Prevalence of COPD among Patients on Bronchodilator Therapy Presenting to a Tertiary Care Center

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ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is the most common non-communicable disease in Nepal and the third leading non-communicable disease globally. Despite its significant burden on public health, proper research is limited in local settings.

Objective: This study aims to find out the utilization of spirometry in establishing the diagnosis of COPD.

Method: A single-center, prospective, cross-sectional study design was conducted that included all patients more than 40 years old on bronchodilator therapy for COPD coming to the Pulmo OPD of Kathmandu Medical College Teaching Hospital (KMCTH). COPD was diagnosed by GOLD COPD. Criteria of fixed post-bronchodilator FEV1/FVC ratio <0.70. A Chhabra et al. 2014 reference equation from the North Indian population was taken for percentage prediction.

Result: A total of 6789 patients visited the pulmo OPD. 877 (12.92%) patients were being treated for COPD at different centers. Out of 877 patients, only 371 cases (42.3%) were properly diagnosed with COPD followed by bronchodilator therapy, and 185 (21.09%) cases were mistakenly treated for COPD, i.e., overdiagnosis, as proven by spirometry later on. Among 692 COPD-confirmed patients, 380 (54.91%) were female and 312 (45.09%) were male.

Conclusion: We conclude that a significant proportion of individuals who are on bronchodilators lack spirometry confirmation to diagnose COPD. Moreover, our study also shows a slightly increased prevalence of COPD among females.

Keywords: COPD, Spirometry, FEV1, FVC, Bronchodilator

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is the most common non-communicable disease in Nepal, followed by diabetes and cardiovascular disease. However, COPD is the third leading non-communicable disease globally. The diagnostic criteria require spirometry to confirm the clinical diagnosis[1]. As per the Global Initiative for Obstructive Lung Disease (GOLD), globally, there is a large variation in the prevalence of COPD, with 10–95% under-diagnosis and 5–60% over-diagnosis due to differences in the definition of diagnosis used and the unavailability of spirometry in rural areas of low- and middle-income countries where the prevalence of COPD is likely to be high[2].

To diagnose COPD, one must have risk factors (smoking, biomass, pollution, recurrent childhood pneumonia, genetic mutations, etc.), clinical signs (lean, thin, cachectic, tall, pursed-lip breathing, Dahl's sign, etc.), and symptoms (cough, sputum production, dyspnea) suggestive of COPD to be supported by post-bronchodilator FEV1/FVC<0.7[2]. However, the majority of cases treated in our context never had spirometry performed, hence leading to inappropriate diagnoses of COPD. However, we do encounter problems when patients taking bronchodilators do not respond to them and keep visiting various centers for proper diagnosis and treatment, further putting an extra financial burden on them. Multiple studies have shown that the majority of individuals with chronic cough and dyspnea were prescribed bronchodilators and/or inhaled corticosteroids based on clinical findings without performing spirometry, the gold standard test at present to diagnose chronic Obstructive Pulmonary disease[1].

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Chronic Obstructive Pulmonary Disease is a common, preventable, and treatable disease characterized by persistent respiratory symptoms that are due to airway and/or alveolar abnormalities, which are due to significant exposure to noxious particles. In fact, in practice, especially among family physicians, a diagnosis of COPD is often made in patients with a history of smoking and the presence of typical symptoms (dyspnea, chronic cough, sputum production) and physical findings (expiratory wheezing), without the performance of spirometry[3]. One large study evaluated 701 subjects to assess COPD diagnosis accuracy in primary care and reported a 13% overdiagnosis and a 59% underdiagnosis of COPD[4]. General physicians were able to correctly exclude patients who did not have COPD, but were less accurate in diagnosing COPD patients[4]. The accuracy of COPD diagnosis in hospitalized patients varies between studies. The performance rate of spirometry in hospitalized patients with COPD as a primary diagnosis (and who received treatment for COPD) ranges from 35% to 69.2%[5,6,7]. In a European and UK national COPD audit, a diagnosis of COPD was confirmed in 46% to 51% of cases[8,9].

COPD is now one of the top three causes of death worldwide, and 90% of these deaths occur in low- and middle-income countries (LMICs)[10,11]. More than 3 million people died of COPD in 2012, accounting for 6% of all deaths globally. COPD represents an important public health challenge that is both preventable and treatable. COPD is a major cause of chronic morbidity and mortality throughout the world; many people suffer from this disease for years and die prematurely from its complications. Globally, the COPD burden is projected to increase in the coming decades because of continued exposure to COPD risk factors and aging of the population[12].

METHODS

This was a descriptive cross-sectional study conducted in the Pulmonary Medicine (Pulmo) Outpatient Department of Kathmandu Medical College from May 19th, 2024, till May 18th, 2025 for a period of one year. An ethical clearance was taken from KMC-IRC: REF: 25032024/02, dated May 17, 2024. The study included all patients more than 40 years of age who visited the OPD of Pulmo-Medicine for COPD.

All the essential clinical and demographic data of the patients required for establishing the diagnosis of COPD were recorded and analyzed using Microsoft Excel, odds ratio, and relative risk, and the results were interpreted. Spirometry was done in all 877 cases as per ATS/ERS Standards using an ndd Easy on PC spirometry, and the Chhabra equation was used for analysis.

RESULTS

A Total of 6789 patients were analyzed, out of which 3635 (53.54%) were male and 3154 (46.46%) were female. Of these, 877 (12.92%) patients were being treated for COPD with bronchodilators. Out of which only 371 (42.30%) of the 877 patients had a confirmed COPD diagnosis via spirometry before treatment. Another 321 (36.60%) cases were later confirmed by performing spirometry at KMC, making a total of 692 (78.9%) confirmed cases of COPD. Even today, a significant number of individuals, i.e., 185 (21.09%) cases, were mistakenly treated for COPD, as shown in Table 1.

Table 1: Summary of Findings

Variables	Number (N)	Percentage (%)
Male	3635	53.54
Female	3154	46.46
Patients are being treated for COPD	877	12.92
Patients confirmed to have COPD by spirometry	692	78.9
Spirometry negative on those being treated	185	21.09

Among the 692 patients confirmed to have COPD by spirometry, 380 (54.91%) were female and 312 (45.09%) were male (Table 2), showing a slightly increased prevalence of COPD among female patients presenting to the pulmonary OPD of KMC.

Table 2: Total COPD Suspects and Spirometry Proven

COPD Suspect	COPD Proven	
877	692	
	Male	**Female**
	312 (45.09%)	380 (54.91%)

Also evident from Table 3 is that 506 (57.69%) out of 877 patients were receiving bronchodilators for COPD without having a confirmed diagnosis of COPD by spirometry, leading to overdiagnosis of COPD among 185 (21.09%) cases, as seen from spirometry findings later on.

Table 3: Total Spirometry

Total spirometry performed among treated COPD cases on bronchodilators	Spirometry before putting on a bronchodilator and reconfirmed at KMC	Spirometry After Putting on Bronchodilator	
877	371 (42.3%)	506 (57.69%)	
		Positive	Negative
		321 (36.6%)	185 (21.09%)

A total of 855 (12.59%) patients had a history of exposure to smoking, distributed as 555 (64.91%) male and 300 (35.09%) female (Table 4), out of which 471 (68.06%) had developed COPD with an odds ratio of 31.71, indicating smoking is a major risk factor for COPD development.

Similarly, a total of 1059 (15.60%) were exposed to biomass, and in the majority of cases, 850 (80.26%) were female. Among biomass-exposed cases, 139 (13.12%) individuals developed COPD with an odds ratio of 1.41 (Table 5), showing biomass exposure is another major risk factor for COPD.

Table 4: Smoking

Smoking	Number (N)	Percentage (%)
Male	555	64.91
Female	300	35.09

Table 5: Biomass exposure

Biomass Exposure	Female	Male
1059	850	209
Confirmed COPD	111	28

DISCUSSION

Spirometry is very useful as well as the gold standard tool for the diagnosis of COPD[13,14].

Even today, a significant proportion of cases (57.69%) are receiving bronchodilator therapy for COPD without confirming the diagnosis with spirometry. Spirometry is also an important part of monitoring COPD. In symptomatic patients, spirometry can help determine whether the patient's symptoms are due to respiratory disease or other conditions. Spirometry is often underutilized in COPD diagnosis, as is evident from our study, wherein the majority of cases were given bronchodilators without confirming the diagnosis of COPD by spirometry. More than a third of patients with a new COPD diagnosis have never had pulmonary function testing, but are given a clinical diagnosis, which in our study leads to overuse of bronchodilators among 21% of the cases i.e., approximately one quarter of patients are overtreated for COPD with bronchodilators. Spirometry is a simple, economical tool that should be available at the primary health care facility site for proper diagnosis and early initiation of therapy, thereby preventing various untoward effects of both under and overdiagnosis[15].

Epidemiological data show that when spirometry is not used, COPD is often underdiagnosed for those with the disease and overdiagnosed for those without the disease[16]. Our study showed that only 42.3% of cases had spirometry done to diagnose COPD before prescribing bronchodilator therapy, which is slightly higher than the study by Joo et al.[16]. Based on our findings, we stopped the use of bronchodilators among cases not found to have COPD on spirometry evaluation and followed them up.

Moreover, as shown in Table 4, a total of 855 (12.59%) cases had a history of smoking (male 64.91%, female 35.09%), out of which 471 (68.06%) had developed COPD with an odds ratio of 31.71, indicating smoking is a major risk factor for COPD development, which is globally the most common cause of COPD. This high odds ratio is consistent with strong associations in high-risk populations. A 2023 study found COPD risk increases with smoking duration, with odds ratios often exceeding 10, supporting our manuscript's finding, though 31.71 is at the higher end, possibly due to the specific population[17].

Not surprisingly, we found out that COPD was more common among female (54.9%) than male (45.08%) at our center, which is probably due to a significant number of females 850 (80%) being exposed to biomass, and 139 (20.09%) developed COPD with an odds ratio of 1.41, showing biomass exposure is another major risk factor for COPD, which is consistent with the findings from a study by Kurmi OP et.al[18] in addition to being the most important risk factor for COPD among low-middle-income countries. Similar to the findings of a study by Yu WC et.al.[19], our study showed that the majority of cases are prescribed bronchodilator therapy based on clinical acumen, leading to underutilization of spirometry and reliance on clinical judgment, leading to unnecessary prescription of bronchodilator therapy and inaccurate diagnosis, which will have a serious impact on the health as well as the economy of an individual. We also believe that responsible government agencies should address this issue of underutilization of spirometry with priority in the coming future. We also found out that 13% of the population who had biomass exposure developed COPD.

LIMITATION

Single-center study; confounders and association with other risk factors except smoking and biomass exposure were not looked for.

CONCLUSION

Based on our findings, we conclude that COPD is overdiagnosed based on clinical criteria, and the utilization of spirometry is remarkably less. Smoking and biomass exposure are the major risk factors associated with COPD.

FUNDING

None

DATA AVAILABILITY STATEMENT

The data of this study are available from the corresponding author upon request.

CONFLICT OF STATEMENT

The authors declare no conflict of interest.

ETHICS CONSIDERATIONS

An ethical clearance was taken from KMC-IRC: REF: 25032024/02, dated May 17, 2024.

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