems related to the respiratory system amongst patients that turned up for the spirometry test and those that did not take up the invitation. No significant differences were registered between the frequencies of the evaluated variables compared through the chi-squared test ($p > 0.05$).

The frequency of COPD in the group that carried out the spirometry test was 29.6% (n = 53). All of them were identified by the forced expiratory volume list (VEF1\CVF) in the first sec-

Table 1. Characteristics of the elderly in communities based on taking the spirometry test, 2014.

Variables	Those that took the spirometry test		Those that did not take the spirometry test		p-value
Demographic and Social	**n**	**%**	**n**	**%**	
Sex					0.855
Male	61	34.1	71	35.5	
Female	118	65.9	129	64.5	
Age (years)					0.978
60 – 69	108	60.3	122	61.0	
≥ 70	71	39.7	78	39.0	
Marital status					0.755
With spouse	89	49.7	96	48.0	
Single/separated	24	13.4	28	14.0	
Widowed	66	36.9	76	38.0	
Level of education in years					0.133
None	42	23.5	66	33.0	
≥ 4 years	99	55.3	95	47.5	
> 4 years	38	21.2	39	19.5	
Family income					0.105
< 1	60	33.5	55	27.5	
1 – 2.5	88	49.2	100	50.0	
> 2.5	31	17.3	45	22.5	
Race (self-declared)					0.388
White/Asian	63	35.2	61	30.5	
Black/Mixed Race	116	64.8	139	69.5	
Related to health					
Self-perception of state of health					0.249
Very bad/Bad/Reasonable	116	64.8	117	58.5	
Very good/Good	63	35.2	83	41.5	
Admissions to hospital in the last 12 months					0.276
Yes	28	15.6	41	20.5	
No	151	84.4	159	79.5	
Polypharmacy					0.691
Yes	48	26.8	49	24.5	
No	131	73.2	151	75.5	
Type of health service most used					0.228
SUS (Brazilian National Health Service)	137	76.5	157	78.5	
Private Health Insurance	26	14.5	43	21.5	
Self-referred morbidity					
Arterial hypertension	132	73.7	152	76.0	0.698
Diabetes *mellitus*	44	24.6	45	22.5	0.722
Osteoporosis	53	29.6	47	23.5	0.219
Arthritis / Osteoarthritis	78	43.6	71	35.5	0.133
Risk factors attributed to COPD					
Smoking					0.159
Never smoked	83	46.4	110	55.0	
Ex-smoker	74	41.2	69	34.5	
Smoker	22	12.3	21	10.5	
Respiratory symptoms					
Cough	91	50.8	100	50.0	0.952
Expectoration	37	20.7	35	17.5	0.513
Smell	79	44.1	92	46.0	0.933
Dyspnea	94	52.5	97	48.5	0.899

ond divided by the forced vital capacity (VEF1\ CVF) below the lower limit of normality[13]. The rest of the elderly that carried out the spirometry test did not show obstructive alterations.

Table 2 shows the specific bivariate analysis for the group that carried out the spirometry test, comparing people with and without COPD in relation to socio-demographic variables. The average age in the group was 69.2 years old (DP ± 7,1) varying from 60 to 93 years old, with the majority being female. There was a predominance of people being black or mixed race with 58.5% in the COPD being one of the aforementioned and 67.5% in the group with an illness falling into one of the above. The majority of the population stated that they had fewer than four years' worth of formal education (78.8%) and approximately a quarter were illiterate. With reference to the economic conditions, 53.6% received a pension and stated that they had a family income of between 1 to 2.5 minimum salaries (49.2%).

Table 3 shows the bivariate analysis for the health conditions amongst those with and without COPD. It was registered that the majority of the older people had a negative perception on their health. The polypharmacy was referred to by 26.8% of the respondents. The majority of those studied received annual flu vaccines. Approximately 94% had at least one doctor's appointment in the last year and about 15% stated that they had been admitted to hospital in the 12 months preceding the study. The morbidity that was most referred to by both the group with COPD and the one without CPOD was arterial hypertension.

Table 4 shows the results of the associations based on the bivariate analysis for the researched signs and symptoms including the pulse oximetry, and Table 5 shows the same analysis referring to smoking and the exposure to smoke and dust.

After the multi-variate analysis, we observed associations with the following factors with the group with COPD: past and current smok-

Table 2. Socio-demographic data on elderly people non-institutionalized with or without COPD (Bivariate Analysis).

Variables	n	%	With COPD n (%)	Without COPD n (%)	p-value	OR (IC95%)
Sex					0.001	
Male	61	34.1	28 (52.8)	33 (26.2)		3.16 (1.62-6.17)
Female	118	65.9	25 (47.2)	93 (73.8)		1.0
Age (years)					0.096	
≥ 70	71	39.7	26 (49.1)	45 (35.7)		1.73 (0.91 - 3.21)
60 – 69	108	60.3	27 (50.9)	81 (64.3)		1.0
Marital status					0.012	
With spouse	89	49.7	34 (64.2)	55 (43.7)		2.31 (1.19-4.48)
With spouse	90	50.3	19 (35.8)	71 (56.3)		1.0
Literate					0.169	
No	42	23.5	16 (30.2)	26 (20.6)		1.66 (0.80-3.45)
Yes	137	76.5	37(69.8)	100 (79.4)		1.0
Level of education in years					0.616	
≥ 4 years	141	78.8	43 (81.1)	98 (77.8)		0.61 (0.32-1.17)
> 4 years	38	21.2	10 (18.9)	28 (22.2)		1.0
Retired					0.133	
Yes	96	53.6	33 (62.3)	63 (50)		1.22 (0.59-2.49)
No	83	46.4	20 (37.7)	63 (50)		1.0
Family Income (in minimum salary)*					0.995	
< 1	60	33.5	18 (34.0)	42 (33.3)		0.98 (0.39-2.40)
1 – 2.5	88	49.2	26 (49.1)	62 (49.2)		0.95 (0.37-2.47)
> 2.5	31	17.3	9 (17.0)	22 (17.5)		1.0
Race					0.251	
White/Asian	63	35.2	22 (41.5)	41 (32.5)		1.47 (0.76-2.85)
Black/Mixed Race	116	64.8	31 (58.5)	85 (67.5)		1.0

* Value of minimum salary in 2013 = R$ 672.00.

Table 3. Characteristics related to the health amongst elderly people non-institutionalized with or without COPD (Bivariate Analysis).

Variables	n	%	With COPD n (%)	Without COPD n (%)	p-value	OR (IC95%)
Self-perception of state of health					0.571	
Very bad/Bad/Reasonable	116	64.8	36 (67.9)	80 (63.5)		1.22 (0.62-0.41)
Very good/Good	63	35.2	17 (32.1)	46 (36.5)		1.0
Admissions to hospital in the last 12 months					0.749	
Yes	28	15.6	9 (17.0)	19 (15.1)		1.15 (0.48-2.74)
No	151	84.4	44 (83.0)	107 (84.9)		1.0
Use of antibiotics (in the last year)					0.030	
Yes	10	5.6	6 (11.3)	4 (3.2)		3.89 (1.05-4.42)
No	169	94.4	47 (88.7)	122 (96.8)		1.0
Previous Spirometry Test					0.740	
Yes	40	22.3	11 (20.8)	29 (23.0)		1.14 (0.52-2.49)
No	139	77.7	42 (79.2)	97 (77.0)		1.0
Polypharmacy					0.771	
Yes	48	26.8	15 (28.3)	33 (26.2)		1.11 (0.54-2.28)
No	131	73.2	38 (71.7)	93 (73.8)		1.0
Annual flu vaccine					0.546	
No	45	25.1	15 (28.3)	30 (24.0)		0.80 (0.39-1.65)
Yes	133	74.3	38 (71.7)	95 (76.0)		1.0
Doctors appointment in the last year					0.459	
No	10	5.6	4 (7.5)	6 (4.8)		1.63 (0.44-6.03)
Yes	169	94.4	49 (92.5)	120 (95.2)		1.0
Type of health service most used*					0.021	
SUS (Brazilian National Health Service)	137	76.5	47 (94)	90 (79.6)		4.00 (1.14-14.03)
Private Health Insurance	26	14.5	3 (6.0)	23 (20.4)		1.0
Self-referred morbidity						
Arterial hypertension	132	73.7	37 (69.8)	95 (75.4)	0.438	0.75 (0.37-1.54)
Diabetes *mellitus*	44	24.6	11 (20.8)	32 (25.4)	0.507	0.77 (0.35-1.67)
Osteoporosis	53	29.6	13 (26.0)	40 (32.5)	0.399	0.73 (0.35-1.52)
Asthma	20	11.2	13 (24.5)	7 (5.6)	0.000	5.53 (2.06-14.81)
Arthritis / Osteoarthritis	78	43.6	17 (33.3)	61 (49.2)	0.055	0.52 (0.26-1.02)
Depressive symptoms	53	29.6	18 (34.0)	35 (37.8)	0.408	1.34 (0.67-2.66)

* The total value varied according to the information not given (*missing*).

ing (OR:3.74; IC95%:1,65-8,46; p = 0,002), the presence of chronic sputum as a respiratory symptom (OR:4,92; IC95%:2,03-11,95 p < 0,001)), pulse oximetry in rest ≤ 90% (OR:8,74; IC95%:1,27-60,07 p = 0,028) and self-report asthma (OR:3,40; IC95%:1,00-11,57; p = 0,05). The dyspnea account showed neighboring values in the final model (OR = 2,11; IC95% = 0,95-4,69;p = 0,066). The Hosmer and Lemeshow test (χ2 HL) with p-valor = 0.526; Pseudo-R2 = 0.306; -2logv = 174.04 was shown.

Discussion

The results of this work showed the need for the revision of the selection criteria for the patients at risk of COPD amongst the elderly people. This is in light of the fact that we identified, as factors associated with COPD in the elderly, the presence of habitual smoking that was current and had occurred in the past. We also noted the presence of chronic sputum as a respiratory symptom as well as self-diagnosed asthma and the saturation presence of ≤ 90% for pulse oximetry at rest.

Table 4. Respiratory signs and pulse oximetry in rest amongst elderly people non-institutionalized with or without COPD (Bivariate Analysis).

Variables	n	%	With COPD n (%)	Without COPD n (%)	p-value	OR (IC95%)
Cough					0.184	
Yes	91	50.8	31(58.5)	60 (47.6)		1.54 (0.81-2.97)
No	88	49.2	22(41.5)	66 (52.4)		1.0
Lack of air					0.090	
Yes	94	52.5	33(62.3)	61 (48.4)		1.76 (0.91-3.39)
No	85	47.5	20(37.7)	65 (51.6)		1.0
Wheeziness					0.029	
Yes	79	44.1	30(56.6)	49 (38.9)		2.05 (1.07-3.93)
No	100	55.9	23(43.4)	77 (61.1)		1.0
Expectoration					0.000	
Yes	37	20.7	21(39.6)	16 (12.7)		4.51 (2.11-9.65)
No	142	79.3	32(60.4)	110 (87.3)		1.0
Loss of weight					0.994	
Yes	71	39.7	21(39.6)	50 (39.7)		0.99 (0.52-1.92)
No	108	60.3	32(60.4)	76 (60.3)		1.0
Pulse Oximetry					0.004	
SatO2 ≤ 90%	8	4.5	6(11.3)	2 (1.6)		7.92 (1.54-40.61)
SatO2 ≤ 90%	171	95.5	47(88.7)	124 (88.7)		1.0

The study which was conducted in São Paulo showed, after the analysis was adjusted, that the following factors independently were associated with COPD: smoking, becoming tired very easily, being over the age of 60, health problems in the last 15 days and a lack of physical activity in their free time[14]. However, the study that was referred to, covered self-diagnosed COPD which represents an important limitation for the condition which is not well known by the general population[5,15]. Some authors highlight that even amongst health care professionals COPD is not well known. There are often inaccuracies in differential diagnosis between asthma and COPD[7,15,16].

It is worth mentioning that even though this study adopted the diagnosis of COPD according to the lower limit of normality in relation to the spirometry exam, after using the bronchodilator it had as a reference the data on the Brazilian population. The use of the lower limit of normality for specific populations has tended to be the criteria adopted internationally in order to avoid the excess of false diagnosis for the elderly population[17].

In the study evaluating the prevalence and associated factors which was also conducted in Brazil, the authors highlighted that COPD was positively associated with age and smoking and inversely with a person's body mass index[18].

In a recent study that compared the prevalence of asthma and COPD in the United States in intervals greater than ten years, the authors highlighted that there still remained, as factors associated with COPD, smoking, low levels of education, nutritional disorders and the exposure to dust and occupational smoke[19].

Therefore, smoking is indicated in all studies as a factor closely associated with COPD and it represents an important problem in public health care[1,20]. A study conducted in some regions of Latin America identified the greatest prevalence of COPD associated with the highest levels of smoking[21]. The intensity of smoking and the persistence of the habit even after the diagnosis, showed direct relations with mortality rates from COPD[22]. The stopping of smoking is described as the most effective intervention in the reduction of the development of pulmonary problems increasing the chances of survival and reducing morbidity[23]. This study found associations amongst current and past smoking habits with the presence COPD in elderly as described in the literature[7,10,11,22,23] without there being evidence associated with the smoking burden in the group with COPD which might be related to memory limitations since the studied public was older people.

Table 5. Exposure to Tabaco, smoke, occupational dust amongst elderly people non-institutionalized with or without COPD (Bivariate Analysis).

Variables	n	%	With COPD n (%)	Without COPD n (%)	p-value	OR (IC95%)
Smoking					0.001	
Smoker/Ex-smoker	96	53.6	38 (71.7)	57 (45.2)		3.07 (1.53-6.13)
Non-Smoker	83	46.4	15 (28.3)	69 (54.8)		1.0
Quantity of cigarettes smoked [a]					0.003	
≥ 20 years/pack of cigarettes	53	29.6	24 (46.2)	29 (23.6)		3.75 (1.72-8.17)
≥ 20 years/pack of cigarettes	39	21.8	13 (25.0)	26 (21.1)		1.66 (0.70-3.90)
Never smoked	83	46.4	15 (30.0)	68 (55.3)		1.0
Exposure to smoke[b]						
Wood Stove	174	97.2	52 (98.1)	122 (96.8)	0.633	1.71 (0.19-15.62)
Collier	27	15.1	5 (9.4)	22 (17.5)	0.171	0.49 (0.18-1.38)
Burning Grass / Straw	107	59.8	29 (54.7)	78 (61.9)	0.371	0.74 (0.39-1.42)
Burning Corncobs	85	47.5	26 (49.1)	59 (46.8)	0.785	1.09 (0.58-2.08)
Exposure to dust at work > 1 year [a]					0.412	
Yes	122	68.2	34 (64.2)	88 (70.4)		0.75 (0.38-1.49)
No	56	31.3	19 (35.8)	37 (29.6)		1.0

[a] The total value varied according to the information not given (missing). [b] The reference extract for this variable was the absence of exposure to smoke.

The presence of chronic sputum as the only respiratory symptom associated with COPD in the studied older people, differs in the data from the literature on the symptoms since there is a greater emphasis on coughs and dyspnea[1,24]. This was a transversal study based on a population of elderly people numbering 3,954 which involved evaluating the role of the respiratory symptoms in the diagnosis of the obstruction to the flow of air referring to smokers and non-smokers presence in both groups amongst three respiratory symptoms (coughs, wheeziness or chronic sputum) almost doubling the chances of COPD[4]. However just the presence of the respiratory symptoms and smoking are not sufficient for the diagnosis of COPD as it is necessary to confirm the presence of the obstruction through the spirometry test[25,26]. The presence of chronic sputum in COPD is more commonly associated with smoking[1]. The absence of the respiratory symptoms's classic association in the studied older people with COPD may interfere in the recognition of the clinical picture contributing to the sub-diagnosis in the population[2,3].

The absence of statistical significance for the presence of dyspnea associated with COPD observed in this study was also described in another study[27] but this does not negate the study's clinical importance. Dyspnea was, in general, present since the initial phases of the disease assisting in the patients searches for diagnosis and presenting direct correlations with the severity of the disease[1,10,28]. Dyspnea caused by pulmonary hyperinflation gets worse during exercise and reduces the patient's capacity to exercise[1]. The self-perception of dyspnea in older people is influenced by the reduction of mobility as a geriatric problem that is common in this group. This limits the conducting of exercise tests and may interfere in the responses on the scale of dyspnea - the *modified Medical Research Council* (MRC) and *COPD Assessment Test* (CAT) usually applied in medical practices[2,24]. In this context, new parameters for evaluating dyspnea in older people as a factor associated with COPD has become necessary in the search for criteria that facilitate the identification of patients with the disease.

The sub-diagnosis of COPD results in the patient not being treated and as a consequence there is increasing morbidity and the risks of complication since the reduction in capacity to exercise implies a reduction in the ability to do daily activities with poor quality of life. As a result, this reduction in capacity to exercise may be a causal and aggravating factor of the comorbidities in COPD such as skeletal muscular dysfunctions, cardiovascular diseases, obesity and metabolic syndrome[28,29].

The association of self-diagnosed asthma in the group with COPD permits a discussion focused on the current literature. Asthma is not uncommon in elderly people being either a reoccurrence of a childhood disease or one which appear later on in life. The search for information on the progressive history of asthma, atopy, triggering factors, responses to corticosteroids and the reversal of the obstruction of the air flow after the application of the bronchodilator test in the spirometry has produced data that corroborates in the presence of asthma amongst the elderly[2,30]. Recent studies highlight the difficulties of making a distinction between asthma and COPD in relation to smokers and ex-smoker[30,31].

The GOLD and Global Initiative for Asthma (GINA) in 2014 defined the criteria for the syndrome of overlap between asthma and COPD as the presence of previous historical data favors asthma in smokers and ex-smokers with the obstruction partially reversed and the bronchodilator test being overwhelming positive (increase from 400ml and from 12% in the value of VEF1 basal) on the spirometry[25]. In the population selected for this study a patient identified asthma and presented spirometry readings that were compatible with asthma and thus was excluded from the study. Amongst the patients with COPD only one older person had an overwhelming positive test with self-diagnosis of asthma which opens up the possibility of overlap to be unlikely.

It is possible to assume that self-diagnosis of asthma is due to the perception on the part of the elderly person of a chronic respiratory disease without diagnosis. This means that the respiratory symptoms would be assumed by the elderly person as a symptom of asthma where they have no knowledge of COPD but without a definition of an accurate diagnosis. a situation already pointed out in another study[2] . Recent studies on the diagnosis of COPD suggest the need to train primary health care professional to seek out patients that are at risk as a key point for early diagnosis[6,7,32].

The association found in this study with a saturation of ≤ 90% on the oximetry at rest which was associated with the COPD in the elderly, showed a correlation with the data in the literature, being common in patients with more severe air flow obstruction and emphysema[1,33]. The presence of saturation with pulse oximetry of ≤ 90 % and induced hypoxemia through exercise is associated with higher levels of mortality[34,35]. The indication of the use of pulse oximetry at rest on its own to predict desaturation on exercising, is controversial in the literature. The works used different methodologies and excluded patients with comorbidities and limitations to the exercise tests[33,35]. In the protocol proposed by GOLD the use of pulse oximetry is recommended for indication and titration of the flow for oxygen therapy. Recently the presence of hypoxemia as a criterion for the classification of the severity of COPD has been excluded[1]. The presence of low oxygen saturation registered by the pulse oximetry at rest in this group of older people with COPD in which dyspnea and coughs are not associated, draws attention to the possibility of the use of pulse oximetry in the search for individuals that are at the greatest risks to COPD[33] in which the diseases are presence without being diagnosed even at advance stages.

Although some studies show the exposure to smoke and the presence of more than one respiratory symptom (cough or dyspnea) as factors associated with COPD[1,3,4,8], these variables did not show themselves to be associated in the group that was studied. The authors attribute this result possibly to limitations in memory due to those being treated are older people. What is described in the literature are the accounts of more respiratory symptoms in patients with prior diagnosis of COPD[20]. Previous data was not collected on the clinical factors associated with asthma in elderly people who stated that they had this condition in the group with COPD, which was a limitation in the study.

It is relevant to highlight the limitation due to the loss of older people who did not turn up to carry out the spirometry test. However, it is also important to highlight that the comparison between the group that conducted the exam and the group that did not turn up for the exam did not show differences. This represents a counterpoint to the limitations of the losses or portrayed losses that are not different.

The results of this study reveal associated factors that highlight the importance of disseminating knowledge and the applicability of the selection criteria of the patients at risk of COPD amongst older people. The conducting of medical interviews to identify inhalation risk factors and the presence of respiratory symptoms may not be sufficient in the selection of older people at risk of COPD, considering the particular nature of perception and the account of some respiratory symptoms such as dyspnea in this age group. The pulse oximetry measurement at rest can be an ally in tracking patients at risk of COPD at advance stages, especially amongst older people with few symptoms. This proposal can contribute in the early identification of patients that would benefit from immediate treatment and being sent for an immediate test in the face of the current scenario of sub-diagnosis of COPD.

Collaborations

ATF Barbosa, JA Carneiro, GCF Ramos, MT Leite e AP Caldeira participated equally in all stages of preparation of the article.

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