Prevalence of depression and its risk factors among patients with chronic obstructive pulmonary disease in a tertiary level hospital in West Bengal, India

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Abstract

In recent years, chronic obstructive pulmonary disease (COPD) has increased several folds in the developing countries and the disease is accompanied with several co-morbidities among which depression is a major one. Still now there is a lack of data regarding the prevalence and risk factors of depression among the patients with COPD in India. The aim of the study is to assess the prevalence of depression and associated risk factors in patients with COPD in Kolkata, India. In this cross-sectional study, 214 COPD patients were selected by purposive sampling at OPD of Pulmonary Medicine, RG Kar Medical College, Kolkata, India. The patients were diagnosed and grouped into different stages of COPD by clinical examination and spirometry. A questionnaire was administered among the respondents to collect the data regarding their socio-demographic conditions followed by Patient Health Questionnaire 9 (PHQ-9) to measure the level of depression. The mean age of the respondents was 59.37 ± 11.37 years and 99% were male. The proportion of depression among patients with COPD was 86%. Among the respondents, 36.9% had moderately severe depression, 32.2% had moderate depression and 6.1% had severe depression. The risk factors of depression among COPD patients were urban residence (OR=4.79, p=0.02), income group of 5000-9999 Rupees per month (OR=18, p=0.38), teetotalers (OR=8.36, p=0.02), Stage 2 COPD (OR= 83, p=0.001) and onset of COPD $\geq$70 years of age (OR=20, p=0.02). The study showed that more than 8 out of 10 COPD patients and it can be considered very high proportion. The study highlight the importance of routine screening for depression of all COPD patients in all healthcare settings and implementation of effective strategies for proper prevention and management of depression in those patients.

Keywords: Depression, COPD, Prevalence, Risk factors, India.

Introduction

Chronic obstructive pulmonary disease (COPD) is one of the leading non-communicable diseases and a leading cause of morbidity and mortality. In 1990, COPD ranked the sixth most common cause of death worldwide and is predicted to become the third most common cause of mortality and the fifth most common cause of chronic disability by 2020[1]. More than 3 million people died of COPD in 2005, which is equal to 5% of all deaths globally that year and almost 90% of COPD deaths occurred in low- and middle-income countries.[2] According to the 2007 estimation of World Health Organization (WHO), 210 million people have COPD.[3]

The burden of COPD in Asia is currently greater than that in developed Western countries linked to the epidemic of tobacco exposure and indoor and outdoor air pollution in Asian countries.[4] Total deaths from COPD are projected to increase by more than 30% in the next 10 years without interventions to cut risks, particularly exposure to tobacco smoke.[2]

In India, prevalence rates of COPD vary from 2 to 22 % in men.[5] There were some variations in prevalence rates depending upon the place of residence and

Practice Points

- COPD is one of the commonest non-communicable diseases and a leading cause of morbidity and mortality.

- There is lack of research regarding the prevalence and risk factors of depression among the patients with COPD in India.

- The prevalence of depression among COPD patients was 86%; 36.9% had moderately severe depression, 32.2% had moderate depression and 6.1% had severe depression.

- The risk factors of depression among COPD patients were urban residence, income, teetotalers, stage 2 COPD and time of onset of COPD.

- Routine screening for all patients and appropriate management and prevention strategies are necessary to overcome depression in COPD patients.

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socio-economic groups but significant differences were observed in relation to the smoking habit and exposures to combustion of solid fuels and environmental tobacco smoke.[6] The prevalence of COPD is estimated as 4.1% in India.[7] More than 80% of these patients are not diagnosed and therefore they are not treated appropriately.[8]

The natural course of COPD is complicated by the development of systemic consequences and co-morbidities.[9] These may be major features in the clinical presentation of COPD. Systemic consequences may be defined as non-pulmonary manifestations of COPD with an immediate cause-and-effect relationship, whereas co-morbidities are diseases associated with COPD. Depression is regarded as one of the major co-morbidities of COPD.[9] Evidence from a study has shown that depression is related to the outcome of emergency treatment in patients with COPD.[10] A few studies were conducted to find out the prevalence of depression among COPD patients and the results were variable. A systemic review conducted on different studies remains inconclusive regarding the prevalence of depression in patients with COPD.[11] The proportion of depression among the patients with COPD can demonstrate how depression can affect the life of a patient with chronic obstructive pulmonary disease.[9] In India, a number of studies were conducted to find out the prevalence of depression in population and a study from urban South India estimated the prevalence of depression is 25.7 % among the people above 60 years of age.[12]

There are limited on depression among patients with COPD in India. A study[13] conducted in Bhopal demonstrated the prevalence of depression among patients with COPD patients is 72%.[13] There is inadequate data regarding the risk factors of depression among patients with COPD and exploration of these risk factors is required for further management of the patients. The presence of un-recognized sub-clinical depression in patients with COPD is a major concern, as they are at risk of developing major depression. This may in turn increase the burden of physical disabilities in patients with COPD. There is still a gap of knowledge regarding the proportion of depression among patients with COPD in other parts of India. The aim of the study is to assess the prevalence of depression and associated risk factors in patients with COPD in Kolkata, India.

Materials and methods

A cross-sectional study was conducted at the R.G Kar Medical College and Hospital, Kolkata, India on patients with COPD attending the outdoor department of pulmonary medicine in the period between September 2011 and March 2012. Patients already under treatment of depression were excluded as antidepressant may affect the depression score. The seriously ill patients were also excluded.

The stage of severity of COPD was determined in all COPD patients and using spirometry according to GOLD standard.[14] A questionnaire was administered to find out the socio-demographic and behavioral status of the patients. The Patient Health Questionnaire 9 (PHQ-9)[15], a valid tool for screening depression[16] was also used to measure the level of depression. We used the validated Bengali version of Patient Health Questionnaire 9 (PHQ-9).[17] The severity of depression was classified according to the depression score of PHQ-9.[15] The classification is as follows: none or minimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), severe (20-27).

Statistical analysis
The statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 16. The prevalence of depression and other categorical variables were reported as proportion with 95% confidence interval (CI). The categorical data were compared by chi-square test followed by a logistic regression analysis at a significant level of 0.05.

Ethical approval
The protocol was approved by the ethical review committee of the R G Kar Medical College and Hospital. All the participants were verbally informed about the name of the researcher, about the study objectives, procedures, and the risks and benefits involved. This information was sufficiently discussed with them and they were allowed to ask any information and clarification. All the participants selected, participate in the study, singed an informed consent and who are illiterate, their witness signature were used. They were informed about their right to withdraw from the study at any time without showing any cause. The participants were reassured about the confidentiality of data and the use of this data only for this research purpose. The questionnaires were kept securely. All the procedures were done with giving respect and dignity to the participants.

Result

Among the 214 respondents only 2 respondents were female. The mean age of the respondents was 59.37±11.4 years. Two-thirds (66.8%) respondents were from urban area and rest one-third (33.2%) were from rural area (Table 1).

More than half of the respondents (59.3%) were found to be ex-smoker, one-third of the respondents were regular smoker and only 8.4% (18) of the respondents were non-smoker. Around two-thirds of the respondents (65.0%) were teetotalers and rest (35.0%) was alcohol consumers. More than half of the respondents (58.9%) were suffering from COPD for 0-4 years. The proportion of the respondents in stage 2 COPD was highest (45.3%) among the stages of COPD. The proportion in stage 1 and stage 3 were 32.2% and 22.0% respectively. Only 0.5% was in stage 4. One-fifth of the respondents (20.1%) were suffering from COPD for 5-9 years. Respondents suffering from COPD for 10-19 years and ≥ 20 years were 32.2% and 22.0% respectively. The mean age of onset of COPD among the respondents was 53.4±10.8 years. Almost one-third (29.0%) of the respondents had family history of COPD (Table 2).

Table 1: Socio-demographic characteristics of the respondents

Variables	Respondents (%)
Age groups (yrs)	
35-44	19 (8.9%)
45-54	55 (25.7%)
55-64	63 (29.4%)
65and above	77 (36%)
Mean age± SD (yrs)	59.37±11.37
Gender	
Male	212 (99.1%)
Female	2 (0.9%)
Religion	
Hinduism	172 (80.4%)
Islam	41 (19.2±%)
Christianity	1 (0.5%)
Marital status	
Single	19 (8.9%)
Married	184 (86%)
Widow/widower	11 (5.1%)
Educational level	
No formal education	73 (34.1)
Primary school level	99 (46.3%)
Madhyamik (Secondary)	13 (6.1%)
Higher Secondary	17 (7.9%)
Graduation & above	12 (5.6%)
Residence	
Rural	71 (33.2%)
Urban	143 (66.8%)
Occupational status	
Service holder	18 (8.4%)
Self -employed	104 (48.6%)
Unemployed	65 (30.4%)
Retired	27 (12.6%)
Household income (Rupees/month)	
0-999	7 (3.3%)
1000-4999	142 (66.4%)
5000-9999	41 (19.3%)
10000-19999	19 (8.9%)
20000 and more	5 (2.3%)

Table 2: Behavioral characteristics and variables related to COPD of the respondents

Variables	Respondents (%)
Smoking status	
Regular smoker	69 (32.3%)
Non-smoker	18 (8.4%)
Ex-smoker	127 (59.3%)
Alcohol consumption	
Alcohol consumer	75 (35%)
Teetotaler	139 (65%)
Stages of COPD	
Stage 1	69 (32.2%)
Stage 2	97 (45.3%)
Stage 3	47 (22%)
Stage 4	1 (0.5%)
Duration of COPD	
0-4 yrs	126 (58.9%)
5-9yrs	43 (20.1%)
10-19yrs	34 (15.9%)
20 yrs and above	11 (5.1%)
Mean±SD	5.93±5.9 years
Age of onset of COPD	
30-49	79 (36.9%)
50-69	120 (56.1%)
≥ 70	15 7%)
Mean±SD	53.4±10.8 years
Family history of COPD	62 (29%)

Teetotaler (OR=8.36, *p*=0.002), Stage 2 COPD (OR=83, *p*=0.001), and onset of COPD ≥70 years of age (OR=20, *p*=0.022) as shown in Table 3.

Discussion

Among the major non-communicable diseases, COPD is the leading cause of morbidity and mortality and prevalence of COPD is rising particularly in the developing world. Co-morbid psychiatric illness accompanied with COPD can be a unique challenge in the treatment of COPD. The presence of unrecognized depression in patients with COPD can be a major concern, as they are at risk of developing major depression and may increase the burden of physical activity which turns into less productivity and poor quality of life.

The current study shows that the prevalence of depression among the COPD patients is very high and it indicates that more than 8 in every 10 respondents were suffering from depression. The prevalence of depression of the current study was in line with result of the study conducted by Dey[13] in Madhyapradesh, which found that almost 7 out of 10 COPD patients were depressed. The same screening tool was used in that study and the mean age (61.7±9.6 years) of the respondents of that study was nearly similar to the mean age (59.3±11.6 years) of the respondents of the current study. Kunik *et al.*[18] in the USA also found that 8 out of 10 patients with chronic breathing disorders had depression, anxiety or both. However, that study included all chronic breathing
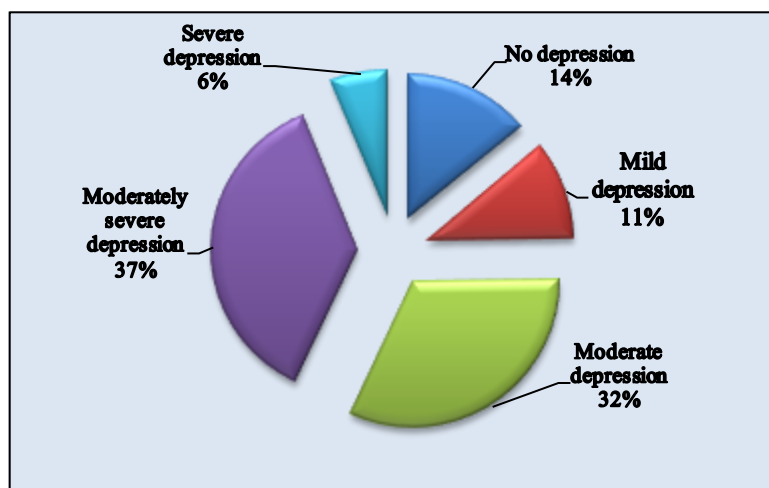
The proportion of depression among patients with COPD was 86%. Among the all respondents, 36.9 % had moderately severe depression, 32.2% had moderate depression and only 6.1% had severe depression as shown in Figure 1. The mean PHQ score among all the respondents was 12.5±5.0. The mean PHQ score among stage 1 COPD (mild), stage 2 COPD (moderate), and stage 3 COPD (severe) were 9±5.5, 13.7±4.3, and 15±3.7 respectively. There was only one patient of stage 4 COPD (very severe) and his PHQ score was 17.0 (Figure 2). It was also found that the depression increases with the progression of the stages of COPD. The risk factors which are found to be involved with the development of depression among COPD patients were urban residence (OR=4.79, *p*=0.02), income group of 5000-9999 rupees per month (OR=18, *p*=0.38),

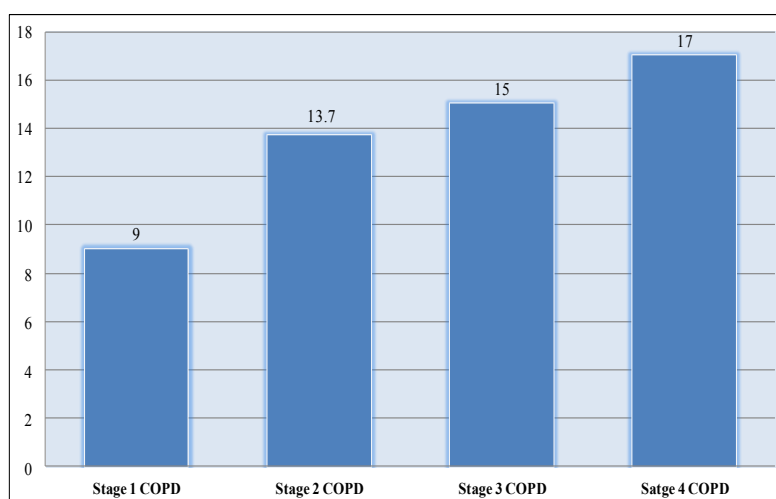**Figure 1:** Level of depression among the respondents

Figure 2: Distribution of mean PHQ-9 score among the different stages of COPD

disorders, namely, COPD, asthma and bronchiectasis. Solani *et al.*[19] found the prevalence of depression to be 71.0% and that is comparable with the result of current study.

A study conducted by Dey[13] found mean PHQ score of 14±7, which was higher than that of our current study. In that study the mean PHQ score of stage 2 COPD and Stage 3 COPD were 13±5.4 and 15.5±3.6, which were in line of the present study.

The proportion of depression among the COPD patients, found in our study varied from the findings of Manen *et al.*[20] (25%) and Wagena *et al.*[21] (22% to 37%) – this may be due to the socio-cultural and economic differences between the Dutch population and Indian population and different health care delivery system. It is also to be mentioned that Manen *et al.*[20] used Centers for Epidemiologic Studies Depression (CES-D) scale[22] and Wagena *et al.*[21] used Dutch version of SCL-90-R[23] for measuring the depression level.

The present study found that the depression increased significantly with the progression of COPD. Apart from it, the risk indicators which are determined from the current study are residence, alcohol consumption habit, educational level, income status, and age of onset of COPD. According to the finding of the current study, COPD patients those are of urban residence, income group of 5000-9999 rupees per month, teetotalers, stage 2 COPD and onset of COPD ≥70 years are significantly more likely to develop depression. There are not much studies focusing on the risk indicators of depression among COPD patients in India and the only study by Dey[13] found that depression increases significantly with the progression of COPD and the finding corresponds with the present study. Manen *et al.*[20] found that patients with mild to moderate COPD severity are not at increased risk for depression but patient with severe COPD had higher risk of depression. However, Wagena *et al.*[21] did not find any significant association between severity of COPD and level of depression.

Table 3: Strength of association of a set of independent variables with status of depression

Independent variables	OR	*P*-value	95 % CI for Exp (B)	
			Lower	Upper
Age category				
Age group (35-44)	1.000			
Age group (45-54)	3.024	0.424	0.200	45.610
Age group (55-64)	2.075	0.339	0.465	9.258
Age group (≥ 65)	2.777	0.316	0.377	20.436
Residence				
Rural	1.000			
Urban	4.794	0.027*	1.2	19.153
Educational status				
Illiterate	1.00			
Literate	3.474	0.051	0.996	12.119
Household Income (rupees/month)				
0-999	1.000			
1000-4999	1.246	0.749	0.324	4.796
5000-9999	18.568	0.038*	1.180	292.209
10000-19999	0.572	0.532	0.099	3.295
≥ 20000	3.793	0.366	0.211	68.342
Alcohol consumption status				
Alcohol consumer	1.000			
Teetotaler	8.36	0.002*	2.192	31.92
Hypertension				
Hypertension absent	1.000			
Hypertension present	0.509	0.237	0.166	1.558
Stages of COPD				
Stage 1	1.000			
Stage2	83.206	0.001*	6.151	1125.617
Stage 3	5.734	0.186	0.431	76.302
Age of onset of COPD				
30 -49 years	1.000			
50-69 years	3.496	0.155	.623	19.622
≥ 70 years	20.879	0.022*	1.554	280.459
Family History of COPD				
Absent	1.000			
Present	2.573	0.096	.845	7.835
Constant	0.00	0.000		

* Significant

The risk factors found in the study of Schane *et al*.[24] were female gender, marital status, educational status, co-morbid diabetes, arthritis and difficulty in walking. This study was done in among the US population who were ≥50 years of age. The current study had only 2 female respondents and hence no valid comparison could be done regarding the gender. Among the other risk factors, educational level was also found to be a risk indicator of our study. The variation among the risk factors of these two studies may be due to the difference of culture, economic condition and health-care facilities of the US population and Bengali population. Manen *et al*[20] also found that living alone was a risk factor of depression among patients with COPD in Dutch population. This study, did not find any significant association of age, sex, education and co-morbidity with depression among COPD. These findings are in line with the findings of the current study.

In the current study teetotalers were found to be significantly more likely to develop depression than the alcohol consumers though alcohol use disorder is suggested to have a causal association with major depression.[25] However, the study conducted by Tabak *et al*.[26] among Dutch population from 1994 to 1997 showed the subjects with low alcohol consumption (1-3 g/day) had lower prevalence of COPD symptoms than the teetotalers and this finding may support the result of the current study.

The study has a number of limitations. Being a hospital-based study, finding of this study may not be generalized and it may not give the actual proportion of depression among patients with COPD of the whole country.

Moreover, diagnosis of COPD and staging of COPD were done by Spirometric test and the results were varied from different examiner's motivation and instructions provided to the patients. This may be resulted inter-examiner variation, which was not calculated. Recognition of co-morbid depression is difficult, because some of the physical symptoms of COPD may mimic the core symptoms of depression, for example, poor sleeping pattern, anorexia and loss of enjoyment due to breathlessness which may lead to overestimation of depression among COPP patients.

Conclusion

The study found that the proportion of depression among patients with COPD is 86% (more than 8 out of 10 patients) and it can be considered very high proportion. The study also confirmed the risk factors of developing depression in COPD patients were urban residence, income group (5000-9999 rupees per month), stage 2 COPD and onset of COPD ≥70 years of age and abstinence from alcohol. The study found that proportion depression increases significantly with the progression of the stages of COPD. The study highlight the importance of routine screening for depression of all COPD patients in all healthcare settings and implementation of strategies for proper management and prevention of depression in those patients. Large scale studies should be conducted to examine the prevalence of depression among COPD patients and their risk factors in the other parts of the country. Awareness regarding depression among COPD patients should be enhanced especially for the health care professionals. Above all, national management guidelines for the depression among COPD patients should be developed and implemented.

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