JOURNAL OF WOMEN MEDICAL & DENTAL COLLEGE

Frequency of Acute Exacerbation of COPD Among Non-smokers in Tertiary Care Hospital of Bannu KPK-Pakistan

Nafid Ullah Khan[1*], Qaisar Iqbal[1], Tahir Ullah Khan[1], Raza Muhammad Khan[1], Atif Masood[2], Atta Ullah Khan[3]

[1]DHQ Teaching Hospital MTI, Bannu.
[2]University of Lahore teaching hospital Lahore
[3]DHQ Hospital Bannu.

Abstract

Chronic obstructive pulmonary disease (COPD) is a common disease with frequent exacerbations, especially in the winter season. Our study evaluated the frequency of acute exacerbation of COPD among non-smokers. We conducted a cross-sectional descriptive study at the Department of Medicine, DHQ hospital Bannu over one year from February 2021 to February 2022. About 193-COPD patients aged 35 to 80 years were included in this study. Patients with other lung diseases like TB, pneumoconiosis, silicosis, pleural effusion, interstitial lung diseases, bronchiectasis and a history of pneumonectomy were excluded from the study. Complete history, including the history of smoking, socio-economic status and co-morbidities, was taken. Complete general physical and systemic examination, including chest and cardiovascular examination, was performed. Spirometry was done, and findings were recorded. Data were analyzed using SSP version 19, and descriptive statistics were applied. Among 193 patients, 55.4% and 44.6% were male and female, respectively. The mean age was 58.89 years ± 10.82 SD. Among these 193 patients, 88.1% were uneducated, and around 6.2%, 29.6%, 32.6% and 31.6% presented with mild, moderate, severe and very severe COPD, respectively. Among them, 22.3% of patients were hypertensive, 14% were diabetic, and 1.6% had thyroid disease. Frequency of non-smoker (50.3%) was stratified on the basis of gender (p=0.01), age (p= 0.16), duration of COPD (p=0.001), educational status (p=0.03), spirometry findings (p=0.73), hypertension (p=0.41), diabetes mellitus (p=0.85) and thyroid diseases (p=0.55). Approximately half of the patients with acute exacerbation of COPD were non-smokers. Of these, females were more likely to be non-smokers than males.

Keywords COPD, gold, non-smokers, WHO.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is an ignored disease; however, it is an exceptionally predominant and developing infection that affects millions of individuals all over the World. Smoking is viewed as the primary causative factor for COPD. It has likewise been expressed that the incidence and cases of COPD are expanding especially because of smoking in youths and females WHO assessed that around 73 % of the complete COPD-related mortality is because of smoking (1). Aside from smoking, other agents like increased utilization of biomass fuel, contamination of air, overly sensitivity of the airways, and hereditary factors are other causative agents (2). It contributes as a significant number in terms of morbidity and financial loss to the World (3). WHO concluded in their reports that around 65 million individuals are experiencing exposure to the causative agents of COPD (4). Around fifteen million Americans are experiencing COPD; however, many of the cases are yet to be discovered. In 2005, around 3 million individuals were thought to be suffered from COPD comprising around 5% of all mortality around the globe (5) and is at present the fourth important leading cause for death in the developing nations (6).

COPD is caused by chronic irritation in the airway that is slowly progressive and related to irritation and hyper responsiveness of air-way and lungs to poisonous gases and harmful particles. Intense decrease in the respiratory, immune responsiveness and weakening in the respiratory system is considered the hallmark of COPD. Among the documented cases of COPD, intense worsening records for 60% of it (7). This progressive nature of the COPD and decrease of personal response to the disease also accounts for the progression of the disease (8). Acute exacerbation

Corresponding author at: Nafid ullah Khan
Email address: nafidullah@gmail.com

https://doi.org/10.56600/jwmdc.v1i2.17

of chronic obstructive pulmonary disease (AECOPD) is noteworthy spills of the disease over the course of COPD, prompting a decrease in the responsiveness of the patients, and weakening in well- the being status of the person. They are likewise the reason for successive hospitalization, expanded medical services and economic burden and mortality related to the disease (8). Although viral and additionally bacterial diseases and air contamination are involved in the pathogenesis of acute exacerbation of COPD, the explanation for 33 percent of the acute exacerbation of the disease remain unknown (9).

Chronic irritation is often considered to be the causative factor in the causation of COPD; there also has been demonstrated proof of fundamental oxidative stress, circulating inflammatory cells and raised degrees of other biomarkers like C-reactive protein. C-reactive protein is a biomarker of acute exacerbation of COPD that can be detected in the blood. Studies have also shown a connection between COPD characteristic course and inflammation, which occurs in the airways (10). Our study evaluated the frequency of acute exacerbation of COPD among non-smokers.

2. Methodology

This descriptive cross-sectional study was conducted at Department of Medicine and Allied, MTI-DHQ, Bannu over One year (22 February 2021 to 22 February 2022). Sample size was 193, keeping 42.9% proportion of non-smokers in patients with acute exacerbation of COPD with 95% confidence interval, 5% margin of error. Open Epi sample size calculator computed it. A consecutive non-probability sampling technique was applied. Patients admitted with acute exacerbation of chronic obstructive pulmonary disease of both genders aged 35 to 80 years were included in the study. Patients with other lung diseases like TB, pneumoconiosis, silicosis, pleural effusion, interstitial lung diseases, bronchiectasis and history of pneumonectomy (based on history, clinical examination and investigations) and decompensated heart disease were excluded.

The study was conducted after approval was sought from the hospital's ethical and research committee. This study was carried out in the Department of Pulmonology at MTI-KTH. All patients admitted to the pulmonology ward meeting the inclusion criteria were included in the study. Written informed consent was taken from all patients fulfilling the inclusion criteria. Demographic data were obtained from all patients on the designed proforma. Smoking status was recorded for each patient and spirometry was conducted in spirometry lab by same spirometer "MIR3b" by a trained technician with at least three year of experience to eliminate any bias.

All the variables, including age, gender, education, occupation, and tobacco smoking were also recorded. Data was entered and analyzed using SPSS version 19.0. Mean + SD was calculated for quantitative variables like age, duration of COPD, FEV1. Frequencies and percentages were calculated for sex, education and tobacco smoking status. Never smoker COPD patients with acute exacerbation were stratified among age, gender, duration of COPD, spirometry findings, education, tobacco smoking status and co-morbidities like diabetes mellitus, hypertension, and thyroid diseases to see effect modifications using chi-square test with p-value of ≤ 0.05 taken significant. All results were presented as tables and graphs.

3. Results

In this study, 193 COPD patients were enrolled. There were 107 males and 86 females. One hundred twenty-four participants were in the age group from 35-60 years, while 69 participants were more than 60 years of age.

These 193 COPD patients were also divided based on their educational status. Among them, 17 patients (8.8%), 04 patients (2.1%), and 2 patients (1%) had the educational qualification of primary school level, middle school level and high school level, respectively. While the remaining 170 participants (88.1%) were uneducated.

Table 1: Shows the frequency of patients and their comorbid conditions.

Variable	Yes	No
Hypertension	43 (22.3%)	150 (77.7%)
Diabetes mellitus	27 (14%)	166 (86%)
Thyroid disorder	03 (1.6%)	190 (98.4%)

Tobacco smoking status	96 (49.7%)	97 (50.3%)

Mean duration of COPD was 11.06 years ± 7.07 SD. COPD was classified as mild, moderate, severe and very severe in 12 (6.2%), 57 (29.6%), 63 (32.6%) and 61 (31.6%) patients respectively. Table 02 shows the frequency of never smoking stratified based on gender. In males, 13 patients (13%) were never smokers, while in females, 84(97.73%) were never smokers. Post-stratification was done by applying the Chi-square test, and the p-value was 0.001, which was significant statistically.

Table 2: Stratification of frequency of never smoking in COPD on the basis of gender (n=193)

Gender	**Smoking status in COPD**		**Total**	**P value**
	Yes	No		
Males	94 (87%)	13 (13%)	107 (100%)	**0.001**
Females	02 (2.27%)	84 (97.73%)	86 (100%)	
Total	96 (49.7%)	97 (50.3%)	193(100%)	

Table 03 shows the frequency of never smoking stratified based on age. In group A, patients aged 35-60 years, 67 (54%) were non-smokers, while in patients aged >61 years, 30 patients (43.5%) were non-smokers. Post-stratification was done by applying the Chi-square test, and the p value was 0.16, which was not significant statistically.

Table 3: Stratification of frequency of never smokers in COPD based on age (n=193)

	Age of patients	**Smoking status in COPD**	**Frequency (%)**	
Group A	36 -60 years	Yes, 57 (46%)	124 (100%)	
		No 67 (54%)		
Group B	> 61 years	Yes, 39 (56.5%)	69 (100%)	**P value 0.16**
		No 30 (43.5%)		
Total	35-80 years	Yes 96 (49.7%)	193 (100%)	
		No 97 (50.3%)		

Table 04 shows frequency of never smoking stratified based on duration of COPD. In patients with ≤ 15 years disease duration, 87 patients (57.7%) were reported to have never smoked in their life while in patients with COPD duration of >15 years, 10 patients (24%) were never smokers. By applying Chi square test on post stratification, p value was 0.001 which was significant statistically.

Table 4: Stratification of frequency of never smoking in COPD on the basis of duration of COPD (n=193)

Duration of COPD	**Smoking status in COPD**		**Total**	**P value**
	Yes	No		
≤ 15 years	64 (42.3%)	87(57.7%)	151 (100%)	**0.001**
>15 years	32 (76%)	10 (24%)	42 (100%)	
Total	96 (49.7%)	97 (50.3%)	193 (100%)	

Table 5 shows frequency of never smoking stratified on the basis of educational status of the participants. Among the patients having primary, middle and higher level of education, 4 patients (23.6%), 1 (25%) and 2 patients (100%) were never smokers while among uneducated patients 90 patients (53%) were never smokers. Post stratification Chi square test was statistically significant as p value was 0.03

Table 5: Stratification of frequency of never smoking in COPD based on educational status

Educational status	**Smoking status in COPD**		**Total**	**P value**
	Yes	No		
Primary level	13 (76.4%)	04 (23.6%)	17 (100%)	**0.03**
Middle level	03 (75%)	01 (25%)	04 (100%)	
High level	0 (0%)	2(100%)	02 (100%)	
Un educated	80 (47%)	90 (53%)	170 (100%)	
Total	96 (49.7%)	97 (50.3%)	193(100%)	

Table 6 shows frequency of never smoking stratified based on severity of COPD and other co-morbid conditions. Among patients with mild, Moderate, severe and very severe COPD, 05 (41.7%), 30 (52.7%), 29 (46%) and 33 (54%) patients were non-smokers respectively. P value was 0.73 by applying Chi-square test on post-stratification which was not significant statistically.

Table 6: Stratification of frequency of never smoking in COPD based on spirometry findings (n=193)

Variable	**Smoking status in COPD**		**Total**	**P value**
	Yes	No		

Diabetic patients	13 (48%)	14 (52%)	27 (100%)	**0.85**
Non diabetics	83 (50%)	83 (50%)	166 (100%)	
Hypertension				
Yes	19 (44%)	24 (56%)	43 (100%)	
No	77 (51.3%)	73 (49.7%)	150 (100%)	**0.41**
Thyroid diseases				
Present	02 (66.7%)	01 (33.3%)	03 (100%)	
Absent	94 (49.4%)	96 (50.6%)	190 (100%)	**0.55**
Severity of COPD				
Mild COPD	07 (58.3%)	05 (41.7%)	12 (100%)	**0.73**
Moderate COPD	27 (47.3%)	30 (52.7%)	57 (100%)	
Severe COPD	34 (54%)	29(46%)	63(100%)	
Very severe COPD	28 (46%)	33 (54%)	61 (100%)	

4. Discussion

In this study, the frequency of non-smokers was 50.3%. An estimated 25 to 45% of patients with COPD are non-smokers. So the results of our study is nearly consistent with the published international range for it as given by Salvi S et al. (11).

Another study conducted by Lamprecht B et al. concluded that 45% of their COPD patients were non-smokers, who are close to the results of our study (12). In our study majority of the female were non-smokers, which is also consistent with Lamprecht B et al. as 65.3% of their female COPD patients were non-smokers.

Zeng G et al. conclude in their study that the prevalence of COPD is increasing among non- smokers and this also strengthens the conclusive statement of our study that COPD is not a disease of only smokers anymore (13).

The results of our study show that the prevalence of never smoking in COPD was more compared to the smoker. This statement endorses the conclusion of Hagstad S et al. that the prevalence of COPD is increasing among non-smokers. It is further supported by Lamprecht B et al. (14).

Zhou Y et al. and Terzikhan N et al. concluded in their study that the prevalence of COPD in non-smokers was 6.4% and 5.3%, which is contrary to the results of our study (15,16). However, their conclusive statement favors our conclusion that COPD prevalence is increasing in non-smokers.

Montserrat-Capdevila J et al. concluded in their study that 33.2% of their COPD patients had never smoked tobacco while more of the non-smokers, i.e., 59.4% of them, were women (17). In our study, most of the non-smokers were women as well.

Implication of our study was to address the ever-growing prevalence of COPD in non-smokers and recommend the medical fraternity to consider COPD among possible differential diagnoses even among non-smokers.

5. Conclusion

Frequency of never smokers was 50.3% in our study which

highlights that apart from smoking cessation, we should also focus on other preventable causes of COPD to reduce the burden of disease and morbidity and mortality. Never smokers are exposed to fuel smoking and other occupational risks, which can predispose them to the risk of developing the chronic obstructive pulmonary disease.

Conflict of Interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Acknowledgement Department of medicine is indebted to the paramedical staff of medicine department DHQ Hospital Bannu in collaboration with pulmonology unit for their services in terms of collecting COPD patients' data for the current study.

References

1. Ho T, Chaudhary N, Cusack RP, Satia I, Kurmi OP. Under-and over-diagnosis of COPD. Breathe. 2019;15(1):24-35.
2. Fragoso CA. Epidemiology OF COPD in aging populations. J Chron Obstruct Pulmon Dis. 2016;13(2):125-9.
3. Carr LL, Jacobson S; Lynch DA, Foreman M G, Flenaugh E L, Hersh C P et al. Features of Chronic obstructive pulmonary diseases as predictors of lung cancer. Chest. 2018;153(6):1326- 35.
4. Vestbo J, Anderson W, Coxson HO, Crim C, Dawber F, Edwards L, et al. Evaluation of COPD longitudinally to identify predictive surrogate end points.ERJ Res. 2008;31(4):869-73. .
5. Burgel, PR., Laurendeau, C., Raherison, C. *et al.* An attempt at modeling COPD epidemiological trends in France. *Respir Res* **19**, 130 (2018). https://doi.org/10.1186/s12931-018-0827-7.
6. Hurst JR, Donaldson GC, Perera WR, Wilkinson TM, Bilello JA, Hagan GW, et al. Use of plasma biomarkers at exacerbation of COPD. Am J RespirCrit Care Med. 2006;174(8):867-74.
7. Maselli D J, Anzueto A , Bhatt S, Bowler RP, De-Meo DL, Diaz AA et al. Clinical epidemiology of COPD. Chest. 2019;156(2):228-38.
8. Daniel JM, Schoorl M, Snijder D, Knol DL, Luttr R.. Procalcitonin vs C-reactive protein as predictive markers of response to antibiotic therapy in acute exacerbations of Chronic obstructive pulmonary disease. Chest. 2010;138(5):1108-15.
9. Simonovska L, Ahmeti I, Mitreski V. Evaluation of C reactive protein in patients with COPD. Open Access Maced J Med Sci. 2015 Jun 15:3(2):283-6.
10. Vestbo J, Anderson W, Coxson HO, Crim C, Edwards L,. Evaluation of Chronic obstructive pulmonary diseases longitudinally to identify predictive surrogate end points.ERJ Res. 2008;31(4):869-74.
11. Salvi S, Barnes PJ. Chronic obstructive pulmonary disease in non-smokers. The Lancet. 2009;374(9691):733-43.
12. Lamprecht B, McBurnie MA, Vollmer WM, Gudmundsson G, Welte T, Nizankowska- Mogilnicka E, ET et al. COPD in never smokers: results from the population-based burden of obstructive lung disease study. Chest. 2011;139(4):752-63
13. Zeng G, Sun B, Zhong N. Non-smoking-related chronic obstructive pulmonary disease: a neglected entity? Respirology. 2012;17:908–12
14. Hagstad S, Bjerg A, Ekerljung L, Backman H, Lindberg A, Rönmark E, et al. Passive smoking exposure is associated with increased risk of COPD in never smokers. Chest. 2014;145(6):1298-304.
15. Zhou Y, Wang C, Yao W, Chen P, Kang J, Huang S, Chen et al. COPD in Chinese nonsmokers. Eur Respir J. 2009;33(3):509-18.
16. Terzikhan N, Verhamme KM, Hofman A, Stricker BH, Brusselle GG, Lahousse L. Prevalence and incidence of COPD in smokers and non-smokers: the Rotterdam Study. Eur J Epidemiol. 2016;31(8):785-92.
17. Montserrat-Capdevila J, Godoy P, Marsal JR, Ortega M, Barbé F, Castañ MT, et al. Prevalence and characteristics of chronic obstructive pulmonary disease in non-smokers. Aten Primaria. 2018;51(10):602-9.