

Severity Assessment And Association Of Depression In COPD Patients With The Help Of HAM-D Scale And Spirometry In Nilgiris

¹Solomon Benny, ¹Khaleelu Rahman T.V, ¹Gowtham N, ¹Narenthiran C.K, ¹Sayoojya Rajeev Nair, ²Shefali Deo, ³Aishwarya Gowda MB, *Dr. Khayati Moudgil

¹Solomon Benny, PharmD Intern,

Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, The Nilgiris, Tamil Nadu, India-643001

¹Khaleelu Rahman T.V, PharmD Intern

Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, The Nilgiris, Tamil Nadu, India-643001

¹Gowtham N, PharmD Intern

Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, The Nilgiris, Tamil Nadu, India-643001

¹Narenthiran C.K, PharmD Intern

Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, The Nilgiris, Tamil Nadu, India-643001

¹Dr. Sayoojya Rajeev Nair, PharmD

Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, The Nilgiris, Tamil Nadu, India-643001

²Dr. Shefali Deo, PharmD

Trainee Executive

Life Cycle Management - Global Regulatory Affairs

Pfizer Healthcare India Pvt Limited

³Dr. Aishwarya Gowda MB, PharmD

Consultant regulatory specialist, GSK(GlaxoSmithKline) Bangalore, India

*Corresponding Author

Dr. Khayati Moudgil, BPharm, PharmD

Assistant Professor, Faculty of Health Sciences, School of Pharmacy, JSS Academy of Higher Education & Research, Mauritius

Abstract:

Psychological Co-morbidity like Depression comes with a considerable reduction in the quality of mental health and often goes underdiagnosed among COPD patients. Implementing screening tools like the HAM-D scale tailored to COPD assessment can help detect depressive thoughts in patients. A cross-sectional study was conducted for six months with purposive sampling in the Government headquarters hospital, Ooty.

Patients were included in the study based on inclusion and exclusion principles. All patients were confirmed with Spirometry, categorized into different stages of severity and subjected to depression assessment using the HAM-D scale. Data were tabulated and assessed for statistical significance. The statistical analysis was done for data collection and the degree of association was estimated using chi-square tests in SPSS (25th version) software. A higher number of samples belonged to the moderate COPD group (51). Of which 29.4% had severe Depression. 80% (eight out of ten) of severe COPD patients had severe depressive symptoms suggestive of increasing depression scores and progressing disease. P-value of significance ($p < 0.05$) was obtained for the severity of the illness, socioeconomic status, and duration of disease variables.

Early detection of mental disabilities like Depression is necessary for proper management and control of COPD. Attention is to be given to developing screening tools for examining depressive ideals during the disease and ensuring pulmonary rehabilitation for patients' well-being.

Key-words COPD, Spirometry, Depression, HAM-D Scale, Nilgiris

INTRODUCTION

COPD is an airway disorder usually caused by exposure to noxious particles or gases that effectuate airway and/or alveolar abnormalities (1). The global prevalence of the disease is 10.1%, but estimates vary between 7-19% (2). According to the WHO report, the Indian population has a 4-20 per cent incidence of COPD (3). Although it is difficult to prove the mechanism, lower socioeconomic status and deprivation correlate with respiratory diseases like COPD (4). Extra-pulmonary consequences of this respiratory ailment include cardiovascular disease, lung cancer and psychological co-morbidities like depression (5). Due to similar signs, it isn't easy to diagnose Depression in COPD patients (6)

MATERIALS AND METHODS

A cross-sectional study was conducted for six months in a Government headquarters hospital, Ooty, with purposive sampling, and patients were included in the study based on inclusion and exclusion principles.

Inclusion criteria:

- All patients diagnosed with Chronic Obstructive Pulmonary Disease; minimum six months
- Age group: between 20-60 years old
- Ward: General medicine – ICU&AE, Male Medical Ward, Female Medical ward.

- Smoker and Alcohol consumption patients
- Patients of all gender, community, and race.

Exclusion criteria:

- Pregnant and Lactating mothers
- Patients on anti-depressant therapy
- History of psychiatry illness

The institutional review board meeting was done and approved on 07-09-2019. IRB Approval ID: JSSCP/IRB/08/2019-20 and was approved for conducting the study. All patients who met inclusion criteria were explained about the study and the patient informed consent form was signed and documented in English and local language. Data collection forms are prepared with various social and demographic details. All patients were subjected to spirometry tests and categorized into different stages of severity.

The assessment of Depression was done using the HAM-D scale or HADRS (Hamilton Depression Rating Scale) Questionnaires. The scale consists of 21 evaluation elements, but only the first 17 were used for Depression. Every issue discusses another symptom or feature of Depression, including mood, feelings of guilt, suicidal ideation, insomnia, anxiety, and somatic symptoms.

Demographic variables (age of patients, Gender of patients), Personal factors influencing

Depression (Living status, marital status, Diet, Compliance, and Education), Social habits (Smoking, Alcohol, Type of smoking), Disease-related factors (Duration of diseases, the severity of disease) and socioeconomic status were collected and tabulated. Data is analyzed in the study against the prevalence of Depression. The statistical significance for the data collection and the degree of association was estimated using chi-square tests in SPSS (25th version) software. The association of Depression with continuous variables were assessed using Pearson's correlation analysis.

RESULTS

A significant association ($P < 0.05$) was observed for three out of 13 variables. Duration of disease, the severity of disease (COPD stages), and Socioeconomic status have a

considerable influence on advancing to comorbid Depression.

(1) Progressing Disease and Comorbid Depression

Three Stages of COPD were matched with various stages of Depression to get the total distribution of samples in each group. The higher number of samples belonged to the moderate COPD group (51) and of which 29.4% had severe Depression. Whereas patients belonging to severe COPD had 80% of them suffering from severe Depression. This indicates that the severity of Depression increases with the increasing severity of COPD.

As the sample density was more in the moderate disease group, all types of patients from normal, mild, moderate, severe, and very severe stages of Depression were found in this group, as shown in Figure 1.

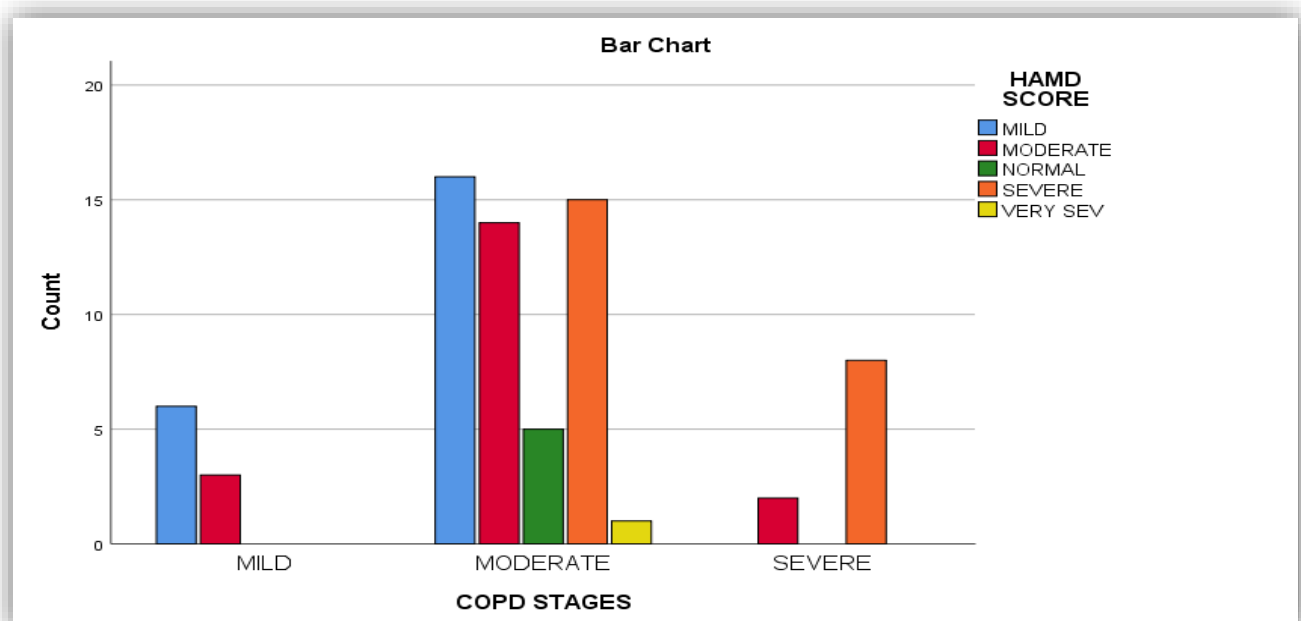


Fig 1: Bar Chart Representing COPD Patients with Depression

Sample who suffered mild lung obstruction were more commonly associated with mild

Depression. Similarly, there was no normal and mild depression among the severely diseased

group. This group of patients had a notable number of severe and moderate Depression. It is so assumed that a directly proportionate relationship exists between COPD and depression symptoms.

(2) Advancing Duration of Disease and Depression

Patient data were analysed by categorizing them into groups based on the duration of disease in years. Patients who developed disease six months to one year before the time

of sampling were scored as 1. Similarly, disease duration of 1-2 years, 2-3 years, 3-4 years, 4-5 years, and > 5 years were tagged as 2, 3, 4, 5, and 6 years respectively.

While there was a wider distribution of depressed patients in these groups, all the patients in the other groups with more years of disease showed moderate to severe Depression. As shown in the bar chart in Figure 2, more patients were likely to have a mild onset of Depression through the early years of developing COPD.

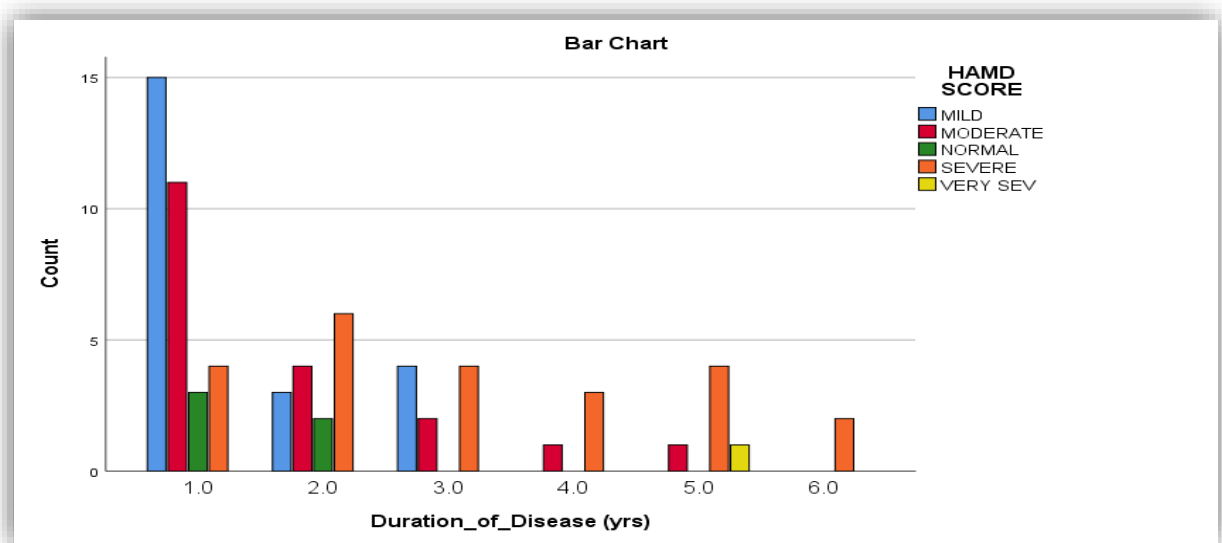


Fig 2: Distribution of COPD Patients with Depression Based on the Duration of Disease
However, as the disease duration advanced, patients ended up with moderate and severe signs of Depression. The chi-square test showed a significant association with a P-value of 0.032 between duration of disease and developing Depression.

Pearson's correlation analysis was done between the duration of illness and the individual HAM-D score. The correlation coefficient (r) obtained was 0.415. The two variables depict a positive correlation (As shown in Table 1)

Variable	Correlation Co-efficient	p-value
Duration of disease	0.415	p*= 0.000

P* < 0.001 at 99% Confidence Interval

Table 1: Pearson- Correlation Analysis of Duration of Disease

(3) Socioeconomic Background on Depression

The socioeconomic status of the patients was assessed for exploring the impact of financial and social background on the development of Depression. Patients were categorized into the upper, middle, working, and lower classes based on their education, occupation, social status, approximate income. The majority of

patients (42 of 65) with Depression come from a lower socioeconomic scenario. More predominantly, 58.5% of depressed patients belonged to the lower class, 18.5% were in the working class, and 11.5% were in the middle class, as shown in Figure 3.

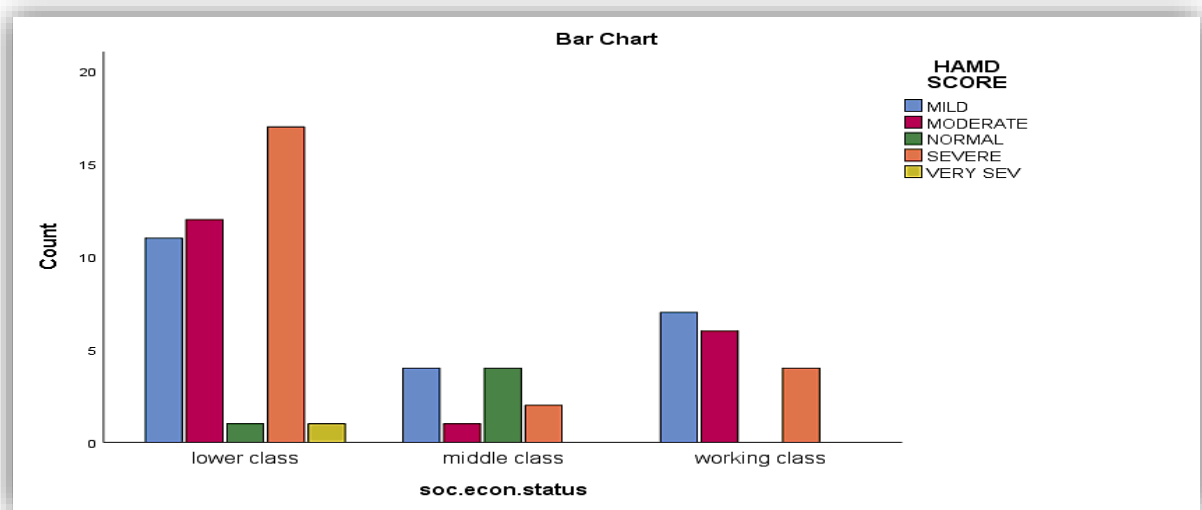


Fig 3: Distribution of Patients with Depression based on various Socioeconomic Status

More moderate and severely ill patients from Depression are seen in lower social class. The middle-class group had the highest number of normal depressive patients reflecting a lower probability of developing depressive symptoms

for people from the middle class. Therefore, results demonstrate an inversely proportional relationship of socioeconomic status with Depression. Whereas the summary of overall results has been depicted in Table 2.

Variables	Distribution of Patients without Depression (N=70)	Patients with Depression	Percentage of Patients with Depression	P-Value
-----------	--	--------------------------	--	---------

Age in years

25-35	1	0	1.42%	P = 0.355
36-45	11	2	12.85%	
46-55	34	3	44.28%	
56-65	24	0	34.28%	

Gender

Male	62	5	81.4%	P = 0.234
Female	8	0	11.42%	

Living status

Alone	13	2	15.7%	P = 0.117
With family	57	3	77.1%	

Marital status

Married	62	2	88.57%	P = 0.016
Unmarried	8	3	11.42%	

Diet

Non-vegetarian	59	4	77.14%	P = 0.886
Vegetarian	11	1	14.28%	

 Education

Illiterate	32	1	44.28%	
Primary	35	3	45.71%	P = 0.189
Secondary	3	1	2.8%	

Compliance

Regular	28	2	37.14%	P = 0.502
irregular	42	3	55.71%	

Smoking

Smoker	57	5	74.28%	P = 0.304
Non-smoker	13	0	18.57%	

Alcohol

Alcoholic	46	4	60%	P = 0.201
Non-alcoholic	24	1	32.8%	

Type of smoking

Cigarette	64	2	88.4%	P = 0.402
Beedi	6	3	4.2%	

Socio-economic status

Lower	42	1	58.5%	P = 0.031
Working	17	4	18.57%	
Middle	11	0	11.57%	

Duration of disease(yrs.)

0.5 – 1	33	3	42.8%	P = 0.032
1.1-2	15	2	18.5%	
2.1-3	10	0	14.3%	
3.1-4	4	0	5.7%	
4.1-5	6	0	8.57%	
5.1-10	2	0	2.85%	

COPD Stages (Based on Spirometry)

Normal	0	0	0%	P= 0.007
Mild	9	0	12.8%	
Moderate	51	5	65.7%	
Severe	10	0	14.3%	
Very severe	0	0	0%	

Table 2: Summary of Results

DISCUSSION

COPD remains to be a burdensome respiratory ailment where progression of the disease can be considered sometimes treatment-resistant. However, proper psychological support for comorbid depression and other mental illnesses helps patients to lead a good quality of life and less functional limitations. Despite findings revealing the connection between comorbid depression and COPD, the evaluation of this psychopathology among patients is still not properly established (7). Recognizing patients and screening using a valid mental health assessment scale helps early diagnosis of this associated disease.

Our analysis included a total of 70 patients with COPD. The patients recruited were of pure COPD, as comorbid conditions such as cardiovascular diseases, diabetes, etc., can also influence the depression level of the patient. Also excluded were other confounding variables such as geriatrics and patients already diagnosed with psychiatric disease.

All eligible COPD patients were confirmed with a spirometry test and categorized according to the FEV1 and FEV1/FVC ratio into Mild, Moderate, Severe, and Very Severe. All the readings were calculated in CONTEC SP10BT SPIROMETER, in which all demographic and related patient data can be connected and exported for easy software review. The data were collected for variables such as age, gender, smoking status, smoke type, alcoholism, living status, marital status, adherence and educational level, socioeconomic status, dietary habits, and disease duration. The socioeconomic status was determined depending on three factors; education level, occupation level, and income level.

Hamilton Depression Scale (HAM-D) was used to classify the depression level among the patients. According to this scale, the scores of 0-7, 8-13, 14-18, 19-22, and above 23 were

classified as normal, mild, moderate, severe, and very severe depression, respectively. 65 out of 70 have been found to have moderate to very extreme Depression, based on the study performed. Of these, five were normal, 22 were mild, 19 were moderate, 23 were severe, and one was very depressed. The statistical analysis was performed with the IBM SPSS version 25 program. Using Chi-square checks, the relation between the independent variables of the study with HAM-D score was evaluated.

Age and gender are possibly not the determinants of COPD depression because; COPD is a disorder of the elderly population and the sample population has a male predominance.

It was found that smoking status, type of smoke, alcoholism, living status, marital status, adherence and educational level, food habits, and HAM-D score were not significantly associated (P -value >0.05). But, for three variables with depression scores, an association was observed:

- Socioeconomic status and Depression had a statistically significant association with a p -value of 0.032.
- Duration of disease and positive correlation of HAM-D score ($p < 0.031$) ($R=0.415$);
- Correlation between disease severity and HAM-D scores ($p=0.017$).

There is considerable evidence that lower socioeconomic status (SES) measured by schooling, occupation, and income are correlated with a higher risk of Depression. It is clear from data that patients with lower socioeconomic backgrounds are more likely to experience Depression relative to middle-class individuals. This is due to the lack of adequate education, access to health facilities, and awareness that leads people to remain in the same unhealthy social habits like smoking, alcohol consumption, etc. However, it is also possible to have an association between

perceptions of their social status affecting the development of depressive symptoms. Self-esteem will reflect the relative position in the socio-economic structure of society. To the degree that people in low socioeconomic status blame themselves for their situation, the propensity for shame, a separate aspect of depressive disorder, may seem to exist. Life in the lower strata of socioeconomic status is more stressful, and stress is related to depressive disorder. That means that the COPD patient's socioeconomic status has an inversely proportional relationship to developing Depression. Higher educational achievement levels and having a socially accepted and respected occupation were found to have a negative association and with fewer chances of developing mental dissatisfaction. A higher education, better working conditions, and higher wages were correlated with lower chances of Depression.

Increased length of COPD disorder is a key factor in the development of related mental illness and co-morbidities. Reducing the ability of patients to perform physical activities on a day-to-day basis can ultimately lead to frustration, hopelessness, and the need for support. With this inability, these patients left to live constantly have a major say in developing depressive symptoms earlier. Health-related quality of life is the main factor undermined by a prolonged period of illness. Prolonged physical disease limitations will have a diminished quality of life. Thus, disease duration is an important factor contributing to widening the chances of Depression in patients with COPD.

Disease frequency in patients with COPD is a positive risk factor for Depression. Patients with moderate illness have minor difficulties, while patients with serious illness have extreme symptoms and disabilities due to developing depressive ideas. Based on this study data, it was understood that Depression in various stages was present in most COPD patients with moderate to severe illness. Thus, patients with severe disease have fastened to depression development.

Most likely, a patient with moderate to severe COPD has a high degree of disability that limits him to meet his daily needs and even deprives him of the most suitable daily living if he belongs to a lower-class family. This long-term view of oneself as unproductive is a major route for developing suicidal thoughts. In describing the burden of illness and psychological co-morbidities, this background is well adapted to the Nilgiris community as the majority belong to a lower socioeconomic status and work daily for a living. There are people with varying risk factor exposure levels, including tea dust or smoking, progressing to varying degrees of severity of COPD. Among them, the development of the condition is underdiagnosed and remains at risk of developing Depression.

COPD illness frequency has a directly proportional association with HAM-D ratings and Depression Levels. Early diagnosis and seriousness of the disorder are also essential to prevent them from experiencing psychiatric disorders such as depression.

CONCLUSION

After completing the study as per the procedure, we concluded that the prevalence of clinically relevant (moderate or severe) depressive symptoms in the Nilgiris population was high compared to other studies in COPD populations. Depression is a common co-morbidity of COPD. Of the 70 patients recruited for COPD, 65 patients suffered from moderate to very extreme depression, and five patients were without Depression. This shows that depression is very prevalent among the Nilgiris COPD populations and needs urgent medical attention.

An important correlation with HAM.D scores was observed for length of disease, disease severity, and socioeconomic status. The risk of Depression rises with increased disease duration and COPD frequency. Prolonged physical disease limitations will have diminished quality of life. As the degree of disease severity increased, the depression scores obtained explaining a direct association

between COPD stages and Depression were greater. The patient's social status also played a part in developing Depression. Higher socioeconomic status had a higher likelihood of COPD disease development and depressive symptoms, suggesting an inverse proportionate relationship between them.

Early detection of a patient's disease is vital for preventing worse clinical outcomes. However, the spirometry test is underused, and patients with COPD are undiagnosed in Nilgiris, leading to late intervention to the disease's progression. A need for greater attention amongst them to psychological co-morbidities, especially Depression. Patients with regular exacerbations and decreased physical activity rates should be tested for Depression.

Conflict of interest

The authors declare none.

Funding

We are extremely grateful to the JSS Academy of Higher Education and Research for providing us with a grant to carry out this project. (REG/DIR(R)/URG/54/2011-2012/5494)

Acknowledgement

We acknowledge the staff of Government Headquarters Hospital, Ooty. Their cooperation will be highly acknowledged.

REFERENCE

1. Johns DP, Walters JA, Walters EH. Diagnosis and early detection of COPD using Spirometry. *J Thorac Dis.* 2014; 6(11):1557-1569.
2. Koul PA. Chronic obstructive pulmonary disease: Indian guidelines and the road ahead. *Lung India.* 2013; 30(3):175-177.
3. Sharifi, Hooman et al. "Interim Report from Burden of Obstructive Lung Disease (BOLD Study) in Tehran: Prevalence and Risk Factors of Chronic Obstructive Pulmonary Disease." *Tanaffos* vol. 13, 3 (2014): 6-13.
4. Agarwal A, Bart S, Prasad R, Verme A, Jilani AQ, Kant S. A study on the prevalence of Depression and the severity of Depression in patients of chronic obstructive pulmonary disease in a semi-urban Indian population. *Monaldi Arch Chest Dis.* 2018 Mar 19; 88(1):902.
5. Kurt B Stage, Thomas Middelboe, Tore B Stage, Claus H Sorensen. Depression in COPD – management, and quality of life considerations. *International Journal of COPD.* 2006;1(3) 315–320.
6. Alfredo Chetta; Dario Olivieri. The COPD Assessment Test in the Evaluation of Chronic Obstructive Pulmonary Disease Exacerbations. *Expert Rev Resp Med.* 2012;6(4):373-375
7. Grover S, Dutt A, Avasthi A. An overview of Indian research in Depression. *Indian J Psychiatry* 2010;52, Suppl S3:178-88