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Impact of psychosocial factors on health-related quality of life in chronic obstructive pulmonary disease patients

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Abstract

Background: The psychosocial factors have an influence on health related quality of life (HRQOL). Considering the importance of the relationship between psychological problems and HRQOL in caring for and promoting the welfare of chronic obstructive pulmonary disease (COPD) patients, this study evaluated HRQOL and impact of psychosocial factors in HRQOL.

Materials and method: The study was conducted in Pulmonary Medicine Department of Gauhati Medical College Hospital, Assam, India. COPD patients who have FEV1/FVC < 70% predicted were included in the study. They underwent St. George's Respiratory Questionnaire (SGRQ) to measure HRQOL and pretested interview schedule for psychosocial factors.

Results: Most affected domain was activity with mean (SD): 63.21 (22.86) followed by symptom 43.87 (19.87), least was impact with mean (SD): 34.79 (16.35) and SGRQ total score was 47.19 (19.39). Out of 280, majority of the cases (42.14%) had moderate impairment of psychosocial factors followed by severe impairment (33.93%). The psychosocial factor showed positive moderate correlation with HRQOL ($p < 0.01$). The correlation coefficient for total score of HRQOL with anxiety, depression, self-efficacy, fatigue, and total were 0.434, 0.492, 0.233, 0.469, and 0.372, respectively.

Conclusion: Patients with COPD showed significantly reduced HRQOL. HRQOL was positively correlated with psychosocial factors. HRQOL can be improved by nursing activities that help them to achieve coping ability, enhanced functional pattern, and improve psychosocial wellbeing. Thereby these individuals could be rejuvenated as a productive component of the family and society.

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Introduction

Chronic obstructive pulmonary disease (COPD) is a devastating lung disease that progressively robs a person's ability to breathe. COPD is a systemic disease with considerable impact on several dimensions of daily life. The switch to the measurement of psychosocial issues in addition to biomedical measures has been shown to play an important role in ensuring positive patient outcome from both a

clinician's and patient's perspective, and is an important outcome measure when evaluating treatment.[1,2]

COPD is a major cause of morbidity and mortality worldwide. It is a slowly progressive disease, characterised by lung function impairment with airway obstruction. Common symptoms are cough, sputum production, and shortness of breath.[3] A World Health Orga-

nization (WHO)/World Bank study estimated the prevalence of COPD per 1000 population in India as 4.38 in males and 3.44 in females.[4] With the increasing prevalence of smoking in developing countries, it is projected that COPD-related mortality and morbidity will dramatically impact Asian and African countries.[5] COPD progressively reduces breathing capacity and impairs patients' ability to carry out activities of daily living, thereby adversely affecting health-related quality of life (HRQOL). HRQOL is defined as the degree to which a patient's health status affects his or her self-determined evaluation of satisfaction or quality of life (QOL).[6] Moreover HRQOL refers to the physical, psychological, and social domains of health that are unique to each individual.[7] HRQOL reflects the insight and perception of the patients regarding their current life as well as their perception of health. The use of HRQOL measures in COPD has currently achieved widespread acceptance.[8] In recent years, much attention has been focused on exploring the impact of physical and mental illness on overall QOL. The switch to the measurement of psychosocial issues in addition to biomedical measures has been shown to play an important role in ensuring positive patients' outcome from both a clinician's and patient's perspective, and is an important outcome measure when evaluating treatment.

Breathlessness, physical impairment, and reduced activities of daily living are the variables that affect the physical health component of HRQOL. Breathlessness, hopelessness, and anxiety affect the psychological component of HRQOL of patients with COPD. Therefore it can be concluded that breathlessness, physical impairment, reduced activities of daily living, hopelessness, and anxiety contribute to physical and mental components of HRQOL in individuals with COPD.[9] The negative affective trait is mostly responsible for psychological domain of HRQOL. The patients with COPD experienced significantly more psychological distress than the general population and less than psychiatric outpatients. The pattern of psychological complaints seems comparable in depressed patients with COPD and psychiatric outpatients. Patients with severe or very severe COPD appeared to be at increased risk of depression.[10]

Anxiety and depression

The prevalence of anxiety and depression were high (28.2% and 18.8%, respectively) in COPD, even when it was of mild degree. Female patients have higher levels of anxiety, depression, and worse symptom-related QOL. Dyspnoea is more strongly correlated with depression in women than in men. Anxiety and depressive symptoms are common in patients affected by COPD, even when their disease is mild in terms of forced expiratory volume in one second (FEV1) and respiratory symptoms.[11] The depressive symptoms are strongly associated with HRQOL. The risk of depressive symptoms increased with increasing COPD severity.[12] Anxiety and depression are common in patients with COPD.[13] The results of the study suggest that the major risk factor for anxiety or depression is dyspnoea and the consequent functional physical limitation.

Self-efficacy

Self-efficacy is a person's judgement about being able to perform a particular activity. The patients with COPD have a low level of self-efficacy. Dyspnoea and exercise performance are related to another determinant of QOL that is self-efficacy. COPD being a highly prevalent, disabling disease, with no definite cure that stays with the patients all his life, affects his QOL.

Self-management education had no effect on hospital admissions, emergency room visits, days lost from work, and lung function. Self-management education reduced need for rescue medication, and led to increased use of courses of oral steroids and antibiotics for respiratory symptoms.[14] Furthermore, several patients reported increased self-confidence and coping behaviour as important effects of the programme. Maintenance of rehabilitation depends on the self-efficacy of the COPD patients.[15] Creation of a positive perception of health, and upgrading and preserving QOL in these patients are of great importance, and should be considered the essential goal in treatment and care for these patients.

Fatigue

Fatigue is recognised as one of the most common and important symptoms in COPD. A sensation of fatigue can be a consequence of poor sleep quality or mood disorders. There is also strong evidence for an association between dyspnoea and fatigue. COPD and associated symptoms, such

as fatigue and dyspnoea, cause restrictions on patients' exercise tolerance; consequently had a major impact on their ability to carry daily activities. Reduction of daily activities frequently results in reduced QOL. Perceptions of poor health are positively associated with symptoms of anxiety, depression, sleep disturbances, and level of daily functioning. A study done by Tel et al.[16] among the COPD patients in Turkey had revealed that all patients experienced dyspnoea and fatigue. Dyspnoea severity and fatigue were more intensified among 65 years and above age group, fourth stage of COPD, repeatedly hospitalised. There was significant negative correlation between FEV1 values, dyspnoea, and fatigue scores. It was recommended that nurses who care COPD patients should assess dyspnoea and fatigue. The appropriate nursing interventions should plan and practice to reduce severity of dyspnoea and fatigue.[16]

From the above literature, summary drawn up is that compared with the general population, patients with COPD have significant impairment in their QOL. Anxiety and depressive symptoms are common in COPD, and correlate with the severity of the disease. Fatigue, as a symptom in COPD, has diverse manifestations, such as physical or mental tiredness, loss of attention, concentration, or motivation. Self-efficacy believes focus on the evaluation of one's ability to effectively perform behaviours necessary to understand that outcome. Hence, enhancement of self-efficacy should be included in the care of COPD. The primary symptoms of COPD were breathlessness and fatigue. A sensation of fatigue can be a consequence of poor sleep quality or mood disorders. However, there is mounting evidence to suggest the relationship between QOL and psychosocial factors of the disease. Hence, the present study aims to investigate HRQOL in COPD and impact of psychosocial factors in HRQOL.

Materials and method

Sample selection

This descriptive study was conducted at Pulmonary Medicine Department of Gauhati Medical College Hospital (GMCH), Guwahati, Assam, India. The study population comprised of adult clinically stable, both old and new COPD patients above 40 years, who had visited outpatient and admitted in Pulmonary Medicine Department. Data had been collected from the randomly selected 280 cases from

March 2011 to November 2013 on the basis of respiratory symptoms, presence of risk factors, and confirmed by spirometry.

Inclusion criteria

1. Patients with clinical symptoms and signs of COPD.
2. Patients with FEV1 to forced vital capacity (FVC) ratio (FEV1/FVC) <70% predicted post bronchodilator.
3. Patients with FEV1 reversibility <12%/<200 ml.
4. Presence of risk factors of COPD.
5. Patients above 40 years.
6. Patients who were willing to give consent.

Exclusion criteria

1. Patients who had history of chronic lung disease such as: tuberculosis, bronchiectasis, asthma, interstitial lung disease, and any malignant condition.
2. Patients who have not volunteered to participate in the study.
3. Patients below 40 years.

Data collection procedure

Detail explanation was given to the subjects and consent taken prior to the data collection. Each study participant had undergone spirometry measurements, performed by trained professionals according to the American Thoracic Society Guidelines.[17] Disease severity was classified according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria.[3] The 6-minute walk test (6-MWT) was performed in a 25 metre long corridor according to the American Thoracic Society Guidelines.[18] The severity of dyspnoea was measured by the modified Medical Research Council (MMRC) dyspnoea scale.[19] HRQOL was measured by the St. George's Respiratory Questionnaire (SGRQ) for COPD patients (SGRQ-C), which is a standardised, self-administered disease specific questionnaire.[20] SGRQ-C consist of 40 items, divided into three sub-scales: symptoms (seven items), activity (13 items), and impact (20 items). Scores were expressed as percentage. The total score varies from zero to 100; with higher the score indicating worse health status. The tool was translated to the mother tongue (i.e. Assamese) of the participants for their better understanding. The tool Psychosocial Factors of the Disease: Anxiety, Depression, Self-efficacy, and Fatigue, is a structured interview schedule. This is a rating scale with the score zero=never, one=mild (sometimes), two=moderate (most days), and three=severe

(everyday). For each factor, minimum score was zero and maximum score was 15. The total score for the instrument was zero minimum and maximum was 60. Content validity was tested by the expert opinion. The reliability was tested by conducting a pre testing. Among the COPD subjects, psychosocial factors of the disease showed internal consistency with Cronbach's alpha 0.88, and the subscale showed internal consistency anxiety 0.77, depression 0.79, self-efficacy 0.78, and fatigue 0.81. The standardised instruments were found suitable in the Indian setting.

Results

Results were reported as mean \pm standard deviation (SD). The relationship between HRQOL scores and continuous variables was assessed using Pearson correlation coefficient (r). P-value <0.05 was considered statistically significant.

Analysing 280 patients with COPD, it was found that a vast majority (84.64%) of patients were male. This was probably because smoking is largely confined to males in India. Highest numbers of cases (37.5%) were observed in the age group of 60-69 years. Most of the cases (31.07%) had farming as their occupation. It was observed that majority of the cases (45.36%) had not stopped smoking in spite of their lung had been affected. In the study, a vast majority of the cases (62.85%) were underweight (body mass index [BMI] <18.5). The distance walked during 6-MWT mean (SD) was 321.84 (73.97) metres. Majority of the patients (48.21%) have dyspnoea grade: two according to the MMRC scale for dyspnoea. A huge majority of the cases (86.43%) had acute exacerbation in the last one year. Among the listed co-morbid conditions, hypertension was most prevalent.

Table 1 shows that highest numbers of cases (46.07%) had moderate

Table 1: GOLD classification of severity of COPD by FEV₁ predicted % wise distribution

FEV ₁ predicted % GOLD classification	No.	Percentage
GOLD 2: Moderate 50-79	129	46.07 %
GOLD 3: Severe 30-49	88	31.42 %
GOLD 4: Very severe <30	63	22.50 %
Total	280	100 %

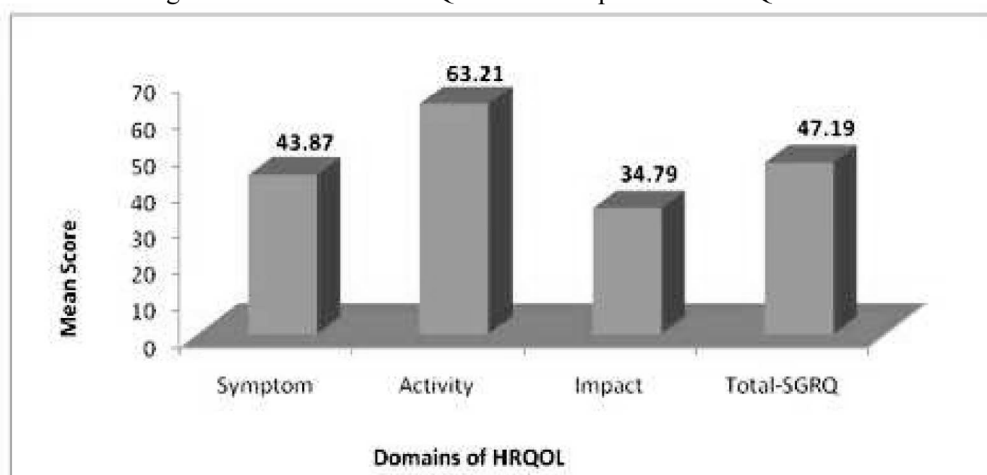
GOLD=Global Initiative for Chronic Obstructive Lung Disease; COPD=chronic obstructive pulmonary disease; FEV₁=forced expiratory volume in one second

disease severity followed by 31.42% cases who were in severe disease stage. There were 22.50% cases with COPD in the very severe disease state. The data depicts that majority were at an advanced stage of the disease. It was clear that COPD was not usually diagnosed at an early stage of the disease. Nobody was observed in the mild disease severity stage.

Health related quality of life with regard to symptom, activity, and impact

Out of 280 cases of COPD, most affected domain was activity (mean 63.21 and SD 22.86) followed by symptom domain (mean 43.87 and SD 19.87). Least affected domain was impact with mean (SD): 34.79 (16.35). The mean (SD) of the SGRQ total score was 47.19 (19.39).

Majority of the cases (43.45%) with COPD had poor HRQOL followed by 29.28% of cases who had very poor HRQOL. Only 27.14% of cases had fair HRQOL. Hence their QOL was compromised. HRQOL of the individuals



HRQOL= Health related quality of life, SGRQ=St. George's Respiratory Questionnaire

Figure 1: HRQOL with regard to symptom, activity, and impact

Table 2: Psychosocial factors wise distribution of cases with COPD

Psychosocial factors	Frequency	Percentage
Mild impairment	67	23.93 %
Moderate impairment	118	42.14 %
Severe impairment	95	33.93 %
Total	280	100 %

COPD=chronic obstructive pulmonary disease

with COPD was impaired, by the restriction poses due to the symptoms of COPD. HRQOL is the important prognosis predictor of this group.

Figure 1 depicts the mean score of HRQOL with regard to symptom, activity, and impact. Most affected domain was activity followed by symptom domain in comparison of mean SGRQ score.

Majority (42.14%) of the cases with COPD had moderate impairment of psychosocial factors followed by severe impairment (33.93%). Only 23.93% had mild impairment of psychosocial factors. Hence from table 2, it is apparent that people with COPD had impairment of psychosocial factors.

Table 3 explains the descriptive statistics (mean and SD) according to the level of impairment of the psychosocial factors. All the psychosocial factors namely depression, anxiety, self-efficacy, and fatigue were almost equally affected along with the total score of the psychosocial factors of the disease.

The psychosocial factors showed positive moderate correlation with HRQOL ($p < 0.01$). The correlation coefficient for total score of HRQOL and anxiety, depression, self-efficacy, and fatigue were 0.434, 0.492, 0.233, and 0.469, respectively. The total score of psychosocial factor showed highly significant positive correlation with HRQOL ($r = 0.372$). The worsening of the psychosocial factors, worsen QOL as assessed by SGRQ. There was positive impact on HRQOL by psychological break-

down of the patients with COPD. Hence, there is significant correlation between HRQOL among COPD patients, and the psychosocial factors: anxiety, depression, self-efficacy, and fatigue.

Discussion

The present study was conducted in the Pulmonary Medicine Department of a University Hospital from March 2011 to November 2013. The current concept of HRQOL acknowledges that wellbeing is a relative state where one maximises his or her physical, mental, and social functioning in the context of supportive environments to live a full, satisfying, and productive life.[21] Keeping in mind the concept of HRQOL, the primary aim of the study was to explore HRQOL in COPD patients and impact of psychosocial factors in HRQOL. This study showed that 280 patients from Assam had significantly impaired HRQOL when measured by the generic questionnaire SGRQ. While examining specific domains, all showed significant impairment.[22] Out of 280 cases of COPD, most affected domain was activity (mean 63.21 and SD 22.86) followed by symptom domain (mean 43.87 and SD 19.87). Least affected domain was impact with mean (SD): 34.79 (16.35). The mean (SD) of the SGRQ total score was 47.19 (19.39). The

Table 3: Descriptive statistics in relation to level of psychosocial factors

Psychosocial factors	Mild impairment	Moderate impairment	Severe impairment	Total
	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Anxiety	48.0±25.7	61.1±18.1	83.2±13.6	65.5±23.3
Depression	45.1±24.2	56.3±19.3	79.0±15.9	61.3±23.7
Self-efficacy	47.7±24.2	59.9±18.8	82.7±15.8	64.7±23.7
Fatigue	47.1±23.7	62.5±18.1	82.9±14.4	65.7±23.0
Total	47.0±23.5	60.0±16.3	82.0±13.0	64.3±22.0

SD=standard deviation

Table 4: Correlation of HRQOL with psychosocial factors

Psychosocial factors	Mean±SD	Correlation r value			
		Symptom	Activity	Impact	Total-SGRQ
Anxiety	2.23±0.712	0.416*	0.473*	0.362*	0.434*
Depression	2.08±0.775	0.492*	0.530*	0.437*	0.492*
Self-efficacy	1.95±0.739	0.231*	0.266*	0.210*	0.233*
Fatigue	2.26±0.677	0.472*	0.504*	0.411*	0.469*
Total	47.19±19.39	0.363*	0.382*	0.374*	0.372*

* $p < 0.01$, SD=standard deviation,

HRQOL= Health related quality of life,

SGRQ=St. George's Respiratory Questionnaire

study findings were supported by the studies conducted by the previous researchers.[23-27]

Majority of the cases (42.14%) with COPD were having moderate impairment of psychosocial factors followed by severe impairment (33.93%). The psychosocial factors showed positive moderate correlation with HRQOL ($p < 0.01$). The correlation coefficient for total score of HRQOL with anxiety, depression, self-efficacy, and fatigue were 0.434, 0.492, 0.233, and 0.469, respectively. The total score of psychosocial factors showed highly significant positive correlation with HRQOL-total score ($r = 0.372$).

Depression and anxiety

The correlation coefficient for total score of HRQOL with anxiety and depression were 0.434 and 0.492 respectively in the present study ($p < 0.01$). The prevalence of depression and anxiety in COPD patients was considerably high and correlated with the patients' QOL. This finding is in agreement with the study conducted by Hwang et al.[28] They revealed that depression itself and its severity exerted heavy impacts on QOL in COPD patients ($p < 0.001$). The findings of our study are supported well with most of the earlier studies.[29-31] QOL is significantly impaired in severely depressed patients.[32] Treatment for depression and anxiety should be considered for all COPD patients, not just those with more severe clinical level of disease.[33]

Self-efficacy and fatigue

The correlation coefficient for total score of HRQOL with self-efficacy was 0.233 ($p < 0.01$). The worsening of the self-efficacy, worsen QOL as assessed by SGRQ.[34,35]

The correlation coefficient for total score of HRQOL with fatigue was 0.469 ($p < 0.01$). Fatigue was recognised as one of the most common and important symptoms in COPD. There was strong evidence for an association between dyspnoea and fatigue, and it had been suggested that fatigue may be a sign of a worsening condition in people with COPD.[36] Study done by Manguiera et al.[37] showed that HRQOL presented a positive correlation with the sensation of fatigue. Changes in the SGRQ correlated significantly with changes in leg fatigue as reported by Katsura et al.[38]

The worsening of the psychosocial factors, worsen QOL as assessed by SGRQ. The psychological breakdown of the patients had direct impact on their HRQOL. Thus there is

significant correlation between HRQOL among COPD patients and the psychosocial factors: anxiety, depression, self-efficacy, and fatigue.

Conclusion

From the above discussion, summary drawn up is that patients with COPD have significant impairment in their QOL. Anxiety and depressive symptoms are common in COPD, and correlate with HRQOL. The patients with COPD have a low level of self-efficacy. Fatigue, as a symptom in COPD, has diverse manifestations, such as physical or mental tiredness, loss of attention, concentration, or motivation. COPD being a highly prevalent, disabling disease stays with the patients forever affecting their QOL. Creation of a positive perception of health, and upgrading and preserving QOL in these patients are of great importance. It was revealed that perceived health status positively correlated to psychological factors, since psychological distress seems to play an important role in how patients experience their disease.

Hence concentrating therapy on selected potentially more treatable aspects of HRQOL may result in more effective care. The patient-focused present study provided the information regarding the problems that these patients experienced. Conclusion can be drawn that there should be an integration of pulmonary rehabilitation and pharmacological therapies that can positively modify severity of distress among COPD patients. Effective assessment and comprehensive nursing managements of symptoms for patients living with COPD are opportunities to improve their HRQOL. Specific nursing interventions will improve QOL of this group of individuals and can be retrieved them as functional unit of the society.

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References

1. Theofilou P. Why is it important to assess health - related quality of life? J Palliative Care Med [serial online]. 2011;1:e104 [cited 2014 Aug 16]. Available from: <http://omicsgroup.org/journals/2165-7386pdfdownload.php?download=2165-7386-1-e104.pdf&&aid=3241>
2. Theofilou P. Quality of life in the field of health: meaning and assessment. E-Journal of Study and Technology (e-JST). 2010;4:43-53.

3. Pauwels RA, Buist AS, Calverley PM, Jenkins CR, Hurd SS; GOLD Scientific Committee. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. NHLBI/WHO Global Initiative for Chronic Obstructive Lung Disease (GOLD) Workshop summary. *Am J Respir Crit Care Med*. 2001;163:1256-76.
4. Murray CJ, Lopez AD. Evidence-based health policy--lessons from the Global Burden of Disease Study. *Science*. 1996;274:740-3.
5. Chan-Yeung M, Ait-Khaled N, White N, Ip MS, Tan WC. The burden and impact of COPD in Asia and Africa. *Int J Tuberc Lung Dis*. 2004;8:2-14.
6. Curtis JR, Patrick DL. The assessment of health status among patients with COPD. *Eur Respir J Suppl*. 2003;41:36s-45s.
7. Testa MA, Simonson DC. Assessment of quality-of-life outcomes. *N Engl J Med*. 1996 Mar 28;334:835-40.
8. Domingo-Salvany A, Lamarca R, Ferrer M, Garcia-Aymerich J, Alonso J, Félez M, et al. Health-related quality of life and mortality in male patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med*. 2002;166:680-5.
9. Hu J, Meek P. Health-related quality of life in individuals with chronic obstructive pulmonary disease. *Heart Lung*. 2005;34:415-22.
10. Wagena EJ, Arrindell WA, Wouters EF, van Schayck CP. Are patients with COPD psychologically distressed? *Eur Respir J*. 2005;26:242-8.
11. Di Marco F, Verga M, Reggente M, Maria Casanova F, Santus P, Blasi F, et al. Anxiety and depression in COPD patients: the roles of gender and disease severity. *Respir Med*. 2006;100:1767-74.
12. Kil SY, Oh WO, Koo BJ, Suk MH. Relationship between depression and health-related quality of life in older Korean patients with chronic obstructive pulmonary disease. *J Clin Nurs*. 2010;19:1307-14.
13. Tetikkurt C, Ozdemir I, Tetikkurt S, Yilmaz N, Ertan T, Bayar N. Anxiety and depression in COPD patients and correlation with sputum and BAL cytology. *Multidiscip Respir Med*. 2011;6:226-31.
14. Monninkhof E, van der Valk P, van der Palen J, van Herwaarden C, Partridge MR, Zielhuis G. Self-management education for patients with chronic obstructive pulmonary disease: a systematic review. *Thorax*. 2003;58:394-8.
15. Monninkhof E, van der Aa M, van der Valk P, van der Palen J, Zielhuis G, Koning K, et al. A qualitative evaluation of a comprehensive self-management programme for COPD patients: effectiveness from the patients' perspective. *Patient Educ Couns*. 2004;55:177-84.
16. Tel H, Bilgiç Z, Zorlu Z. Evaluation of dyspnea and fatigue among the COPD patients. In: Ong K-C, editor. *Chronic obstructive pulmonary disease - current concepts and practice* [internet]. InTech; 2012 [cited 2014 Aug 22]. p. 257-72. Available from: http://cdn.intechopen.com/pdfs/30171/InTech_Evaluation%20of_dyspnea_and_fatigue_among_the_copd_patients.pdf
17. Standardization of Spirometry, 1994 Update. American Thoracic Society. *Am J Respir Crit Care Med*. 1995;152:1107-36.
18. ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories. ATS statement: guidelines for the six-minute walk test. *Am J Respir Crit Care Med*. 2002;166:111-7.
19. Fletcher CM, Elmes PC, Fairbairn AS, Wood CH. The significance of respiratory symptoms and the diagnosis of chronic bronchitis in a working population. *Br Med J*. 1959;2:257-66.
20. Meguro M, Barley EA, Spencer S, Jones PW. Development and validation of an improved, COPD-specific version of the St. George Respiratory Questionnaire. *Chest*. 2007;132:456-63.
21. Kobau R, Snizek J, Zack MM, Lucas RE, Burns A. Well-being assessment: an evaluation of well-being scales for public health and population estimates of well-being among US adults. *Appl Psychol Health Well Being*. 2010;2:272-97.
22. Lopez AD, Shibuya K, Rao C, Mathers CD, Hansell AL, Held LS, et al. Chronic obstructive pulmonary disease: current burden and future projections. *Eur Respir J*. 2006;27:397-412.
23. Shavro SA, Ezhilarasu P, Augustine J, Bechtel JJ, Christopher DJ. Correlation of health-related quality of life with other disease severity indices in Indian chronic obstructive pulmonary disease patients. *Int J Chron Obstruct Pulmon*

- Dis. 2012;7:291-6.
24. He QY, Zhou X, Xie CM, Liang ZA, Chen P, Wu CG. [Impact of chronic obstructive pulmonary disease on quality of life and economic burden in Chinese urban areas]. [Article in Chinese]. *Zhonghua Jie He He Hu Xi Za Zhi*. 2009;32:253-7.
25. Obaseki DO, Erhabor GE, Awopeju OF, Obaseki JE, Adewole OO. Determinants of health related quality of life in a sample of patients with chronic obstructive pulmonary disease in Nigeria using the St. George's respiratory questionnaire. *Afr Health Sci*. 2013;13:694-702.
26. Balcells E, Gea J, Ferrer J, Serra I, Orozco-Levi M, de Batlle J, et al.; PAC-COPD Study Group. Factors affecting the relationship between psychological status and quality of life in COPD patients. *Health Qual Life Outcomes*. 2010;8:108.
27. Lin YX, Xu WN, Liang LR, Pang BS, Nie XH, Zhang J, et al. The cross-sectional and longitudinal association of the BODE index with quality of life in patients with chronic obstructive pulmonary disease. *Chin Med J (Engl)*. 2009;122:2939-44.
28. Hwang YI, Lee YS, Oh Y-M, Lee S-D, Park S-W, Kim YS, et al. Prevalence of depression and its influence on health-related quality of life in COPD patients. *Chest [serial online]*. 2011;140(4_MeetingAbstracts):542A [cited 2014 Aug 25]. Available from: <http://journal.publications.chestnet.org/article.aspx?articleid=1046122>
29. Ito K, Kawayama T, Shoji Y, Fukushima N, Matsunaga K, Edakuni N, et al. Depression, but not sleep disorder, is an independent factor affecting exacerbations and hospitalization in patients with chronic obstructive pulmonary disease. *Respirology*. 2012;17:940-9.
30. Omachi TA, Katz PP, Yelin EH, Gregorich SE, Iribarren C, Blanc PD, et al. Depression and health-related quality of life in chronic obstructive pulmonary disease. *Am J Med*. 2009;122:778.e9-15.
31. Hynninen MJ, Pallesen S, Nordhus IH. Factors affecting health status in COPD patients with co-morbid anxiety or depression. *Int J Chron Obstruct Pulmon Dis*. 2007;2:323-8.
32. Sreevani R, Reddemma K. Quality of life and functional impairment among depressive patients in a psychiatric outpatient setting in India. *Dysphrenia*. 2013;4:132-7.
33. Cleland JA, Lee AJ, Hall S. Associations of depression and anxiety with gender, age, health-related quality of life and symptoms in primary care COPD patients. *Fam Pract*. 2007;24:217-23.
34. Belza B, Steele BG, Hunziker J, Lakshminaryan S, Holt L, Buchner DM. Correlates of physical activity in chronic obstructive pulmonary disease. *Nurs Res*. 2001;50:195-202.
35. Hesselink AE, Penninx BW, Schlösser MA, Wijnhoven HA, van der Windt DA, Kriegsman DM, et al. The role of coping resources and coping style in quality of life of patients with asthma or COPD. *Qual Life Res*. 2004;13:509-18.
36. Kapella MC, Larson JL, Patel MK, Covey MK, Berry JK. Subjective fatigue, influencing variables, and consequences in chronic obstructive pulmonary disease. *Nurs Res*. 2006;55:10-7.
37. Manguiera NM, Viegas IL, Manguiera Mde A, Pinheiro AN, Costa Mdo R. Correlation between clinical parameters and health-related quality of life in women with COPD. *J Bras Pneumol*. 2003;35:248-55.
38. Katsura H, Yamada K, Wakabayashi R, Kida K. The impact of dyspnoea and leg fatigue during exercise on health-related quality of life in patients with COPD. *Respirology*. 2005;10:485-90.