www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i11.27

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Article

Correlation between quality of sleep, depression, BODE Index and quality of life in COPD patients

Authors
Dr Aqsa Mujeeb (PT), Dr Shambhovi Mitra (PT), Dr Rajnish Gupta
Corresponding Author
Aqsa Mujeeb
Warsi Appt, Plot No 458, Flat No 102, Zakir Nagar (West), New Delhi – 110025
Email: *aqsa.mujeeb@gmail.com*

Abstract

Background: *One of the least studied symptoms of Chronic Obstructive pulmonary disease (COPD) are quality of sleep and Obstructive Sleep Apnea(OSA). The aim of this study was to find the correlations between qualities of sleep, depression, BODE Index and quality of life in COPD patients.*

Materials and Methods: *52 stable COPD patients were recruited according to GOLD 2013 guidelines as per the inclusion and exclusion criteria. Hindi versions of four questionnaires were administered - The Pittsburgh Sleep Quality Index (PSQI), Patient Health Questionnaire 9 (PHQ 9) and the St. George Respiratory questionnaire (SGRQ) and the patients were assessed for quality of sleep, depression and quality of life respectively. 6 minute walk tests and Pulmonary function tests was performed as per American Thoracic Society (ATS) guidelines.*

Results: *In the sample of 52 patients there were 43 males and 9 females, with mean age 57.01(+/-9.27). All patients had affected quality of sleep and 5.76% indicative of OSA. There were significant correlations between the Pittsburgh Sleep Quality Index. Patient Health Questionnaire 9, the St. George Respiratory questionnaire and BODE Index (p value < or = 0.05).*

Conclusion: *The prevalence of affected quality of sleep is high in COPD and there is a significant correlation between quality of sleep, depression, BODE Index and quality of life in COPD patients.*

Introduction

Around the world, Chronic Obstructive Pulmonary Disease (COPD) is one of the leading causes of morbidity and mortality. In COPD, nocturnal symptoms and symptomatic sleep disturbances are quite common, available epidemiological data shows that it may exceed upto 75%, in patients with COPD.[1] Indian study done by Sajal De on 40 patients also reported all COPD patients having affected quality of sleep.[2] Currently, there is a paucity of data on sleep disturbances, circadian variation in lung functions and comorbid conditions and their relationships in COPD. In this study with the help of Hindi versions of some questionnaires (The Pittsburgh Sleep Quality Index, The Epworth sleepiness scale, Patient health questionnaire 9 and St. George Respiratory Questionnaire) [3,4,5] various factors (sleep, depression, BODE Index and quality of life) have been studied and correlated to find any relation among them.

Material and Methods

This correlation study was done on 52 patients in Delhi, India, with convenient sampling being the sampling method. Patients with stable diagnosed COPD with post bronchodilator FEV_1/ FVC < 0.70. (As per GOLD criteria 2013), patients able to read and understand Hindi and Patient able to ambulate independently were included in the study. Any patient with acute exacerbation in less than 4 weeks duration with any prescribed changes in medication, any diagnosed neurological, psychological, musculoskeletal, cognitive impairment, any diagnosed co morbidity like malignancy, diabetes mellitus, cardiovascular or any other pulmonary disease and patient on domiciliary oxygen supplementation, New York heart association grade IV dyspnea, uncontrolled hypertension,[6] Body mass index more than 30 kg/m^2, Neck circumference of more than 17 inches for men and 16 inches for women, patients on sedatives or anti depressants[7,8] were in the exclusion criteria. After recruiting the patient pulmonary function tests were done according to ATS guidelines. Then dyspnea was assessed according to MMRC. Patients were then asked to fill the Pittsburgh Sleep Quality Index, The Epworth sleepiness scale, Patient health questionnaire 9 and St. George Respiratory Questionnaire and then lastly 6 minute walk distance test was performed according to ATS guidelines.

Data analysis

IBM SPSS Statistics 20 was used for analyzing the data. All the continuous variables were presented as mean +/- SD, and Bivariate relationships between the variables was calculated using Spearmen Rank Correlation Coefficient. A p value of less than or equal to 0.05 was considered significant.

Results

In this study 52 patients were recruited with the mean age of the sample being 57.01(+/- 9.07) and BMI 19.60 (+/- 3.98). All had a positive history of exposure to smoke in some form. The sample had 10 moderate, 23 severe and 19 very severe COPD as per GOLD guidelines 2013. The quality of sleep was assessed using the PSQI and 38 patients had a score of more than 5 which have a significant correlation with diagnosed sleep disorders. The prevalence of daytime sleepiness was calculated as the score of Epworth Sleepiness scale and the results were distributed in various categories. Out of 52 patients 32 were normal, 6 had average sleepiness, 11 were very sleepy and 3 had score of above 16 which can be correlated and is highly indicative of OSA.

Correlations of Global PSQI

variable	r value	p value
BODE Index	0.34	**0.01***
BMI	-0.02	0.83
MMRC	0.42	**0.00***
6 minute distance	-0.25	0.06
ESS	0.50	**0.00***
PHQ 9	0.53	**0.00***
Total SGRQ	0.53	**0.00***

(*significant correlations)

Correlations of the Epworth sleepiness scale

Variables	r value	p value
BODE Index	0.39	**0.00***
BMI	0.02	0.83
MMRC	0.34	**0.01***
6 minute walk distance	-0.35	**0.01***
PHQ 9	0.58	**0.00***
Total SGRQ	0.47	**0.00***
PSQI	0.50	**0.00***

(*significant correlations)

Correlation of Total SGRQ

Variables	r value	p value
BODE Index	0.62	**0.00***
BMI	0.17	0.21
MMRC	0.56	**0.00***
6 minute walk distance	-0.54	**0.00***
ESS	0.47	**0.00***
PHQ 9	0.65	**0.00***
Global PSQI	0.53	**0.00***

(*significant correlations)

Correlations of PHQ 9: 66.37% patients were suffering from mild to moderately severe depression.

Variables	r value	p value
BODE Index	0.48	**0.00***
BMI	0.03	0.82
MMRC	0.84	**0.01***
6 minute walk distance	-0.46	**0.00***
ESS	0.58	**0.00***
Total SGRQ	0.65	**0.00***
Global PSQI	0.53	**0.00***

(*significant correlations)

Discussion

This study was done on 52 COPD patients, out of which 43 were males. Number of male patients were more maybe because COPD is more common in males rather than females[1], although convenient sampling was done and no bias was there for male patients. Out of 52, 48 patients had a positive smoking history and remaining 4 had exposure to bio fuels for more than 10 years. Female patients were mainly hookah smokers or were exposed to bio fuels smoke for many years. Therefore, all patients had a positive history to smoke exposure. In all the patients none of the patients were in mild category of COPD as per GOLD guidelines.

Quality of sleep in COPD

In 2006, a study was done by Foteini Karachaliou et al, that gave the prevalence of sleep related symptoms in primary care population. There were 1501 patients and it reported that there is increased possibility of OSAS – related symptoms in COPD in contrast to asthma, and it also suggested that COPD is the largest group that should be considered for screening of OSAS in primary care.[9] In a study done on 59 patients, Lewis et al found that 61% people had poor quality of sleep.[10] Nunes et al observed 71% of patients with COPD having affected sleep quality. [11] In India, study done by Sajal De, assessed the quality of sleep in 40 COPD patients and found all the patients having affected quality of sleep.[2] The present study gives a prevalence of 73.05% COPD patients having affected quality of sleep with a global PSQI score of more than 5. Daytime sleepiness was also found in 26.91% of patients with 5.76% patients having an Epworth sleepiness scale score of more than 16, indicative of obstructive sleep apnea.

Correlations of the Pittsburgh Sleep Quality Index and its subcomponents with various variables

A weak, positive, significant correlation was observed between quality of sleep assessed by PSQI and BODE Score (r = 0.34, p = 0.01), showing that with increase in effect on quality of sleep there is an increased risk of death in COPD patients possible reason could be because with increasing BODE Index the symptoms of patients also increases and with deteriorating condition of the patient the sleep quality may get reduced. BMI when correlated with the global PSQI then a weak, negative, non significant correlation was found. This could be because earlier literature supports the prevalence of sleep problems and OSA in obese patients.[7,8] BMI is not sensitive to measure lean body mass and the sample was taken of non obese group, thus BMI was not sensitive to establish a correlation between sleep quality and body composition.

When MMRC was correlated with Global PSQI, a significant positive correlation was observed (r = 0.42, p = 0.00). This may be due to the fact that with increasing levels of dyspnea there can be a deterioration of respiratory conditions, which can lead to increased upper tract obstruction. Moreover it is proven that oxygen saturation is lower in COPD patients during night which may be affecting the quality of sleep.(1) The Global PSQI could not be correlated significantly with the 6 minute walk distance (r = -0.25,p = 0.06), but a weak negative correlation was there. This could be because more the quality of sleep is affected the daytime activities of the patients get affected. The energy levels are low and daytime dysfunction is common in those patients as in OSA. But a significant correlation could not be established may be because of the small sample size. ESS Score had a moderate, positive significant correlation with Global PSQI (r = 0.50, p = 0.00). this correlation can be because with increasing night time sleep problems there is a increased daytime dysfunction. In OSA there is affected sleep in night because of the apnea episodes and daytime sleepiness is a major symptom of the disease therefore having a related pathophysiology. PHQ 9 also correlated well with Global PSQI (r = 0.53, p = 0.00), giving a moderate positive significant correlation, which is proven in earlier researches. (2) Total SGRQ also correlated significantly with Global PSQI (r =

0.53, p = 0.00), which is a moderate positive significant correlation, which could be because with affected quality of sleep there is a reduced quality of life as quality of life instrument holistically reviews all spheres of life. [12]

The first component of PSQI which is subjective sleep quality was correlated with various variables. When correlated with BODE Index there was a weak positive significant correlation (r = 0.33, p = 0.01). When correlated with BMI there was a very weak, negative non significant correlation. With MMRC there was a significant weak positive correlation (r = 0.37, p = 0.00). With 6 minute walk distance there was a weak negative non significant correlation. It correlated significantly with the ESS Score (r = 0.53, p = 0.00), which is moderate positive and significant, showing that with increase in affected quality of sleep daytime sleepiness also increases. With PHQ9 there was a strong positive significant correlation (r = 0.60, p = 0.00), which indicates that with increasing depression there is deteriorated quality of sleep which is in accordance with the previous literature.[2] Total SGRQ Score was correlated with subjective sleep quality and the results were significant (r = 0.59, p = 0.00) giving a moderate positive correlation, suggesting that with increasing affected quality of sleep there is an increased effect on the quality of life in COPD patients.

The second component of PSQI had a weak positive but non significant correlation with BODE Index (r = 0.25,p = 0.06), the correlation could have been non significant because the sleep latency was filled by the patients subjectively and for exact values polysomnography is required. With BMI(r = -0.06, p = 0.64) there was a very weak, negative non significant correlation was found. With MMRC there was a weak positive significant correlation (r = 0.31, p = 0.02) which implies that with increasing levels of dyspnea there is an increase in sleep latency. When correlated with 6 minute walk distance there was a very weak negative non significant correlation (r = -0.13, p = 0.33). With ESS there was a weak positive non significant correlation (r = 0.26, p = 0.05), the result could be non significant because of the subjectivity in the values of sleep latency. With PHQ 9 there was a moderate positive significant correlation found (r = 0.45, p = 0.00). with total SGRQ scores there was a positive moderately significant correlation (r = 0.43, p = 0.00).

The third component of PSQI which is sleep duration, could not be correlated with any of the variables. When correlated with BODE Index gave a very weak positive non significant correlation, the relation could be non significant may be because sleep duration was asked by the patients and they gave number of hours subjectively but o get the exact sleep duration we need the time of sleep excluding even the arousal for minimal time also and this can be calculated only by a sleep study which was not done and hence the statistical significance was not proven. When correlated with BMI there was a very weak, positive non significant correlation. With MMRC there was a weak positive non significant correlation. A very weak non significant negative correlation was found with 6 minute walk distance. With ESS, PHQ 9 and Total SGRQ there were weak positive non significant correlations.

Correlations of the Epworth Sleepiness Scale Score

The Epworth Sleepiness scale have a weak positive significant correlation with the BODE Score (r = 0.39, p = 0.00) showing that with increasing daytime sleepiness, which is prevalent in COPD there is an increased risk of death. This could be explained by the fact that, obstructive sleep apnea syndrome significantly increases the risk of stroke or death from any cause, and the increase is independent of other risk factors, including hypertension.[13] There was a very weak, positive non significant correlation with BMI (r = 0.02, p = 0.83). The reason for this being non significant could be that Obstructive Sleep apnea obesity is one of the major risk factors thus BMI may not be correlated significantly. A weak, positive significant correlation of ESS with MMRC (r = 0.34, p = 0.01). As dyspnea can be

because of hyperventilation, hypoxia or hypercapnia or even with psychological factors which are also a cause of OSA, can be the reasons of this correlation. Its correlation with the 6 minute walk distance (r = - 0.35, p value = 0.01), which was weak negative and significant. PHQ 9 also had a moderate positive significant correlation with ESS (r = 0.58, p = 0.00) signifying that with increasing depression there is increased daytime sleepiness. It was known from earlier studies that depression has a effect on quality of sleep. Global PSQI and ESS Scores (r = 0.50, p = 0.00) correlated well giving a moderate positive significant correlation which can be simply understood as the fact that a person having poor sleep quality can have daytime sleepiness. While in COPD apart from the normal cause like lack of energy there is an existing respiratory pathology which may lead to daytime sleepiness. SGRQ correlated significantly with ESS (r = 0.47, p = 0.00) having a moderate positive correlation, suggesting that daytime sleepiness increases with deteriorating quality of life of COPD patients. As proven in literature that obstructive sleep apnea may lead to affected quality of life.[14]

Correlations of the St. George Respiratory questionnaire

Total SGRQ scores used for assessing the quality of life of COPD patients had a strong positive significant correlations with BODE Score (r = 0.62, p = 0.00) shows that quality of life of the patients get deteriorated with increasing BODE score which is in accordance with the existing literature. [15,16] When correlated with BMI (r = 0.17, p = 0.21) there was a very weak, positive but non significant correlation. The correlation could be because due to the pathology there is a reduced BMI in patients with COPD has shown that weight loss is common in chronic obstructive pulmonary disease and is an independent risk factor for all cause mortality. In addition, weight gain seems to have a protective effect in under and normal-weight subjects with severe chronic obstructive pulmonary disease.[17], this could lead to affected quality of life as well. When total SGRQ was correlated with MMRC, a moderate positive significant correlation (r = 0.56, p = 0.00) was found, which may be due to the fact, that dyspnea is the most disabling symptom in COPD.. 6 minute walk distance correlated negatively and significantly with moderation (r = -0.54, p = 0.00), which is in accordance with the previous literature.[16] PHQ 9 when correlated with SGRQ significant correlation was found (r = 0.64, p = 0.00) implies that depression increases with decreasing quality of life in COPD patients as there in literature.[18]

The symptom score of SGRQ was correlated with the variables and weak, positive significant correlations were found with BODE Score (r = 0.32, p = 0.02. PHQ 9 (r = 0.31, p = 0.02) showing that with increasing symptoms levels of depression also increases and global PSQI (r = 0.28, p = 0.04) which shows that with increase in symptoms there is an increased effect on quality of sleep as well.[16] There was a very weak positive non significant correlation with BMI. Weak positive and non significant correlation with ESS and MMRC, signifying that with increasing symptoms severity there is increase in level of dyspnea which rates breathlessness, one of the major feature of COPD and daytime sleepiness also a symptom. With 6 minute walk distance there was a weak negative non significant correlation. The correlation signifies that with increase in symptoms there is a decrease in functional capacity of the patient.

The activity score of SGRQ, subjectively assesses the functional capacity of a COPD patient. Activity score of SGRQ had a moderate positive significant correlation with BODE Score (r = 0.53, p = 0.00) showing that reduction in activity levels or functional status of the patient correlates with increase in risk of death in patients with COPD.[16] There was a weak positive non significant correlation with BMI. There was a moderate positive significant correlation with MMRC (r = 0.43, p = 0.00), which can be explained by the fact that increased levels of dyspnea implies most commonly oxygen

desaturation in patients with COPD and reduced oxygenation will lead to reduced functional capacity. there was a moderate negative significant correlation with 6 minute walk distance (r = -0.53, p = 0.00) showing that with increased reduction in activity levels there is a reduced 6 minute walk distance. There was a weak positive significant correlation with ESS (r = 0.39, p = 0.00) and global PSQI scores (r = 0.39, p = 0.00) showing that worsening of the activity scores correlates with increasing daytime sleepiness decreasing quality of sleep. A strong positive significant correlation was found with PHQ 9 (r = 0.61, p = 0.00) showing increasing levels of depression correlating well worsening of the activity levels as proven by earlier studies. [19]

Correlations of PHQ 9

Prevalence of Depression in COPD has been observed in many studies. A cohort done in 2011 from 2118 patients gives a prevalence of depression to be 26% in which 12% were smokers and 7% non smokers.[20] A study done by Sajal De used the Hindi version of Patient Health questionnaire 9 and concluded that Symptoms of depression are observed at all stages of COPD and its severity increased with an increase in severity of the COPD. In this study the prevalence of depression in COPD patients is very high and apart from 96.16 all patients were found to have some amount of depression.[21]

Scores of PHQ 9 correlated significantly with all the variables except BMI showing that depression plays an important role in the presenting symptoms of the patient. It correlated significantly with BODE Score (r = 0.48, p = 0.00). It was a moderate positive correlation, showing that with increasing depression risk of death also increases as consistent with earlier studies.[22] There was a very strong positive significant correlation with MMRC (r = 0.84, p = 0.01) and a moderate negative significant correlation with 6 minute walk distance (r = - 0.46, p = 0.001) showing that with an increase in severity of depression there is a reduction in the functional status of the patient which is consistent with the existing literature.

Limitations of the study

1) The study was done on a small sample size of 52 patients.
2) Polysmnography could not be done.
3) Since Hindi is the most spoken language in Delhi only those questionnaires could be used which were translated and well validated in Hindi.

Future recommendations

1) A large scale study on a large sample size should be done.
2) Polysomnography should be done for diagnosing sleep disorders.

Acknowledgements

The author is thankful to Dr. Manvir Bhatia for providing the Hindi version of the Epworth sleepiness scale.

References

1. Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease. Updated 2013. Available from ; http:\\www.goldcopd.com.
2. Sajal De, subjective assessment of quality of quality of sleep in chronic obstructive pulmonary disease patients and its relationship with associated depression, Lung India, vol – 29,issue 4, oct-dec 2012, 332-335
3. Kochhar PH, Rajadhyaska SS, Suvarna VR for PRIMEMD Study Group. Translation and validation of brief patient health questionnaire against DSM IV as a tool to diagnose major depressive disorder in Indian patients. J Psotgrad Med 2007;53:102-7.
4. Bhatia M, Prasad K, Pande RN, hindi validation of the Epworth Sleepiness scale, The Indian Journal of Sleep Medicine Year : 2006, Vol: 1, Issue : 4, 171-174
5. Denial J Buysee et al, The Pittsburgh sleep quality index; A new instrument for

psychiatric practice and research, Psychiatry research, vol 28, 193-213.
6. LH Lindholm, The problem of uncontrolled hypertention, Journal of Human Hypertension (2002) 16, S3–S8
7. Andrew L. Chesson et al, An American sleep association disorder review. The indications for polysomnography and related procedures. Sleep 20(6), 423 – 287.
8. Clete A. Kushida et al. Practice parameters for the indications for polysomnography and related procedures: an update for 2005,
9. Foteini Karachaliou, Konstantinos Kostikas, Chaido Pastaka, Konstantinos Kostikas, Prevalence of sleep-related symptoms in a primary care population - Their relation to asthma and COPD, DOI: 10.3132/pcrj.2007.00045.
10. Lewis CA, Fergusson W, Eaton T, Zeng I, Kolbe J, isolated nocturnal desaturation in COPD – prevalence and impact on quality of life and sleep, Thorax 2009, 64, 133-8
11. Nunes et al, impaired sleep reduces quality of life in chronic obstructive pulmonary disease, Lung 2009, 187, 159-63.
12. Steven M Scharf et al, Sleep quality predicts quality of life in chronic obstructive pulmonary disease, International Journal of Chronic Obstructive Pulmonary Disease 2011:6 1–12.
13. H. Klar Yaggi, M.D., M.P.H., John Concato, M.D., M.P.H., Walter N. Kernan, M.D., Judith H. Lichtman, Ph.D., M.P.H.,Lawrence M. Brass, M.D., and Vahid Mohsenin, M.D. Obstructive Sleep Apnea as a Risk Factor for Stroke and Death, N Engl J Med 2005;353:2034-41.
14. H M Engleman, N J Douglas, Sleep ? 4: Sleepiness, cognitive function, and quality of life in obstructive sleep apnoea/ hypopnoea syndrome, Thorax 2004;59:618–622.
15. M Medinas Amorós, C Mas-Tous, F Renom-Sotorra, M Rubí-Ponseti, MJ Centeno-Flores, MT Gorriz-Dolz, Health-related quality of life is associated with COPD severity: a comparison between the GOLD staging and the BODE index, Chronic Respiratory Disease May 2009vol. 6 no. 2 75-80.
16. Nurhan Sarioglu et al, Relationship between BODE index, quality of life and inflammatory cytokines in COPD Patients, Multidisciplinary Respiratory Medicine 2010; 5(2):84-91.
17. E. Prescott, T. Almdal}, K.L. Mikkelsenz, C.L. Tofteng, J. Vestbo§, P. Lange, Prognostic value of weight change in chronic obstructive pulmonary disease: results from the Copenhagen City Heart Study, Eur Respir J 2002; 20: 539–544.
18. Jennifer A Cleland et al, Associations of depression and anxiety with gender, age, health-related quality of life and symptoms in primary care COPD patients, Family Practice—an international journal.
19. Martijn A. Spruit et al Determinants of poor 6-min walking distance in patients with COPD: The ECLIPSE cohort, Respiratory Medicine (2010) 104, 849e857.
20. Nicolia A Hanania et al. Determinants of Depression in the ECLIPSE Chronic Obstructive Pulmonary Disease Cohort, Am J Respir Crit Care Med Vol 183. pp 604–611, 2011.
21. Sajal De, Prevalence of Depression in Stable Chronic Obstructive Pulmonary Disease, The Indian Journal of Chest Diseases & Allied Sciences, 2011;Vol.53, 36-39.
22. Khaled Al-shair et al, Depression and its relationship with poor exercise capacity, BODE index and muscle wasting in COPD, Respiratory Medicine (2009) 103, 1572 – 1579.