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# Chronic Obstructive Pulmonary Disease and Its Impact on 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.

## 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) (Murray & Lopez, 1996). COPD is the fourth leading cause of mortality and projected to be the third leading cause of mortality by 2020 (Lozano et al., 2012). 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 (GOLD Global Strategy, 2013). In 1995, the European Respiratory Society (ERS) consensus statement (Siafakas et al., 1995) 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.

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 (ATS Statement, 1995; Burrows et al., 1987). 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" (ATS Statement, 1995).

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 (Wongsurakiat et al., 2003). COPD is characterized by persistent, progressive airflow limitation that is often accompanied by cough as well as increased sputum production (GOLD Global Strategy, 2013). 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, (Boschetto et al., 2006; Hu et al., 2010; Salvi & Barnes, 2009). 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 (Kessler et al., 2006).

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 (Wongsurakiat et al., 2004; Donaldson et al., 2002). 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 (Alam et al., 2015). Nevertheless, this study was aimed to assess the impact of COPD among hospitalized patients in a tertiary care hospital in Bangladesh.

## MATERIALS AND METHODS

### *Study Design & 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:** Association between sociodemographic and habitual factors and COVID-19 status of HCPs (n= 483)

| 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)

**Figure 1:** Physical Health Problems related to PPE

### *Physical Health Problems related to long shift*

Physical health problems related to long shift were Back pain 69.20%, dehydration 73.90%, reduced concentration 64.00%, UTI 47.30%, sleep disturbance 62.20%, and others 6.50%. (Figure 2).

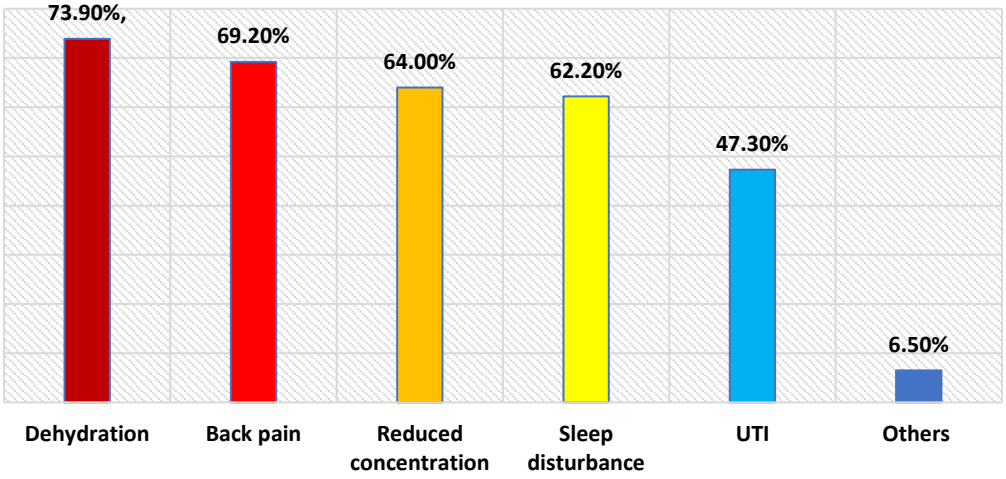


**Figure 2:** Physical Health Problems related to long shift

In our study, the safety of the working environment, availability of PPE, monitoring for family-related responsibilities, HCPs notified about up-to-date information on COVID-19, getting adequate health support from the organization, financial support, family members taking special care of HCPs as they work for COVID-19 patients, and a family member who tested COVID-19 positive were all significant with the COVID-19 status of HCPs (positive or negative for COVID-19) at a 5% level of significance as a p-value less than 0.05. (Table 3).

**Table 3:** Association between organizational, familial, and social factors and COVID-19 status of HCPs (n=483)

| Characteristics | COVID-19 status of HCPs, Positive for COVID-19 (%) | COVID-19 status of HCPs, Negative for COVID-19 (%) | Total n (%) | p Value |
|---|---|---|---|---|
| **The safety of the working environment** | | | | |
| Not safe | 50 (11.1) | 10 (30.3) | 60 (12.4) | **0.005** |

| | | | | |
|---|---|---|---|---|
| Moderately safe | 171 (38.0) | 11 (33.3) | 182 (37.7) | |
| Highly safe | 229 (50.9) | 12 (36.4) | 241 (49.9) | |
| **Availability of PPE** | | | | |
| A small amount | 174 (38.7) | 19 (57.6) | 193 (40.0) | **0.032** |
| Adequate amount | 276 (61.3) | 14 (42.4) | 290 (60.0) | |
| **Monitoring for mental stress** | | | | |
| Not at all | 84 (60.9) | 209 (60.6) | 293 (60.7) | 0.953 |
| Occasionally | 54 (39.1) | 136 (39.4) | 153 (31.7) | |
| **Monitoring for family-related responsibilities** | | | | |
| Not at all/sometimes | 353 (78.4) | 31 (93.9) | 384 (79.5) | **0.033** |
| Regularly | 97 (21.6) | 2 (6.1) | 99 (20.5) | |
| **HCPs notified about up-to-date information on COVID-19** | | | | |
| Not at all/sometimes | 286 (63.6) | 27 (81.8) | 313 (64.8) | **0.034** |
| Regularly | 164 (36.4) | 6 (18.2) | 170 (35.2) | |
| **Getting adequate health support from the organization** | | | | |
| Not at all | 64 (14.2) | 12 (36.4) | 76 (15.7) | **0.003** |
| Sometimes | 223 (49.6) | 12 (36.4) | 235 (48.7) | |
| regularly | 163 (36.2) | 9 (27.3) | 172 (35.6) | |
| **Financial support** | | | | |
| Not satisfactory | 156 (34.7) | 20 (60.6) | 176 (36.4) | **0.003** |
| Satisfactory | 294 (65.3) | 13 (39.4) | 307 (63.6) | |
| **Training for Infection Prevention and Control** | | | | |
| No | 256 (56.9) | 20 (60.6) | 276 (57.1) | 0.677 |
| Yes | 194 (43.1) | 13 (39.4) | 207 (42.9) | |
| **Family members taking special care of HCPs as they work for COVID-19 patients** | | | | |
| Not always | 168 (37.3) | 21 (63.6) | 189 (39.1) | **0.003** |
| Always | 282 (62.7) | 12 (36.4) | 294 (60.9) | |
| **A family member who tested COVID-19 positive** | | | | |
| No | 324 (72.0) | 17 (51.5) | 341 (70.6) | **0.013** |
| Yes | 126 (928.0) | 16 (48.5) | 142 (29.4) | |

*[N.B. p-value is less than 0.05 was considered as significant.]*

## DISCUSSION

The findings of this cross-sectional study provide valuable insights into the physical health challenges faced by HCPs in Bangladesh during the COVID-19 pandemic. The discussion highlights the implications of these findings, explores potential contributing factors, and suggests strategies for addressing the identified issues.

From our study, we found that age, marital status, education, designation, and monthly income were significant with the COVID-19 status of HCPs (positive or negative for COVID-19). Sex, BMI of the participants, extra care at home to avoid COVID-19, and the religion of the participants were insignificant with the COVID-19 status of HCPs (positive or negative for COVID-19). A study, done by Monita Karmakar and others in the US, shows an association of social and demographic factors with COVID-19 incidence and death rates in the US12. Their study shows relation of socio-economic condition to COVID-19 infection. Housing, transportation, and food are also related to the COVID-19 infection, which is different from our study. Their study was done on general people, while our study was done on HCPs. So, some difference is present in the results.

Our study found HCPs, who had COVID-19, were suffering from fatigue 10.60%, cough 8.90%, headache 8.80%, loss of smell or taste 8.20%, recurrent fever 7.80%, worsened symptoms after physical or mental activity 7.50%, concentration problem 7.00%, breathing difficulty 7.00%, muscle pain 6.40%, dizziness when standing 6.00%, depression or anxiety 5.70%, joint pain 5.60%, fast heartbeat 5.60%, chest pain 4.30%, and others 0.80%. A review

article held up complications that arise as long-term complications of COVID-19, including cardiovascular, neurological and psychological, haematological, pulmonary, dermatological, and other injuries13. So, these were common complications that people encountered due to COVID-19.

Our study shows that HCPs experienced sweating 88.20%, discomfort 84.90%, headache 82.40%, dehydration 79.70%, difficulties to auscultate 72.90%, difficulties to communicate 54.90%, skin damage 51.30%, skin rash 37.50%, blister 34.00%. raised BP 28.40%. due to PPE. A similar study9 shows that 97% reported discomfort, including labored breathing (20%), fatigue (16%), device-related pressure injuries (13%), anxiety (12%), face acne (10%), insomnia (8%), depression (6%), allergic dermatitis (4%), and hand maceration or foot erosion (4%), trunk or limbs heat rash (3%), conjunctivitis or keratitis (2%), and perineal maceration or tinea corporis (2%). Both the studies show that HCPs suffered a lot due to PPE.

### *Strengths and limitations of the study*

The study, conducted during the pandemic time of 2021, highlighted healthcare workers' physical health challenges and its related factors. Investigating HCPs' physical health issues during the pandemic was vital for their safety, workforce sustainability, burnout prevention, patient care, and long-term health.

With its strength, it faced limitations like difficulty gathering accurate data and sampling delays. Random sampling was practical but less representative, while excluding support staff and minority subgroups like nutritionists and biomedical engineers narrowed the study's scope.

## CONCLUSION

This cross-sectional study provides valuable insights into the physical health challenges faced by HCPs in Bangladesh amidst the COVID-19 pandemic. The prevalence of COVID-19 among the HCPs, physical health problems due to PPE and long shifts, and significantly associated sociodemographic, habitual, organizational, and familial factors with the COVID-19 status of HCPs underscore the serious burden placed on them as they combat the virus.

The findings highlight the need for targeted interventions to address the physical health needs of HCPs in Bangladesh. Based on the findings of our study, policymakers should emphasize ensuring access to adequate PPE, optimizing work schedules along with organizational support, strong healthcare infrastructure, and improved working condition- all are crucial steps to mitigate their physical hazards and promote their well-being.

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