

# RESPIRATORY FUNCTION PROFILE UPON DIAGNOSIS OF COPD IN NON-SMOKERS

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**Keywords:** COPD, spirometry, FEV1, biomass, non-smoker

**Abstract:** COPD is a disease associated almost exclusively with cigarette smoking. For this reason, suspicion index of COPD in the non-smoker is low, thus making the disease severely underdiagnosed. Therefore, there is the need for both an epidemiological and spirometrical characterisation of the disease in the non-smokers. The current study wishes to describe the pulmonary function of the non-smoking COPD patient at the time of diagnosis. We have observed a predominance of patients who seek medical help in late stages of the disease, with moderate to severe airflow limitation. Also, the impact of using biomass for heating, on pulmonary function has been assessed and found similar to that of cigarette smoking. In rural environments, using biomass as a primary heating source has been associated, especially in the male patients, with significantly lower FEV1 values.

**Cuvinte cheie:** BPOC, spirometrie, VEMS, biomasă, nefumători

**Rezumat:** Bronhopneumopatia obstructivă cronică este o patologie asociată aproape întotdeauna pacientului fumător. Din acest motiv, pragul de suspiciune pentru BPOC la pacientul nefumător este scăzut, boala fiind sever subdiagnosticată. Este astfel necesară o caracterizare atât epidemiologică dar mai ales funcțional respiratorie a populației bolnavilor de BPOC nefumători. Studiul curent se vrea o caracterizare a funcției pulmonare a pacientului nefumător cu BPOC în momentul primei prezentări la medic. Astfel, am observat o predominanță a pacienților care se prezintă la medic în stadii relativ tardive ale bolii, cu obstrucție bronșică moderată sau severă. De asemenea, se observă impactul arderii de biomasă asupra funcției pulmonare comparabil cu cel al fumatului de țigarete. Încălzirea cu biomasă în mediul urban, mai ales la bărbat, este asociată cu valori semnificativ scăzute ale VEMS.

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is characterized by airflow limitation. Although the diagnosis is suggested by clinical history and physical examination, certainty is obtained by examining lung function with the use of spirometry.(1)

Using spirometry to diagnose COPD patients is necessary both in smokers, who have an increased index of suspicion, and in the non-smokers (with or without a history of smoking) patients who usually have a low index of suspicion, which often leads to late or incorrect diagnosis of the disease.(2)

Another benefit of spirometry in these patients is the identification of the individuals who may benefit from pharmacological treatment, thus improving the quality of life and improving the prognosis of the disease by decreasing the number of exacerbations.(3)

In Romania, the COPD patients remain underdiagnosed, especially among the people who have never smoked. This trend translates into lower quality of life in these patients, with increased absenteeism from work and number of exacerbations, characterized by significant increases in the cost of the disease.(4)

## PURPOSE

The study aims at accomplishing an epidemiological and spirometrical characterisation of the COPD disease in the non-smokers.

## METHODS

To profile the respiratory function of the non smokers with COPD, we have chosen to perform a descriptive study of 199 patients, ex-smokers (n = 144) or never smokers, diagnosed with COPD in the respiratory outpatient of Vâlcea county during 2010-2012. The spirometric evaluation of the pulmonary function in the patients with COPD was performed by using a Vitalograph Alpha spirometer, following quality assessment criteria ATS / ERS.

Data were collected at diagnosis of COPD and refer to the demographic characteristics of patients, their comorbidities, functional status, and respiratory therapy instituted.

The data collected were processed and stored in digital format.

Statistical analysis was performed using SPSS software suite edition 20.

## RESULTS AND DISCUSSIONS

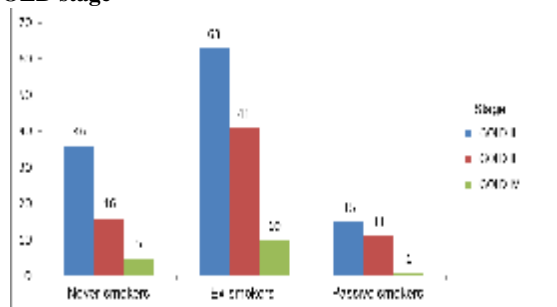
In the patients with COPD, we considered useful to study FEV values, VC and Tiffneau index, defined as the ratio of FEV and VC, necessary for diagnosis and staging of COPD according to GOLD criteria.

In the entire group, the median forced expiratory volume per second (FEV) was of 53.04% (confidence interval 95% - 2%), corresponding to a moderate level of bronchial obstruction.

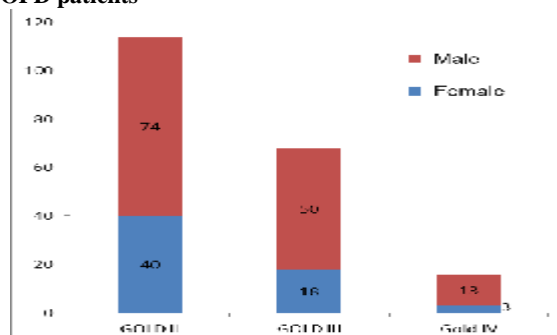
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## CLINICAL ASPECTS

**Figure no. 1. Non-smoking COPD patients' distribution by GOLD stage**



**Figure no. 2. Gender distribution and GOLD stage for COPD patients**



Regarding GOLD status of the patients at diagnosis, most of them - 57.3% (n = 114) belonged to stage II, FEV 50-70%, followed by the patients enrolled in GOLD stage III, with severe obstruction - 34.2% (n = 68). Very severe obstruction was seen in 8% of patients (n = 16), a significant percentage if you analyse the severity of symptoms and its profound impact on quality of life (figure no. 1) Compared with a similar study conducted in Bangladesh (5), we observe a high percentage of patients diagnosed in stage II (57.3% vs. 36%) fact that denotes a presentation at the doctor's office earlier, in the patients we studied.

Among the non-smokers without passive exposure to cigarette smoke, 63.2% (n = 36) were in GOLD stage II, 28.1% in stage III and 8.8% in stage IV. Ex-smokers and those with passive exposure to cigarette smoke had a similar distribution of staging - stage II 55.3% 53.6% and stage III - 36% respectively 39%, but we see a significantly higher percentage of stage IV former smokers than stage IV passive smokers (8.8% vs. 3.6%).

Median FEV is lower for ex-smokers - 54.9%, compared to non-smokers or passive smokers (51.7%). Gender distribution of cases studied show a predominance of males (68.8%, n = 137). Their enrolment in GOLD stages showed a higher frequency of moderate obstruction in women (64.5% vs. 54%) with the reversal of this situation where severe and very severe obstruction is concerned. If we only analyze the non smokers and the passive smokers, we can observe a predominance of cases in females, accounting for 63.5% of all cases occurring in non smokers, thus possibly reflecting the higher incidence of smoking in men, especially after the age of 40.(6)

Regarding the area of residence, we did not observe significant changes in median FEV when comparing rural to urban areas. However, there is a high percentage of women with COPD in rural areas, a smaller percentage of smokers and of exposure to products of biomass combustion. Under these circumstances, we observe a median FEV increase in women compared to men in the rural areas (54.72% vs. 50.9%), a difference not found in the urban areas. Another notable

difference occurs in female smokers, where the median FEV is higher in the rural areas (54.12% versus 49.8% in the urban areas), inverse in female former smokers (54.6% in the rural areas compared to 59.3% in the urban areas). These differences are not found in male patients, probably showing greater uniformity of the risk factors for decreased FEV.

Although smoking has been incriminated as the main risk factor for developing COPD, the diagnosis of the disease in non smokers has led to search for other risk factors, highlighting the important role of biomass heating, especially in improperly ventilated enclosures.(7) If we take into consideration that 3 billion people are exposed to biomass burning while only one billion people smoke worldwide, the role of exposure to combustion products of biomass is at least as important as that of smoking.(8)

In this study, we observe a median FEV higher in urban populations than in rural people exposed to biomass burning (52% vs. 45.3%), difference especially visible between males (50.7% in rural areas compared to 39.3% in urban areas). This difference is not found in the patients without exposure to biomass combustion (table no. 1).

**Table no. 1. Distribution of the COPD cases in non-smokers according to the system of heating and gender**

Heating		Median	Number	Std Deviation.
Biomass	Feminine	54.48	46	14.270
	Masculine	49.62	89	14.937
	Total	51.27	135	14.841
Thermofication	Feminine	53.75	16	15.203
	Masculine	55.79	48	14.727
	Total	55.28	64	14.752
Total	Feminine	54.29	62	14.393
	Masculine	51.78	137	15.102
	Total	52.56	199	14.894

### CONCLUSIONS

The non-smoker patient with COPD is difficult to diagnose because of the low suspicion index for this pathology associated almost exclusively with smoking. When the patients consult the physician, airway obstruction is already moderate or severe. Biomass heating plays an important part, especially in urban areas, where the lack of access to district heating is almost exclusive to impoverished people with inadequate access to health services. In the rural areas, the impact of biomass burning is similar to that of cigarette smoking history.

Under these conditions, the authors consider necessary raising the suspicion index for COPD in non-smoking patients, especially for the people from the rural areas exposed to products of biomass combustion, which come to the physician with acute bronchial obstruction.

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## CLINICAL ASPECTS

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