CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) AND ITS IMPACT AMONG HOSPITALIZED PATIENTS IN A TERTIARY CARE PUBLIC HOSPITAL IN BANGLADESH

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a significant global health concern, ranking fifth in terms of global disease burden and projected to become the third leading cause of mortality by 2020. This study aims to assess the socio-demographic factors and impact of COPD among hospitalized patients at a tertiary care hospital in Bangladesh. A descriptive cross-sectional study was conducted among 187 COPD. Data was collected using semi-structured questionnaires through face-to-face interviews after obtaining informed consent. The analysis involved Pearson Chi-square tests to assess the associations between COPD-related factors and demographic variables. The mean age of respondents was 58 years, with 52.9% aged between 40-59 years, and 87.7% were male. The majority (73.3%) were current smokers, and 93.6% reported current breathing problems. Smoking was significantly associated with gender (P=0.002), and poor ventilation in the kitchen was reported by 69% of participants. Co-association analyses showed significant relationships between housing type, body mass index, education, and COPD-related factors. The findings emphasize the need for public health interventions, including smoking cessation programs, awareness campaigns on indoor air quality, and early medical diagnosis to manage and prevent COPD progression in Bangladesh.

Keywords: *COPD, Health, Hospitalized Patients, Smoking*

Introduction

Chronic Obstructive Pulmonary disease (COPD) is a major health problem worldwide. At present, its rank is fifth in terms of the global burden of disease, measured as disability-adjusted life-years (DALY) [1]. COPD is the fourth leading cause of mortality and projected to be the third leading cause of mortality by 2020 [2]. COPD is a preventable and treatable disease, which is characterized by persistent airflow limitation that is usually progressive, caused by an enhanced chronic inflammatory response in the airways and the lungs to noxious particles or gases [3]. In 1995, the European Respiratory Society (ERS) consensus statement [4] defined COPD as a disorder characterized by reduced maximum expiratory flow and slow emptying of the lungs; features of which did not change markedly over several months.

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Most of the air flow limitations are slowly progressive and irreversible. The airflow limitation is due to varying combinations of airways disease and emphysema; the relative contribution of these two processes is difficult to define in vivo [5, 6]. In the 1995 American Thoracic Society (ATS) Statement COPD was defined as a “disease state characterized by presence of airflow obstruction due to chronic bronchitis or emphysema; the airflow obstruction is generally progressive, may be accompanied by airways hyper reactivity and may be partially reversible"[5].

Though the exposure to occupational dust, chemicals and air pollution are considered as key risk factors of developing COPD, cigarette smoking is the most important risk factor that can cause COPD independently [7]. COPD is characterized by persistent, progressive airflow limitation that is often accompanied by cough as well as increased sputum production [3]. The airflow limitation is associated with chronic inflammation in the lungs that is principally caused by long-term exposure to airborne irritants due to cigarette smoke. Besides, smoke from biomass fuels and industrial toxins are also recognized as problematic risk factors in the context of Asia-Pacific region, [10-12]. The symptoms of COPD like breathlessness, anxiety, and physical limitations can impair the quality of life (qol) significantly by resulting in days of missed work [13].

Chronic inflammation throughout the airways, parenchyma, and pulmonary vasculature are the hallmarks of the disease resulting in pathological changes characteristic of COPD. Viral infection, in particular influenza, plays a vital role in exacerbation of COPD as well as in association of functional decline. Study reveals that influenza vaccines can reduce serious illness and death in patients with COPD by about 50%, regardless of the severity of disease [8,9]. The evidence related to the pneumococcal vaccine in patients with COPD is somewhat weak that indicates a need for large international trials to fully address this issue. In Bangladesh, the prevalence of COPD was 13.5% by Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria and 10.3% by lower limit of normal (LLN) criteria. COPD is prevalent among the males and the rural residents [14]. Nevertheless, this study was aimed to assess the impact of COPD among hospitalized patients in a tertiary care hospital in Bangladesh.

Methodology

Study Design and Setting:

A descriptive cross-sectional study was conducted at Sir Salimullah Medical College & Mitford Hospital, Dhaka, Bangladesh. This tertiary care hospital serves a large population and provides medical care to a diverse group of patients from both urban and rural areas. The study focused on hospitalized patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD).

Study Period and Study Population:

The study was carried out over an eight-month period, from March to October 2022. The study population consisted of COPD patients admitted to the medical wards of Sir Salimullah Medical College & Mitford Hospital during this period. Eligible participants were adult COPD patients willing to provide informed

consent. Patients who were mentally ill or unable to participate in the interview process were excluded from the study.

Sample Size and Sampling Technique:

A total of 187 patients were recruited for the study using a purposive sampling technique. This non-probability sampling method was employed due to the specific inclusion criteria of COPD diagnosis and hospitalization in the selected medical wards during the study period.

Data Collection Procedure and Analysis:

Data were collected using a semi-structured questionnaire designed to capture socio-demographic information, smoking habits, exposure to pollutants, family history of COPD, and clinical symptoms such as breathing problems. Face-to-face interviews were conducted after obtaining informed consent from the participants, and each interview took approximately 30 minutes to complete.

Collected data were processed and analyzed using SPSS software version 22.0. Descriptive statistics were used to summarize the demographic characteristics of the participants. Pearson Chi-square tests were applied to examine associations between demographic variables and COPD-related factors, with a significance level set at $P < 0.05$.

Ethical Consideration:

The study received ethical approval from the Ethical Review Committee of the Faculty of Allied Health Sciences, Daffodil International University. Informed written consent was obtained from all participants after explaining the study's objectives, risks, and benefits. Confidentiality and anonymity of the participants were strictly maintained throughout the study, and all data were handled in accordance with institutional ethical guidelines.

Results

Socio-demographic characteristics of the respondents

The mean age of the respondents was 58 years. Around half (52.9%) of the respondents were between 40-59 years of age and 87.7% of the respondents were male and the rest were female. 68.4% of the participants resided in the rural area; and 85.5%–were Muslims, 31.6% of them had primary level of education, followed by Secondary School Certificate/Higher Secondary School Certificate (SSC/HSC) & above (31.5%). The majority (38%) were farmers (practicing agriculture), followed by service holders (23.5%). The mean family monthly income was 24705.8 taka (USD308.8) (Table 1).

Table 1: Distribution of Respondents by Socio-demographic characteristics (n=187)

	Variable	Frequency	Percentage
Age	40 – 59 years	99	52.9
	60 – 80 years	88	47.1
	Mean = 58 ± 6.27 years		
Sex	Male	164	87.7
	Female	23	12.3
House	Urban	59	31.6
	Rural	128	68.4
Religion	Muslim	161	85.5
	Non-Muslim	26	14.43
Education	No formal education	30	16.0
	Primary	59	31.6
	High School	39	20.9
	SSC/HSC & above	59	31.5
Occupation	Agriculture	71	38.0
	Business	38	20.3
	Day labor	11	5.9
	Housewife	23	12.3
	Service	44	23.5
Family income (Taka)	5,000 -25,000	111	59.4
	26,000 – 46,000	67	35.8
	47,000 – 67,000	9	4.8
	Mean = 24705.8 ±11482.76		

Chronic Obstructive Pulmonary Disease Related Factors

Table 2 showed that 73.3% of the respondents were currently smokers, 79.7% of their spouses never smoked, followed by current smokers (12.8%) and the rest were past smokers. More than half (54%) smoked at least 2 packets of cigarettes a week. 77.5% of the respondents' working places were not air polluted. 69% of the respondents' ventilation facilities in the kitchen were very bad. 62% of the participants had a familial history of COPD, 64.7% of the respondents had past history of breathing problems, and 93.6% of the respondents were currently having problems with breathing.

Table 2: Distribution of Respondents by COPD related variable (n=187)

Variable		Frequency	Percentage
Smoking status	Never	34	18.2
	Currently smoker	137	73.3
	Past smoker	16	8.6
Smoking status for spouse	Never	149	79.7
	Currently smoker	24	12.8
	Past smoker	14	7.5
Smoking per week	Less than 1pack	49	26.2
	2 packets	101	54.0
	More than 2 pack	37	19.8
Air pollution around working place	Yes	42	22.5
	No	145	77.5
Ventilation facilities in kitchen	Very bad	129	69.0
	Good	17	9.1
	Average	41	21.9
Family history of COPD	Yes	116	62.0
	No	71	38.0
Past history of breathing problem	Yes	66	35.3
	No	121	64.7
Current problem of breathing	Yes	175	93.6
	No	12	6.4

Co-association between gender and COPD related factors

Table 3 showed the co-association between gender and COPD related factors. There was significant relationship ($P<0.001$) between the body mass index (BMI) of the respondents and their gender. Smoking status of the respondents was found to be significantly associated ($P=0.002$) with gender. The smoking status of the spouse was also significantly associated with gender in this study. The finding also showed that gender of the respondents was associated with, familial history of COPD ($P=0.021$) and ventilation facility in kitchen ($P=0.009$).

Table 3: Co-association between Gender and COPD related factors (n=187)

Variables		Gender		Statistics
		Male	Female	
Body Mass Index (kg/m^2)	Underweight	23(88.5)	3(11.5)	X^2=8.184, df=1, P<0.001*
	Normal	36(83.7)	7(16.3)	
	Overweight	49(89.1)	6(10.9)	
	Obese	56(88.9)	7(11.1)	
Smoking status	Never smoke	24(70.6)	10(29.4)	X^2=11.28, df=1, P=0.002*
	Smoke	140(91.5)	13(8.5)	
Smoking status of the spouse	Never smoke	138(92.6)	11(7.4)	X^2=16.43, df=1, P<0.001*
	Smoke	26(68.4)	12(31.6)	
Family history of COPD	Never	57(80.3)	14(19.7)	X^2=5.84, df=1, P=0.021*
	Yes	107(92.2)	9(7.8)	
Ventilation facility in kitchen	Average or bad	153(90.0)	17(10.0)	X^2=9.16, df=1, P=0.009*
	Good	11(64.7)	6(35.3)	

Co-association matrix between housing and some socio-demographic factors

Table 4 showed the co-association matrix between housing and some socio-demographic factors. There was a significant association (P=0.002) between BMI and housing type of the respondents. The age of the respondents was also found to be associated with housing type (P=0.003). The educational level of the respondents was strongly associated with housing type (P<0.001). There was also significant relationship between housing type and frequency of smoking per week (P=0.012), current problem of breathing (P=0.011).

Table 4: Co-association matrix between housing and some socio-demographic factors (n=187)

Variables		Housing		Statistics
		Urban f (%)	Rural f (%)	
Body Mass Index (kg/m^2)	Underweight	4(15.4)	22(84.6)	X^2=9.122, df=1, P=0.002*
	Normal	7(16.3)	36(83.7)	
	Overweight	21(38.2)	34(61.8)	
	Obese	27(42.9)	36(57.1)	
Categories of age (years)	≤59	41(41.4)	58(58.6)	X^2=9.47, df=1, p=0.003
	≥60	18(20.5)	70(79.5)	
Education	No Education	19(63.3)	11(36.7)	X^2=16.71, df=1, P<0.001*
	Education	40(25.5)	117(74.5)	
Smoking per week	Less than 1 Pac	23(46.9)	26(53.1)	X^2=7.28, df=1, P=0.012*
	More than 1 Pac	36(26.1)	102(73.9)	
Current problem of breathing	Yes	51(29.1)	124(70.9)	X^2=7.32, df=1, P=0.011*
	No	8(66.7)	4(33.3)	

Co-association between education and COPD related factors

Table 5 showed the co-association between education and COPD related factors. Educational level is one of the most important socio-demographic characteristics of the respondents in this study. Education status of the participants was found to be significantly associated with respondent's smoking frequency per week (P=0.025), family monthly income (P=0.031).

Table 5: Co-association between Education and COPD related factors (n=187)

Variables		Educational status		**Statistics**
		No education	Education	
Smoking per week	Less than 1 Pac	13(26.5)	36(73.5)	X^2=5.42, df=1, p=0.025*
	More than 1 Pac	17(12.3)	121(87.7)	
Categories of family income	≥ 35,000	56(34.8)	105(65.2)	X^2=4.94, df=1, p=0.031*
	≤ 36,000	15(57.7)	11(42.3)	

Discussion

From our study, the mean age of the respondents was 58 years. 31.6% of respondents had primary level of education, followed by Secondary School Certificate/Higher Secondary School Certificate (SSC/HSC) & above (31.5%). According to a study by Bakke et al. People with primary and secondary education had a higher prevalence of spirometric airflow limitation than the people who had university education with statistically significant age, sex, smoking, and occupation adjusted odds ratios of 5.2 and 1.8 respectively [15]. Based on occupational status of the respondents, the majority (38%) were farmers (practicing agriculture), followed by service holders (23.5%). In a recent review done by Hendrick, it was concluded that particular occupational environments are likely to involve a risk of COPD, though its effect is likely to be less potent than the smoking effect, and interactions between smoking and occupations are possibly pertinent [16].

Above seven-tenths (73.3%) of the respondents were currently smokers, according to the smoking status of the spouse 79.7% never smoked. More than half (54%) smoked at least 2 packets of cigarettes a week. Farzan, mentioned that smoking is a major risk factor for COPD as well as environmental pollutants and chemicals which affect both COPD and asthma [17]. Murray and Lopez have provided mortality projections for the leading causes of death including COPD in the frame of the Global Burden of Disease Study. They predicted that if this current smoking habit continues, COPD will become the third cause of death in the world by the year 2020 [18]. However, there are many mechanisms that have been considered to be involved with the relationship between socioeconomic status and COPD including intrauterine lung growth, childhood respiratory infections, early life exposures, smoking through childhood to adulthood, housing condition, occupation and nutrition [19].

From our study, 77.5% of the respondents' working places were not air polluted. 69% of the respondents' facilities in the kitchen were very badly ventilated. Some studies conducted in areas with lower levels of air pollution did not observe the association between an increase of respiratory diseases associated and air pollution [20,21]. Our findings showed that 93.6% of the respondents were currently having problems

breathing. Breathing problem is an important symptom for COPD. In a study done by Fletcher and Peto, they reported that breathlessness was the symptom related with the primary loss of lung function over time and to a worse prognosis [22]. Our study revealed that gender was significantly associated with smoking status of the participants (p=0.002), smoking status of the spouse (p=0.0001). Researchers have predicted COPD as the third cause of death globally by the year 2020 [18]. This might be due to the spread of smoking consumption which has occurred among females in the developing world [23,24].

It was observed in our study that housing type was associated with current problems with breathing. Menezes et al found that poor housing, poor schooling, and family income were independently associated with the chronic bronchitis [25]. Nevertheless, air pollution (indoor and outdoor air pollution) is a major environment related health threat and risk factor for both acute and chronic respiratory diseases. According to the WHO, an estimated 36% of lower respiratory infections and 22% of chronic obstructive diseases in the world were caused by indoor air pollution. The report showed further that indoor air pollution is responsible for the deaths of two million people every year [26].

Conclusion

Study concludes that the majority of the participants in this research were currently smokers; however little above three-fifths had familial history of COPD. The housing type of the respondents was found to be associated with BMI, age, smoking frequency and current problem of breathing of the respondents. Educational status was also found to be significantly associated with respondent's smoking frequency per week and family monthly income.

Recommendations

To effectively address the public health threat posed by Chronic Obstructive Pulmonary Disease (COPD), it is imperative to implement a comprehensive awareness program aimed at educating the community about its impact and prevalence. Early diagnosis and timely intervention are crucial in slowing the progression of COPD, thereby reducing associated disabilities and improving overall life expectancy. Additionally, initiatives must be developed to raise awareness regarding the detrimental effects of passive smoking, highlighting the risks not only to smokers but also to those exposed to secondhand smoke. Further research is essential to identify and promote preventive measures, along with dedicated efforts to eliminate smoking and mitigate indoor air pollution. Such multifaceted strategies will be vital in combating the rising burden of COPD and enhancing public health outcomes.

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