

ORIGINAL ARTICLE

Depressive Disorders Among Patients In Chronic Obstructive Pulmonary Diseases

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Abstract:

Background: This study was done to see the prevalence of depressive disorders in COPD patients and that will be able to draw attention of the relevant personnel's in effective treatment of COPD.

Materials and Methods: This was a cross sectional comparative study. The study was carried out in the Department of Psychiatry in collaboration with the Department of Respiratory Medicine, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet, during the study period from 1st July 2014 to 30th June 2015 were the study population. All COPD patients those got admitted in the different unit of Medicine and Respiratory Medicine fulfilling inclusion and exclusion criteria were taken as case. Control subjects were age and sex matched accompanying person of the patients or other patients attending them. After fulfilling the inclusion and exclusion criteria 96 patients of COPD (based on clinical history, examination and lung function test spirometry) were selected as study subjects (Group-A). Age and sex matched 96 healthy subjects who were fulfilling the inclusion and exclusion criteria selected as control subjects (group-B). The clinical parameters and results were analyzed by Un-paired t test, Chi-square test and Fishers Exact test.

Results: In this study, there was significant increase in major depressive disorder (MDD) in COPD patients than in control group (27.1% vs 8.3%) ($\chi^2=11.58$, $p<.05$) and persistent depressive disorder (PDD) was present in 15 COPD patients and in 1 respondent of control group which was also statically significant ($\chi^2=13.35$, $p<.001$).

Conclusion: This study showed that the proportion of depressive disorders is significantly higher in patients suffering from COPD than that of control subjects. Major depressive disorder and persistent depressive disorder are also significantly more frequent in patients of COPD.

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Introduction:

Chronic Obstructive Pulmonary Disease (COPD) is a preventable and treatable disease characterized by persistent airflow limitation that is usually progressive. It is commonly associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. The prevalence of COPD directly related to the

prevalence of tobacco smoking and the use of biomass fuels, more common in low and middle income countries. Current estimate suggest that 80 million people worldwide suffer from moderate to severe stage of COPD ¹.

Chronic obstructive pulmonary disease (COPD) is a chronic illness and is a major cause of morbidity and mortality worldwide ². By 2030

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COPD has been predicted 3rd leading cause of death and 5th leading cause of disability in the world. The overall prevalence of COPD is 4.32% in general population in Bangladesh³.

COPD patients suffer from limitations of activities, loss of independence, decreased social functioning and quality of life. Commonly associated co-morbid conditions include cardiovascular disease, the metabolic syndrome, osteoporosis, depression, lung and other cancer⁴.

Among psychiatric morbidities depression is the most common complication in COPD patient. The prevalence of depressive symptoms among COPD patients has been estimated to be 40 to 50%⁵. Depression is the 1st leading cause of disability worldwide⁶. Most often depression is unexplored in a patient due to variations of clinical presentation⁷.

The Medical Outcomes Study suggested that patients with chronic respiratory disease (next only to patients with chronic gastro-intestinal disease) appeared worst off on their mental health status than patients with all other chronic diseases^{7, 8}.

Mortality is significantly high in patients with depressive disorders, largely due to suicide. Rates of suicide in patients with mood disorder are at least 15 times higher than those in the general population and tend to be higher in unipolar depression than in bipolar disorder⁹.

Unrecognized and untreated depressions is associated with poor treatment compliance, increased frequency of consultation, hospital admission, hospital stay, treatment cost and increased overall health care burden to the health care services⁸. Risk of dropout from pulmonary rehabilitation is significantly greater in depressed COPD patients, irrespective of severity of breathlessness^{10, 11}.

Due to the irreversible nature of chronic obstructive pulmonary disease (COPD), the aim of treatment in patients with COPD is not to cure but to reduce symptoms, increase functioning and improve the patient's quality of life. Along with the disease process itself, attention should given to co-morbid depression in COPD patient¹².

Material and Methodology

This was a cross sectional comparative study was carried out in the Department of Psychiatry in collaboration with the Department of Respiratory Medicine, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet from 1st July 2014 to 30th June 2015. A total of 96 COPD patients those got admitted in the different units of Medicine and Respiratory Medicine fulfilling inclusion and exclusion criteria were taken as case. Control subjects were age and sex matched accompanying person of the patients or other patients attending Sylhet M.A.G. Osmani Medical College Hospital, Sylhet during the study period from 1st July 2014 to 30th June 2015 were the study population. Informed written consent was obtained from the patients after full explanation of purpose of the study. After fulfilling the inclusion and exclusion criteria 96 patients of COPD (based on clinical history, examination and lung function test spirometry and confirmed by chest specialist) were selected in this study as study subjects (Group-A). Age and sex matched 96 healthy subjects examined by chest specialist who were fulfilling the inclusion and exclusion criteria selected as control subjects (group-B). By spirometry the following values were obtained from the test: Forced Expiratory Volume 1 sec [FEV1], Forced Vital Capacity [FVC], and FEV1/FVC ratio for the staging of COPD patients according to GOLD guidelines. Post bronchodilator spirometry (Salbutamol 2.5mg by nebulization) was performed in all the patients to exclude the diagnosis of bronchial asthma. All data were recorded systematically in a preformed check list. Quantitative data were summarized as mean and standard deviation; and comparison was performed between the two groups by unpaired t- test. Qualitative data were summarized as frequency and percentages. Comparison between two groups was done by chi-square (χ^2) test and Fisher's exact test. A probability (p) value of, <0.05 was considered statistically significant and p>0.05 was taken as non-significant. Statistical analysis was performed by using SPSS (Statistical package for social science) for windows version 21.

Results:

Table-I
Distribution of the respondents on the basis of age

| Age in years | Study group | | p-value |
|--------------|---------------------------------|---------------------------------|----------|
| | Group-A (n=96) Frequency (%) | Group-B (n=96) Frequency (%) | |
| 41-50 years | 6 (6.2) | 5 (5.2) | *p=0.935 |
| 51-60 years | 32 (33.3) | 36 (37.5) | |
| 61-70 years | 49 (51.0) | 47 (49.0) | |
| 71-80 years | 9 (9.4) | 8 (8.3) | |
| Mean (years) | 63.35 (SD ± 6.68) | 61.90 (SD ± 6.37) | †p=0.123 |

The table shows that most of responder in both case group and control group were within 61 to 70 years age range and lowest responders were from 41 to 50 years age range.

Table-II
Distribution of the respondents according to sex

| Sex | Study group | | *p-value |
|--------|---------------------------------|---------------------------------|----------|
| | Group-A (n=96) Frequency (%) | Group-B (n=96) Frequency (%) | |
| Male | 85 (88.5) | 85 (88.5) | - |
| Female | 11 (11.5) | 11 (11.5) | |
| Total | 96 (100.0) | 96 (100.0) | |

The table shows that both case and control group had 85 male and 11 female responders. Male were more than females in both case and control group.

Table-III
Distribution of respondents according to their social background

| Social background | Study group | | *p-value |
|-------------------|---------------------------------|---------------------------------|----------|
| | Group-A (n=96) Frequency (%) | Group-B (n=96) Frequency (%) | |
| Rural | 78 (81.2) | 84 (87.5) | *p=0.233 |
| Urban | 18 (18.8) | 12 (12.5) | |
| Total | 96 (100.0) | 96 (100.0) | |

* χ^2 (Chi- square) test was employed to analyze the data ($C^2=1.422$; $p=0.233$).

In COPD group, 78 (81.2%) respondents were rural dweller whereas in control group, 84 (87.5%) were rural and 12 (12.5%) respondents were urban inhabitant. The difference between the two groups was statistically non-significant

Table IV
Distribution of respondents according to smoking status

| Smoking status | Study group | | p-value |
|----------------|---------------------------------|---------------------------------|---------|
| | Group-A (n=96) Frequency (%) | Group-B (n=96) Frequency (%) | |
| Smoker | 91 (94.8) | 57 (59.4) | *p<001 |
| Non-smoker | 5 (5.2) | 39 (40.6) | |
| Total | 96 (100.0) | 96 (100.0) | |

* χ^2 (Chi- square) test was employed to analyze the data. ($C^2=34.084$; $p<0.001$).

Here, 91 (94.8%) respondents were smoker in COPD group and 57 (59.4%) were smoker in control group. Smoker were significantly more in COPD group than that of control group

Fig.-1 shows 34 (35.4%) patients were steroid user and 62 (64.6%) patients did not use any steroid.

Fig.-2 shows the distribution of respondents according to duration of COPD. Duration of COPD was 1 to 5 years in 27 (28.1%) cases, 6 to 10 years in 40 (41.7%) cases and above 10 years in 29 (30.2%) cases.

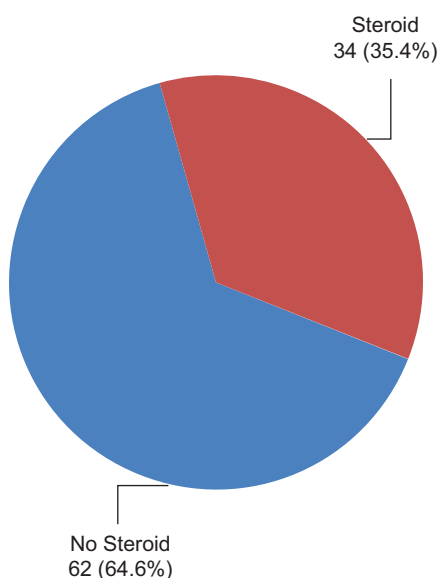


Fig.-1: Distribution of the patients of COPD according to steroid use (n=96)

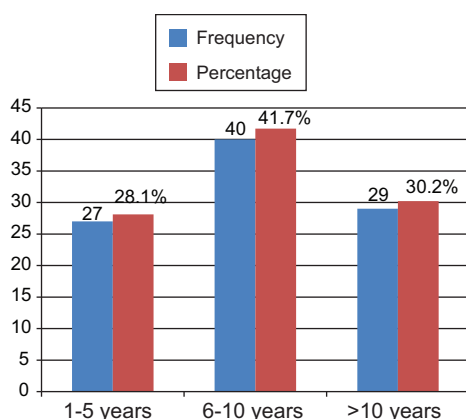


Fig.-2: Distribution of respondents according to duration of COPD (n=96)

Fig.3 shows the distribution of the patients by severity of COPD according to GOLD criteria. GOLD stage-III was the most frequent and was present in 47.9% of cases, followed by stage-IV (45.8%) and stage -II (6.2%).

Fig.-4 shows CES-D score was positive for depressive disorders in 47 (49.0%) COPD patients and 11 (11.5%) respondents of control group. The difference was statistically significant ($\chi^2=32.016$; $p<0.001$).

Depressive disorders were present in 41 (42.7%) COPD group which was significantly higher than that in control group, n=9 (9.4%). ($\chi^2=27.691$; $p<0.001$).

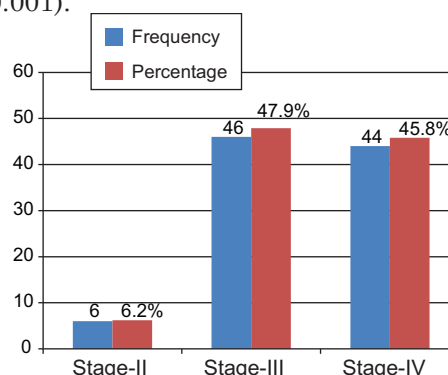


Fig.-3: Distribution of the patients by severity of COPD according to GOLD criteria (n=96)

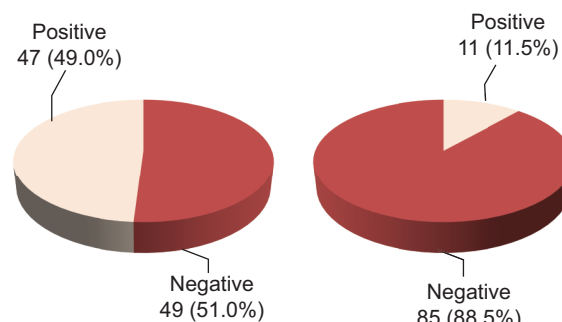


Fig.-4: Distribution of respondents by CES-D score

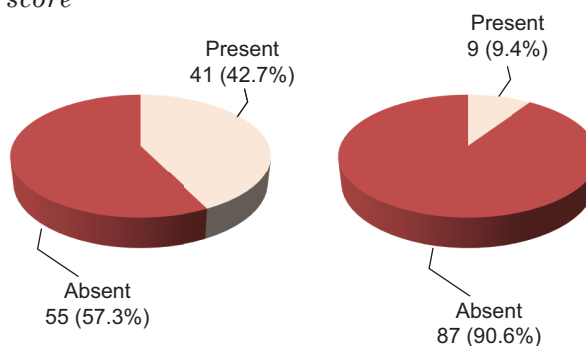


Fig.-5: Distribution of respondents by depressive disorders according to DSM-5 criteria.

Table-V
Association of smoking and depressive disorders in COPD

| Smoking status | Depressive disorders | | p-value |
|------------------|--------------------------|-------------------------|----------|
| | Present Frequency (%) | Absent Frequency (%) | |
| Smoker (n=91) | 39 (42.9) | 52 (57.1) | *p=1.000 |
| Non-smoker (n=5) | 2 (40.0) | 3 (60.0) | |

*Fisher's Exact test was employed to analyze the data. (p=1.000).

Depressive disorders were present in 39 (42.9%) smoker patients and 2 (40.0%) non-smoker. Smoking status did not affect the depressive disorders in COPD,

Table-VI
Association of steroid intake and depressive disorders

| Steroid intake | Depressive disorders | | p-value |
|----------------|--------------------------|-------------------------|----------|
| | Present Frequency (%) | Absent Frequency (%) | |
| Yes (n=34) | 17 (50.0) | 17 (50.0) | *p=0.285 |
| No (n=62) | 24 (38.7) | 38 (61.3) | |

*Chi-Square (χ^2) test was employed to analyze the data. Figure in the parenthesis indicates corresponding percentage.

Table VIII shows Depressive disorders were present in 17 (50.0%) steroid users. Although steroid intake increased the rate of depressive disorders in COPD but did not reach the level of significance. ($\chi^2=1.144$; p=0.285). Association of steroid intake and depressive disorders in COPD was shown in table- VI.

Table-VII
Association of duration of COPD and depressive disorders

| Duration of COPD | Depressive disorders | | p-value |
|--------------------|--------------------------|-------------------------|----------|
| | Present Frequency (%) | Absent Frequency (%) | |
| 1-5 years (n=27) | 9 (33.3) | 18 (66.7) | *p=0.231 |
| 6-10 years (n=16) | 16 (40.0) | 24 (60.0) | |
| 11-15 years (n=44) | 16 (55.2) | 13 (44.8) | |

*Chi-Square (χ^2) test was employed to analyze the data. ($\chi^2=2.931$; p=0.231).

Table VII shows depressive disorders were present in 9 (33.3%) patients of COPD for 1 to 5 years range duration , 16 (40.0%) patients of 6 to 10 years group and 23 (52.3%) patients in 11 to 15 years of disease duration . Though the rate of depressive disorders increased with duration of COPD but did not reach the level of significance .

Table-VIII
Association of COPD stage and depressive disorders

| COPD stage | Depressive disorders | | p-value |
|------------------|--------------------------|-------------------------|----------|
| | Present Frequency (%) | Absent Frequency (%) | |
| Stage-II (n=6) | 1 (16.7) | 5 (83.3) | *p=0.176 |
| Stage-III (n=46) | 17 (37.0) | 29 (63.0) | |
| Stage-IV (n=44) | 23 (52.3) | 21 (47.7) | |

*Fisher's Exact test was employed to analyze the data (p=0.176).

Depressive disorders were present in 16.7% patients in stage-II, 37.0% in stage-III, and 52.3% patients in stage-IV COPD. Though the rate of depressive disorders increased with stage of COPD but did not reach the level of significance,

Table- IX
Distribution of respondents by type of depressive disorders

| Depressive disorders | Study group | | *p-value |
|----------------------|---------------------------------|---------------------------------|----------|
| | Group-A (n=96) Frequency (%) | Group-B (n=96) Frequency (%) | |
| MDD | 26 (27.1) | 8 (8.3) | p=0.001 |
| PDD | 15 (15.6) | 1 (1.0) | p<0.001 |

* χ^2 (Chi-square) test was employed to analyze the data. ($\chi^2=11.580$; $p=0.001$), ($\chi^2=13.354$; $p<0.001$).

Table-IX shows the distribution of respondents by types of depressive disorders. Major depressive disorder (MDD) was present in 26 COPD patients. Presence of MDD was statistically significant in COPD patients. Persistent depressive disorder (PDD) was present in 15 cases. There was also significant difference of presence of PDD in COPD patients than that of control subjects

Discussion

This cross sectional and comparative study was conducted to evaluate depressive disorders among COPD patients. 96 COPD patients were selected according to inclusion and exclusion criteria and categorized as COPD group (group-A) and age, sex matched 96 persons were studied as control group (group-B).

In this study, the mean age was 63.35 (SD \pm 6.68) years in COPD group; whereas in control group it was 61.90 (SD \pm 6.37) years which is almost similar ($p=0.123$). This result correlated with the study of Jorgensen¹¹ where mean age of male patients with COPD was 62.8 \pm 5.8 years. In some other studies like, Graat-Verboom¹² mean age was 65.6 (SE 0.4) years, Naghshin¹³, Van Menon¹⁴ found 69.34 \pm 9.47 years, Julian¹⁵, found 66.4 \pm 5.9 years which also support our result.

In this study male predominance was observed as both case and control group had 85 (88.5%) males. Male preponderance of COPD was reported in some other studies such as Dursun¹⁶, .91.3%, and Balcells¹⁷ 94%. But female preponderance of COPD was also reported in Ng⁷ 64.6%, Julian¹⁵ 60.1%, Katz¹⁸ 57.6%;

In this study, 91 (94.8%) respondents were smoker in COPD group and 57 (59.4%) in control group. Smoker were significantly more in COPD group than that of control group ($p<0.001$). Sijapati¹⁹ supports this result that 93 (93%)

patients with COPD were smokers. Balcells¹⁷ found that 99.4% of COPD patients were smoker (current or ex-smoker) and only 0.06% patients were never smoker. Julian¹⁵ found that 19.1% of COPD patients were current smoker and 79.3% of patients were ever smoker.

In this study, among 91 smoker patients, depressive disorders were present in only 39 (42.9%) responders. Smoking did not affect the depressive disorders in COPD ($p>0.05$). Prospective cohort studies show that depression predicts smoking initiation²⁰ and increases in smoking behavior²¹, and decreases in physical activity²². We did not find the association of smoking and the depressive disorders in COPD patients (p value). This may be due to inclusion of both current and ex-smoker in smoker group; as there are complex associations between nicotine dependence, depression and anxiety disorders, and smoking cessation²².

In the present study 34 (35.4%) patients were steroid user. Depressive disorders were present in 17 (50.0%) patients on steroid and 24 (38.7%) patients without steroid. Though steroid intake increased the rate of depressive disorders in COPD but did not reach the significant level ($p>0.05$).

In the current study depressive disorders were present in 9 (33.3%) patients with 1 to 5 years duration of COPD, 16 (40.0%) patients with 6 to 10 years duration of COPD and 23 (52.3%)

patients 11 to 15 years duration group. Though the rate of depressive disorders increased with duration of COPD but did not reach the level of significance ($p>0.05$). Depressive disorders increased with the duration of diseases may be due to with the progression of diseases process as patients become physically inactive, weak and breathing become more laborious with increased of diseases severity with time. Schneider²³ reported a longer lag time between the first COPD diagnosis. We also found increase rate of depression increased with COPD duration but difference was not significant may be due to small sample and method of screening and diagnosis of depression by DSM-5 criteria.

Depressive disorders were present in 1 (16.7%) patient of stage-II COPD, 17 (37.0%) patients of stage-III, and 23 (52.3%) patients of stage-IV COPD. Though the rate of depressive disorders increased with severity of COPD but was non-significant ($p>0.05$). There are reports indicating no relationship between lung function and depression^{24; 25}. Conversely, Van Mannen¹⁴ found the prevalence of depression to be 19.6% in patients with mild to moderate COPD, and 25.0% among patients with severe COPD suggesting an association between the severity of lung function and depression. Gudmandsson²⁵ reviewed the prevalence of depression and anxiety, using the HADS, in 79 in-patients with COPD, and found that those with more severe impairment in lung function had higher scores of depression and anxiety. Atlantis²², in a systematic review and meta-analysis showed that the increased burden of co-morbid depression in COPD likely rises with the degree of disease severity. Iguchi¹⁹ found that the prevalence of depression increased with BODE stage, being 12.5% (1/8) in stage I, 45.5% (5/11) in stage II, 38.2% (13/34) in stage III, and 75% (12/16) in stage IV ($P=.02$). In this study the rate of depressive disorders increased with severity of COPD but not significant may be due to small sample size, diagnosis of depression by CES-D scoring and followed by DSM-5.

This study showed that CES-D score was positive for depressive disorders in 47 (49.0%) patients in COPD group and in 11 (11.5%) respondents of control group. The difference between these two groups was significant ($p<0.001$). This result is

supported by Van Manen¹⁴. He also reported that among COPD patients attending the GP practitioner, depressive disorders were present in 25.0% based on CES-D scale and it reached 50% in moderate to severe stages of COPD.

In this study major depressive disorder (MDD) was present in 26 (27.1%) COPD patients and 8 (8.3%) respondents in control group. There was a significant difference of presence of major depressive disorder in COPD patients than that of control subjects ($p=0.001$). Persistent depressive disorder (PDD) was present in 15 (15.6%) COPD patients and was in 1 (1.0%) respondents of control group. There was a significant difference of presence of persistent depressive disorder in COPD patients than that of control subjects ($p<0.001$). Julian¹⁵ found that major depressive disorder (11.2%), minor depression (12.2%) and dysthymia (1.6%) among their COPD patients. Patten³ found major depressive disorder in 31 (24.8%) COPD patients and 914 (16.4%) control subjects, major depressive disorder was significantly higher in COPD patients than that of control subjects ($p=0.01$). Patients with COPD may have a spectrum of symptom severity ranging from short-term depressive symptoms to dysthymia to clinical depression. A few studies (Yohannes⁶; Kim²⁶), have reported that approximately two thirds of COPD patients with depression have from moderate-to-severe depression. In one study⁸, it was reported that approximately one fourth of COPD patients had unrecognized subclinical depression. Such patients commonly have a high burden of physical disability and are at risk for a major depression.

Conclusion

The results of this study showed that the proportion of depressive disorders is significantly higher in patients suffering from COPD than that of control subjects. Major depressive disorder and persistent depressive disorder are also significantly more frequent in patients of COPD. Thus the null hypothesis is rejected and alternate hypothesis (hypothesis of this study) is established. A liaison between medicine and psychiatry practice is essential for early detection and treatment of depression in patients suffering from COPD.

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