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ORIGINAL RESEARCH

Prevalence of chronic obstructive pulmonary disease (COPD) in Albania

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Abstract

Aim: The objective of this study was to determine the prevalence of COPD and its associated factors among adults in Albania.
Methods: This was a cross-sectional study conducted in Albania in 2013-14. A nation-wide representative sample of 1200 adults aged ≥40 years was selected using multistage cluster sampling technique. All participants were interviewed about socio-demographic characteristics, respiratory symptoms, smoking status and clinical characteristics. Spirometry was performed according to standard methods. COPD was defined as post-bronchodilator FEV1/FVC ratio <70% predicted.
Results: Of the 1200 adults invited to participate, 939 adults or 78% (467 men and 472 women) were eligible for the study. The overall COPD prevalence (GOLD stage 1 or higher) was 12.4%; it was higher in men (17.4%) than in women (7.7%). Using Lower Limit of Normal (LLN), the prevalence of COPD was 9.9%, again higher in men (13.2%) than women (6.6%). The prevalence of doctor-diagnosed COPD was 1.3% (1.9% in men, 0.6 % in women). Male sex, smoking and increasing age were significantly associated with COPD diagnosis.
Conclusion: The overall prevalence of COPD in Albania was 9.9% using BOLD standards. Smoking and increasing age were the main risk factors for COPD. The study highlights the importance of raising awareness of COPD among health professionals.

Keywords: *Albania, BOLD study, COPD prevalence, risk factors.*

Conflicts of interest: None declared.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is currently the fourth leading cause of death in the world but is projected to be the 3rd leading cause of death by 2020 (1). Globally, the COPD burden is projected to increase in coming decades because of continued exposure to COPD risk factors and aging of the population (2).

COPD prevalence, morbidity and mortality vary across countries and across different groups within countries. COPD is the result of a complex interplay of long-term cumulative exposure to noxious gases and particles, combined with a variety of host factors including genetics, airway hyper-responsiveness and poor lung growth during childhood (3,4). Often, the prevalence of COPD is directly related to the prevalence of tobacco smoking, although in many countries outdoor, occupational and indoor air pollution (resulting from the burning of wood and other biomass fuels) are major COPD risk factors (5,6).

Despite a growing burden, COPD is often a neglected disease and its epidemiology is largely unknown in particular in low and middle income countries (7). Existing COPD prevalence data vary widely due to differences in survey methods, diagnostic criteria and analytical approaches (2). Many patients with COPD are still underdiagnosed, inadequately evaluated and under-recognized leading to significant underreporting of the disease (8,9).

Community based studies using appropriate methods are needed to determine the epidemiology of COPD and to enable the development of prevention and management strategies for the future.

The Burden of Obstructive Lung Disease (BOLD) initiative aimed at developing and using a standardized method to measure the prevalence of COPD and its risk factors in various areas around the world (10,11).

In our study, we used BOLD protocol to estimate the prevalence and burden of COPD in Albania.

Methods

BOLD developed standardized methods including standardized spirometry equipment, meticulous quality control measures, standard protocols, validated and translated questionnaires and standard data entry and analysis.

BOLD Operations Centre (OC) emphasized data quality control at every stage of the process. The study was conducted in close collaboration with the BOLD Operations Centre (OC) in London which provided oversight, training, materials, quality control, and data analysis.

National Bioethics Committee's approval was a prerequisite for study implementation.

Study design

This was a cross-sectional study conducted in Albania in 2013-14, which consisted of a COPD prevalence survey among adults aged ≥40 years. A representative sample of adult individuals in this age range was asked to fill in the questionnaires and perform spirometry tests designed by BOLD.

Target population and sampling procedure: A nation-wide representative sample was drawn. A multi-stage cluster sample of 1200 individuals (600 men and 600 women) aged ≥40 years was drawn based on the sampling frame (alias the target population) available from the national Institute of Statistics (INSTAT). BOLDOC in London, UK, reviewed and approved the sampling approach calculated by a local expert.

Recruitment of participants: Participants were contacted through home visits and were

asked to provide an informed consent to schedule a clinic visit and where necessary.

Study Measures

Spirometry was performed by eight trained and certified technicians (EasyOne spirometer; ndd Medizintechnik; Zurich, Switzerland). COPD was defined as a post-bronchodilator FEV1/FVC <70% predicted. Spirometry data were sent electronically to the OC where each spirogram was reviewed and graded using ATS guidelines (12).

Post bronchodilator spirometry tests were performed at least 15 min after achievement of at least 3 acceptable and 2 reproducible pre bronchodilator spirometry tests.

The number of pack-years of cigarette smoking was defined as the average number of cigarettes smoked per day divided by 20 (i.e., packs per day) times the duration of smoking in years.

Data recording and analysis

Data for BOLD study consisted of electronically generated spirometry records, responses to questionnaires administered to study participants, individual tracking data, and aggregate data about the target population. Our data were reported to OC for validation and analysis. Estimated population prevalence of COPD for the overall city population was computed using survey data methods in Stata v. 12 (Stata Corporation, College Station, TX, USA), and stratified by sex, age and smoking status. The study was conducted from October 2012 to December 2013.

Results

Of the 1200 adults invited to participate, 997 (83%) of them were eligible for the study. Among them 11 participants were excluded because of lost spirometry data due to the faulty spirometer and 47 other participants due to unacceptable post BD spirometry.

Table 2 shows that there were no differences between responders and non-responders who were eligible for the study, except for smoking status and other co-morbid conditions ($p<0.001$ and $p<0.007$, respectively). Participants that were current smokers and those with co-morbid conditions were less likely to be responders.

Table 3 shows the prevalence of smoking in Albania by sex and age. Overall, 21.6% of individuals ≥40 years old were smokers at the time of the study. Smoking was much more prevalent in males than in females. The percentage of smoker was higher in age group 50-59.

The overall prevalence of GOLD stage I or higher COPD was 12.4%, and was higher in male (17.4%) than female sex (7.7%) and in those >70-year old.

Using Lower Limit of Normal (LLN) the prevalence of COPD was 9.9%, again higher in males (13.2%) than females (6.6%) and like using GOLD criteria was higher in individuals > 70 years old (Table 4).

The prevalence of COPD was strongly related to smoking history expressed as pack years as shown in table 5.

Table 6 shows the prevalence of smoking in Albania by sex and age. Overall, 21.6% of individuals ≥ 40 years old were smokers at the time of the study. Smoking was much more prevalent in males than in females. The percentage of smokers was higher in age group 50-59. The prevalence of doctor-diagnosed COPD was much lower than spirometry-confirmed COPD, with an overall estimate of 1.3% (1.9% in males, 0.6 % in females) (Table 28). It was higher in group >70 years.

Table 1. Disposition of Study Participants for BOLD SITE: Tirana, Albania

Outcome	Men	Women	Unknown	Total
Responders:				
Full data collected (Core Ques plus QC acceptable post BD spirometry)	467	472	0	939
Full data collected (Core Ques plus QC unacceptable post BD spirometry)	27	20	0	47
Full data collected (Spirometry data lost due to faulty spirometer)*	2	9	0	11
Total responders	496	501	0	997
Non-responders:				
Partial data collected	51	49	0	100
Refused (minimal data collected)	2	2	0	4
Refused (no minimal data collected)	43	32	0	75
Known to have temporarily left area	3	10	0	13
Unreachable (couldn't reach)†	4	5	0	9
Total non-responders	103	98	0	201
Ineligible:				
Deceased	1	1	0	2
Permanently left catchment area	0	0	0	0
Age ineligible	0	0	0	0
Institutionalized	0	0	0	0
Untraceable (bad address & phone)‡	0	0	0	0
Total ineligible	1	1	0	2
Total selected for recruitment¶	600	600	0	1200

* Some spirometry data was lost before it could be transferred, due to a faulty spirometer;

† Contact information apparently correct, but no response to contact attempts;

‡ Contact information incorrect, no updated information available;

¶ Number of responders + non-responders + ineligibles.

Table 2. Comparison of responders* and non-responders† for Albania

		Responders	Non-responders	P-value‡
Age	40-49	351 (36%)	81 (40%)	0.382
	50-59	330 (33%)	55 (27%)	
	60-69	191 (19%)	40 (20%)	
	70+	114 (12%)	25 (12%)	
Gender	Male	494 (50%)	103 (51%)	0.768
	Female	492 (50%)	98 (49%)	
Smoking status	Current	213 (22%)	46 (23%)	<0.001
	Ex	148 (15%)	9 (4%)	
	Never	625 (63%)	146 (73%)	
Doctor diagnosed asthma, emphysema, CB or COPD	Yes	64 (6%)	6 (3%)	0.056
	No	922 (94%)	194 (97%)	
Other co-morbid conditions	Yes	260 (26%)	72 (36%)	0.007
	No	726 (74%)	129 (64%)	

* Responders are those who completed post-BD spirometry (regardless of QC scores) and the core questionnaire.

† Non-responders are eligible individuals who are missing the core questionnaire and/or post-BD spirometry, but for whom the tabulated variable is known.

‡ Two-sided p-value based on Pearson's chi-square test

Table 3. Estimated Population Prevalence (SE) of GOLD Stage 1 or higher COPD* by age and sex for Albania

	Age-group				
Sex	**40-49**	**50-59**	**60-69**	**70+**	**Total**
Male	3.8 (0.5)	10.0 (2.3)	28.4 (6.7)	52.5 (7.5)	17.4 (2.5)
Female	2.3 (0.5)	4.1 (1.9)	17.0 (6.1)	14.7 (5.2)	7.7 (2.3)
Total	3.0 (0.4)	7.0 (1.5)	22.4 (4.7)	32.3 (4.9)	12.4 (1.7)

* Post-BD FEV1/FVC <70%.

Table 4. Estimated Population Prevalence (SE) of COPD in Tirana, Albania, using Lower Limit of Normal (LLN): Modified Stage 1 or higher COPD* by age and sex (Local Equations)

	Age-group				
Sex	**40-49**	**50-59**	**60-69**	**70+**	**Total**
Male	4.2 (0.9)	5.3 (2.3)	21.2 (2.2)	41.2 (11.0)	13.2 (2.6)
Female	3.8 (1.4)	4.1 (1.9)	12.3 (5.5)	10.7 (2.4)	6.6 (1.4)
Total	4.0 (0.8)	4.7 (1.5)	16.5 (3.2)	24.9 (5.4)	9.9 (1.4)

* Post-BD FEV1/FVC < LLN

Table 5. Estimated Population Prevalence (SE) of GOLD Stage 1 or higher COPD* by pack years and sex in Tirana, Albania

		Pack-years			
Sex	**Never smokers**	**0-10**	**10-20**	**20+**	**Total**
Male	6.2 (2.2)	10.2 (4.8)	7.6 (2.3)	27.6 (4.6)	17.4 (2.5)
Female	6.1 (2.9)	19.8 (18.9)	24.2 (11.5)	9.0 (8.4)	7.7 (2.3)
Total	6.1 (2.1)	14.8 (9.5)	14.3 (5.5)	27.0 (4.5)	12.4 (1.7)

* Post-BD FEV1/FVC < 70% and post-BD FEV1 < 80% predicted

Table 6. Prevalence of current smoking by age and sex in Tirana, Albania

		Age-group				
	Sex	**40-49**	**50-59**	**60-69**	**70+**	**Total**
Respond-ers with usable data*	Male	40.5%	44.6%	29.3%	21.0%	35.8%
	Female	7.8%	8.4%	5.3%	3.0%	7.3%
	Total	22.5%	23.6%	19.9%	15.8%	21.6%
Popula-tion†	Male	44.5% (5.2)	46.7% (1.7)	29.4% (5.6)	21.1% (7.8)	38.7% (3.2)
	Female	6.5% (3.2)	8.3% (1.8)	4.8% (4.2)	5.2% (4.5)	6.5% (0.9)
	Total	25.3% (3.2)	27.9% (1.0)	17.1% (4.4)	12.4% (4.0)	22.4% (1.8)

* Non-weighted data for the sample of responders.

† Weighted population estimate, with SE shown in parenthesis.

Table 7. Estimated Population Prevalence (SE) of Doctor-Diagnosed COPD* by age and sex in Tirana, Albania

Sex	40-49	50-59	Age-group 60-69	70+	Total
Male	0	1.7 (1.4)	3.8 (1.8)	4.4 (2.6)	1.9 (0.8)
Female	0	2.3 (0.7)	0	0	0.6 (0.1)
Total	0	2.0 (0.8)	1.9 (0.9)	2.0 (1.2)	1.3 (0.4)

* Includes chronic bronchitis, emphysema or COPD

Discussion

This is the first COPD prevalence study ever conducted in Albania. Response rate for Albania was high, both for males and females, 82.3%. Response rates among females were slightly higher, 84% as compared to 83% for males, although not statistically significant. We did not observe any difference among the responders according to age groups, doctor diagnosed asthma, emphysema, chronic bronchitis (CB) or COPD, but we found statistically significant difference in relation to smoking status and other co-morbid conditions. The percentage of responders and non-responders among current smokers was similar, showing that completing questionnaires and performing spirometry was not easy for a current smoker. The percentage of never smokers for non-responders and responders was respectively 73% and 63%, ($p<0.001$), showing that never smokers are less concerned about respiratory health status. Among participants with co-morbid conditions, the percentage of non-responders and responders was respectively 64% and 74%, ($p<0.007$), showing that presence of co-morbid conditions is likely to increase awareness about respiratory health status.

Our study showed that the overall COPD prevalence (GOLD stage 1 or higher) in Albania was 12.4%, and was higher in males (17.4%) than females (7.7%) and in those aged > 70 years old. Using Lower Limit of Normal (LLN) the prevalence of COPD was 9.9%, again higher in males (13.2%) than females (6.6%) and like when using GOLD criteria, was higher in those aged > 70 years old. Thus, the prevalence of COPD using LLN was lower than the prevalence estimated using GOLD criteria.

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) uses a fixed ratio of FEV1/FVC of 0.7 for the diagnosis of obstruction by spirometry, regardless of age, sex or height (13). This may result in false-positive diagnose of COPD in elderly subjects, as the ratio has a small but significant age related regression (14). The ATS/ERS task force has recommended the use of Lower Limit of Normal (LLN) rather than a fixed ratio to avoid overdiagnosis of COPD (15). In our study we used LLN for that purpose.

A literature review of the epidemiology of chronic obstructive pulmonary disease showed that the prevalence estimates varied widely, depending on the methods used for diagnosis and classification of COPD (16-18). The reported prevalence of COPD ranged from 0.2% in Japan to 37% in USA (19).

Another systematic review for Europe countries showed that prevalence estimates varied from 2.1% to 26.1%, depending on country, age group and methods used (20).

Comparing our data to the international BOLD studies we conclude that COPD prevalence in Albania is lower than that reported from many other countries like: Austria

26.1% (21); Iceland 18% (22); Germany 13.2% (23), and higher than that of other countries like: China 8.2% (24) and Australia 7.9% (25).

These geographical differences, despite the use of the BOLD protocol, could be attributed to different levels of smoking in the local population, or possibly other risk factors, such as genetic predisposition, occupation, biomass and air pollution.

Our study showed a significant correlation between age and smoking history expressed as pack years ($r = 0.500$; $p < 0.001$). The association of COPD with old age may be attributed to a greater exposure to risk factors (26,27).

The prevalence of COPD in women in our study was lower than in men like in most of the countries worldwide due to the fact that women traditionally smoke much less than men (28). This situation has changed in some developed countries, where the prevalence of smoking in women is now often as high as that in men (29).

The prevalence of COPD in never smokers was surprisingly similar for both men and women, which differs from that of most of the studies.

The high prevalence of COPD among women in most of the developing countries is attributed to biomass and cooking conditions (30-32). In Albania it does not appear to be a major contributory factor.

The prevalence of smoking in our study was 21.6%. It was higher in males than females, 35.8% and 7.3% respectively. The highest prevalence was in age groups 50-59 and 40-49 years; there was a trend for smoking cessation with increasing age. We think that this fact is related to the co-morbidities that associate the age group above 60 years old. An important fact is noted in relation to female smoking status. In females over 40 years smoking was not as prevalent as in males in population. This is related to the fact that our society is a conservative one. But this trend has changed for younger generations: in females under 40 years old an increase in smoking prevalence was observed. Our study showed that the prevalence of smoking was 17% in group age 20-39, as compared to 7.3% in other group ages above 40 years old. This high percentage was found mainly in the urban areas, whereas in rural areas smoking prevalence in this group age did not differ compared to other group ages. The prevalence of COPD in the smoker group (both former and current smoker) was found to be much higher than that in the non smoker group. Similar findings were reported in most studies and cigarette smoking is the most common risk factor for COPD worldwide (26,33).

Consistent with the present understanding of the role of smoking, we found a strong dose-response relationship with pack-years of smoking (27,34).

As found in other studies there was also a positive trend with the increasing of pack-years, confirming smoking as an important risk factor for disease development (35,36).

Our data showed a low prevalence of doctor diagnosed COPD reported by participants, only 1.3% and this finding was similar to most of the countries where under-diagnosis of COPD is common (37).

But there are countries where prevalence of doctor-diagnosed COPD was higher like in South Arabia 9.8% (38) and in Salzburg, Austria 5.6% (39).

Skipping spirometric confirmation of COPD, thus leading to over-diagnosis, might be the reason behind reported data in South Arabia (38).

Our data are consistent with those of other countries where there is still a high level of under-diagnosis. The need for spirometry

testing should be brought to the attention of primary care physicians.

Our study has several strengths. This is the first study conducted in Balkan areas using BOLD protocol. Moreover, we applied the BOLD protocol with standardized methodology and high-quality post-BD spirometry. Such standardized methodology included standardized spirometry equipment, meticulous quality control measures, standard protocols, validated questionnaires and standard data recording, reporting and analysis.

Moreover, the use of a large sample size represents the whole country.

Conclusion

We found that the prevalence of COPD among adults in Albania was high, with an estimated prevalence of 12.4% in adults ≥40 years old; 17.4% and 7.7% in men and women respectively. Using LLN, the prevalence of COPD was lower, 9.9% (13.2% and 6.6% in men and women respectively).

COPD prevalence was strongly related to smoking and national smoking cessation policies are needed.

Doctor diagnosed COPD reported by the participants was very low. These numbers clearly show a high degree of COPD underdiagnosis and highlight the need to improve physicians' knowledge about COPD diagnosis and greater use of spirometry

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