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Evaluation of Quality of Life and Neuropsychiatric Symptoms in Patients with Chronic Obstructive Pulmonary Disease

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Abstract:
Introduction: *Chronic obstructive pulmonary disease (COPD) is a partially reversible disease associated with airflow limitation. Long standing COPD patients exhibit comorbidities and neuropsychological symptoms.*
Aims and Objectives: *To assess the neuropsychiatric symptoms in COPD patients using PGI Memory scale and symptom check list 80 and quality of life in using SGRQ questionnaire.*
Materials and Methods: *A total of 200 COPD patients defined as per GOLD guidelines and 50 healthy individuals will be subjected to PGI memory scale and symptom check list 80 and SGRQ questionnaire. The data obtained was statistically analyzed using Pearson correlation analysis.*
Results: *There was significant difference regarding parameters of PGI memory scale, symptoms check list 80 and SGRQ questionnaire. Also there was significant difference in COPD patients with or without neurocognitive impairment.*
Conclusion: *Neuropsychological symptoms and quality of life should be evaluated at both initiation and at various follow ups. By applying appropriate screening methods affected patient may be detected at the early stage of disease and the progression of disease and resultant drop in quality of life may be prevented by using effective therapeutic methods*

I. Introduction

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality throughout the world. It is the fourth leading cause of death. It is ranked twelveth as a burden of disease in a study by the World Bank and WHO in 1990.[1] According to the Global Burden of Disease Study, it results in 1.68 years of living with disability (YLD) per 1,000 population representing 1.8% of all YLDs, with a greater burden in men than in women (1.93% vs. 1.42%). COPD is a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases.[1] The diagnosis of COPD is based upon spirometry. The presence of a post bronchodilator forced expiratory volume in 1st second (FEV_1) < 80% of the predicted value in combination with ratio of FEV_1 and forced vital capacity (FEV_1/FVC) < 70% confirms the presence of airflow limitation that is not fully reversible.[1]

COPD arises from an interaction between the host factors and environmental exposures. Worldwide tobacco smoking is the most commonly encountered risk factor.[2] Exposure from passive smoking, termed as environmental tobacco smoke (ETS) exposure may also play a contributory role especially in non-smoker individuals including women.[3,4] Weight loss, cachexia, osteoporosis, chronic anaemia, cardiovascular disorders, peripheral neuropathy, motor neuron involvement and encephalopathy have been described in these patients. Because of these associated comorbidities the quality of life is deteriorated in the COPD patients. High degree of the associated comorbidities is assessed by poor quality of life score and psychiatric treatment may improve not only psychiatric status but also quality of life.

In spite of the observation between neuropsychiatric symptoms in COPD and their impact on quality of life only few isolated studies have assessed neuropsychiatric manifestation in COPD patients and their impact on quality of life.

The present study is planned to evaluate neuropsychiatric symptoms in COPD patients using **PGI Memory scale** and **symptom check list-80** as well as to assess quality of life in patients with COPD by using **SGRQ questionnaire** and to assess the extent to which quality of life in COPD is affected.

II. Aims and Objectives

1. To assess neuropsychiatric symptoms in COPD patients using PGI Memory scale and symptom check list 80.
2. To assess quality of life in COPD patients using SGRQ questionnaire

III. Material and Methods

The present study was conducted in the Department of Tuberculosis and Respiratory Medicine in collaboration with Department of Psychiatry, Pt. B.D. Sharma PGIMS, University of Health Sciences, Rohtak.

A total of 200 COPD patients defined as per GOLD guidelines and 50 healthy individuals were taken for the study. Patients were selected from those indoor and outdoor in the department. The selection of the cases was done based on computer aided randomization. An explicit written consent was taken from each patient.

Inclusion criteria

- Age ≥40 years
- Smoking history >20 pack years

Exclusion criteria

1. Clinical manifestation of any neurological disease.
2. History of any coexisting respiratory disease
3. Any other medical or surgical illness
4. Patient not willing to provide consent

After relevant history and clinical examination, Spirometry was done in each patient and on the next day each patient was subjected to the following questionnaire.

- Symptom Check List-80[5]
- St.George Respiratory Questionnaire[6]
- PGI Memory Scale[7]

Smoking Pack Years:

Smoking pack years were calculated from mode of smoking (bidi, cigarette or hooka), daily consumption and total years smoked. One pack year was 20 cigarettes smoked /day for one year. For bidi, cigarette equivalents were calculated by applying a weight of 0.5 to bidisand for hooka, 12.5g of loose tobacco was equivalent to one packet of 20 cigarettes. After evaluating quality of life neuropsychiatric symptoms were evaluated using symptom check list-80 and PGI memory scale

Statistical Analysis:

The data obtained was statistically analyzed using Pearson correlation analysis. The findings of (a) PGI Memory Scale (b) Symptom Check List-80 (c) St.George Respiratory Questionnaire were correlated with patient characteristics including age, duration of illness, quantum of smoking, occupation of patient, education status Multiple regression analysis was used to assess factors affecting quality of life.

Table 1: Characteristics of subjects in COPD group and healthy volunteers group

	COPD group Mean±S.D.	Healthy volunteers group Mean±S.D.	p-value
Age (year)	61.37±7.4	59.76±.7.21	0.08
Ht (in meter)	1.67±.0.06	1.68±0.05	.241
Wt(kg)	56.5±9.3	65.58±4.1	<0.001*
Respiratory rate	22.80±2.6	14.52±1.8	<0.001*

Table II: Distribution of COPD patients and healthy volunteers according to occupation

	COPD group	Control group	p-value
Unskilled	108(54%)	28(56%)	p>0.05
Semi Skilled	79(39.5)	19(38%)	
Skilled	13(6.5%)	3(6%)	

Table III: Distribution of COPD patients according to mode of smoking

MODE	COPD group(n=200)
Bidi	97(48.5%)
Bidi Hooka	69(34.5%)
Hooka	24(12%)
Cigarette	10(5%)

Table IV: Distribution of COPD patients and healthy volunteers according to their educational status

Educational status	COPD group	Healthy volunteers group
Illiterate	15(7.5%)	4(8%)
Primary	18(9%)	4(8%)
Middle	120(60%)	30(60%)
Matric	22(11%)	5(10%)
Senior secondary	22(11%)	6(12%)
Graduate	3(1.5%)	1(2%)

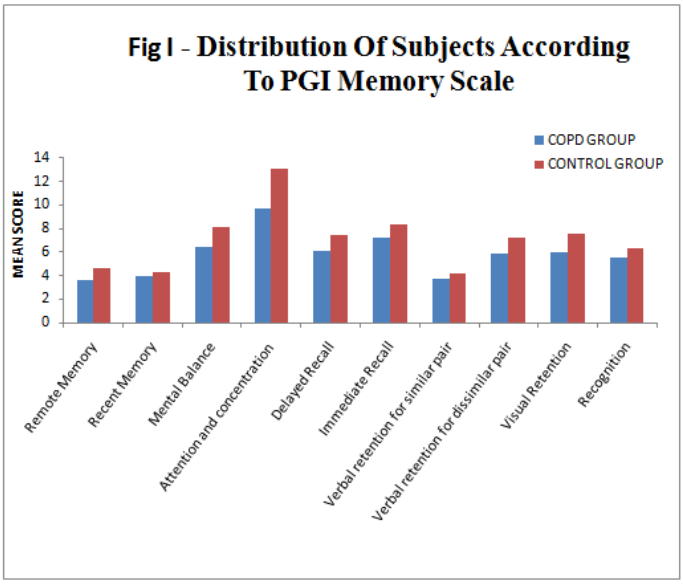
Fig I - Distribution Of Subjects According To PGI Memory Scale
COPD GROUP
CONTROL GROUP
MEAN SCORE
0
2
4
6
8
10
12
14
Remote Memory
Recent Memory
Mental Balance
Attention and concentration
Delayed Recall
Immediate Recall
Verbal retention for similar pair
Verbal retention for dissimilar pair
Visual Retention
Recognition

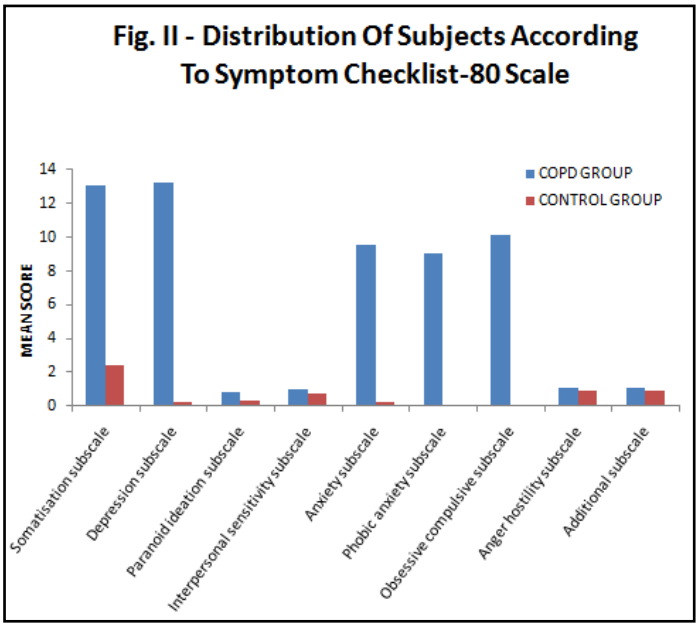
Fig. II - Distribution Of Subjects According To Symptom Checklist-80 Scale
COPD GROUP
CONTROL GROUP
MEAN SCORE
0
2
4
6
8
10
12
14
Somatisation subscale
Depression subscale
Paranoid ideation subscale
Interpersonal sensitivity subscale
Anxiety subscale
Phobic anxiety subscale
Obsessive compulsive subscale
Anger hostility subscale
Additional subscale

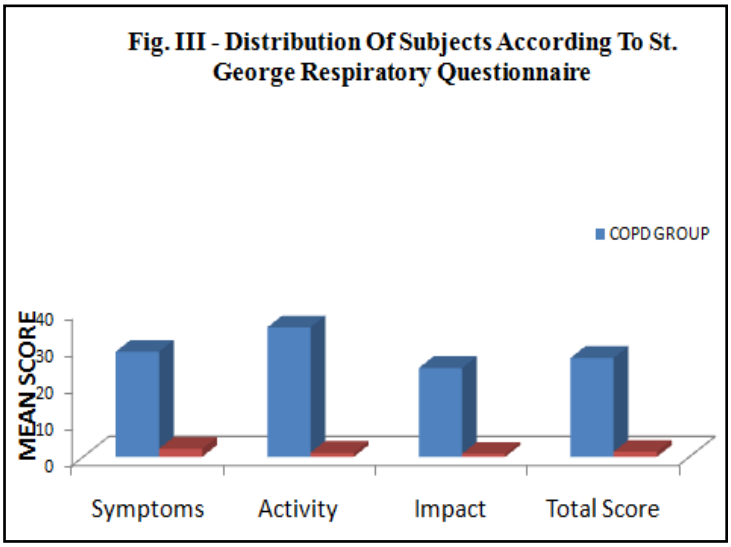
Fig. III - Distribution Of Subjects According To St. George Respiratory Questionnaire
COPD GROUP
MEAN SCORE
0
10
20
30
40
Symptoms
Activity
Impact
Total Score

Table V: Incidence of Abnormalities* In Pgi Memory Scale Parameter in Patients with COPD

PGI MEMORY SUBSCALE	No. of abnormalities(%ages)
Remote Memory	109(54.5%)
Recent Memory	0(0%)
Mental Balance	54(27%)
Attentation	112(56%)
Delayed Recall	50(25%)
Immediate Recall	53(26.5%)
Verbal retention for similar Pair	75(37.5%)
Verbal retention for dissimilar Pair	38(19%)
Visual retention	113(56.5%)
Recognition	45(22.5%)
Total PGI MEMORY score	105(52.5%)

TABLE VI: Incidence of Abnormalities* In Symptom Check List-80''components In Patients with COPD

SCL-80 SUBSCALE	No. of abnormalities(% ages)
Somatisation subscale	120 (60%)
Depression subscale	90 (45%)
Paranoid ideation subscale	35 (17.5%)
Interpersonal sensitivity subscale	19 (9.5%)
Anxiety subscale	86 (43%)
Phobic anxiety subscale	106 (53%)
Obsessive compulsive subscale	157 (78.5%)
Anger hostility subscale	6 (3%)
Additional subscale	6 (3%)
Total SCL-80 score	138 (69%)

TABLE VII: Distribution of COPD patients with and without neurocognitive impairment and their characteristics

	COPD patients with neurocognitive impairment(N=105)	COPD patients without neurocognitive impairment(N=95)	p-value
Age (year)	64.75+7.47	57.78+5.31	<0.001*
Period of illness (year)	10.48+2.88	4.36+1.71	<0.001*
Pack year	42.6+11.51	23.43+4.18	<0.001*
Distance walked in 6 minute (meter)	153.7±21.2	204.5±24.6	<0.001*
MMRC score	2.13+0.59	1.22+0.44	<0.001*
FEV1 (litre/min)	1.11±0.23	1.56±0.34	<0.001*
BMI	19.02±1.36	19.31±1.27	>0.05

IV. Discussion

In the present study both groups were comparable regarding age, height, occupation and educational status. A significant difference was found in weight and respiratory rate between both the groups (Table I-III). Mode of smoking in COPD patients was bidi, hooka, bidi-hooka, cigarette (Table IV).

Cognitive evaluation showed the presence of significant abnormality in the COPD group as compared to control where a variation of ± 3 SD from the control value was taken as abnormal (99^{th} percentile). We found impairment in Remote Memory, Mental Balance , Attention, Delayed recall , immediate Recall , verbal retention for similar pair, verbal retention for dissimilar pair, recognition (Figure I). Only a few studies have reported in the frequency and type of cognitive impairment in COPD patients. In a similar study by Ozge C et al[8] 64% of patients with COPD showed abnormality in MMSE, predominantly in memory, construction, attention, language and orientation domain. Chronic hypoxemia, chronic hypercapnia, decreased cerebral metabolism in the parietal white matter of brain, decreased cerebral perfusion and abnormality in cerebral membrane phospholipids have been suggested as possibly being associated with cognitive decline in COPD patients. Our study is consistent with the study carried by Hung et al[9] who assessed that mean cognition score and concluded that even after multivariable adjustment mean score of adults with severe COPD remained lower ($p<0.001$), whereas mean score of adults with non-severe COPD was no longer different when compared with adults without COPD ($p=0.39$). Inclazzi et al[10] found faster cognitive decline in the presence of severe bronchial obstruction and parallels the worsening of affective status in COPD patients on oxygen therapy.

In our study COPD patients having neurocognitive impairment had statistically significant difference in age, duration of illness, pack year of smoking and more severity of disease as evidenced from decrease in FEV_1 (litre/minute), increased MMRC dyspnea score and decreased 6 minute walking distance from the COPD patients without having neurocognitive impairment (Table VII). In COPD patients cognitive abilities are necessary to remain adherent to complex medication regimens such as inhalers and oxygen and to manage other chronic disease often associated with COPD. Patients with cognitive difficulties if undetected and untreated

have lower adherence to treatment and follow up regimens and as a consequence may deteriorate more rapidly and have worse health outcome.

The negative impact of COPD can be further complicated by the widespread presence of psychological co-morbidity in COPD patients**.** In the present study psychological evaluation was done using SYMPTOM CHECKLIST-80. T-test revealed statistically significant increase in the mean score of Depression Subscale (13.22 ± 8.9), Somatization Subscale (13.04 ± 7.8), Paranoid Ideation Subscale (0.82 ± 0.77), Anxiety Subscale (9.64 ± 7.31), Phobic Anxiety Subscale (9.14 ± 6.18), Obsessive Compulsive Subscale (10.18 ± 6.9) and total score (59.94 ± 37.3) in COPD patients as compared to healthy volunteers (Figure II) indicating possible diffuse psychological impairment in the COPD patients. Previous studies by Aghanwa et al[11], Aydin et al[12] and Dowson et al[13] had reported prevalence of anxiety among patients with COPD varies from 10% to more than 50% .

Dyspnea is the commonest disabling symptom experienced by COPD patients who described such episode being associated with anxious feeling. Anxiety in turn heightens the sensation of dyspnea. It therefore appears as complex interrelationship between dyspnea and anxiety which contributes to the increased prevalence of anxiety related disorders in COPD.

In our study 45% patients had depressive symptoms in COPD group and it was consistent with previous studies which had reported prevalence of depression among patients with COPD varies from 10% to >50%.[10,11,14] which can be partly attributed to the use of different measures for depression and difference in patients chracterstics. Lacasse Y et al[15] demonstrated that patients of COPD on long term oxygen therapy developed significant depressive symptoms. In addition to depression and anxiety, COPD patients also showed impairment in somatization (60%), paranoid ideation (17.5%), obsessive compulsive (78.5%), anger hostility and interpersonal sensitivity (9.5%) (Table VI). Psychological symptoms are more common in COPD patients and chronic hypoxemia, chronic hypercapnia, severe dyspnea, associated comorbidities, loneliness, physical disability from the disease, poor quality of life, and dependence on long term oxygen therapy might be the cause of these symptoms in COPD patients.

Another variant in our study was to assess the quality of life using St. George respiratory questionnaire. T test revealed a statistically significant increase in the mean score of symptoms (28± 8.3), activity (35.4±10.2), impact (24.3±7.6), and total score (27.0±8.6) in COPD patients as compared to healthy volunteers indicating that quality of life was impaired in COPD patients. Okubadzo et al[16] and Alvarezmon et al[17] in their studies evaluated the quality of life through SGRQ questionnaire and reported a score of 55.3±18.2 and 37.5±17.5 respectively revelaing an unpleasant quality of life in COPD patients. On the other hand Ferrer and colleagues[18] stated that COPD was one of the factor responsible for decreasing the quality of life in COPD patients. Inclazzi et al[19] observed that with severity of disease quality of life gets worsened. Simon and colleagues observed a linear correlation between SGRQ total score and stage of the COPD.[20]

Impairment of quality of life might be due to inability of patients to change their life style to control the sign and symptoms of disease. Their lack of knowledge regarding rehabilitation programme and high cost of health care services might be the other cause of impaired quality of life in these patients. In our study quality of life in term of impact subscale was also low and that might be due to the fact that COPD despite its physical impact also affect social and mental status of patients. Hizaro et al[21] found that factors like severity of disease, associated anxiety and depression were linked with poor quality of life.

V. Conclusion

Quality of life is impaired in COPD patients and activity component is most affected compared to symptom and impact component. So it is recommended that quality of life should be evaluated at both initiation and at various follow ups. By applying appropriate screening methods affected patient may be detected at the early stage of disease and the progression of disease and resultant drop in quality of life may be prevented by using effective therapeutic methods (rehabilitation programmes, emotional and mental support) and educating the patients with regard to change in their lifestyle (quitting smoking).

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