

A Measure of Health-related Quality of Life (HRQoL) of COPD Patients Following Pulmonary Rehabilitation Program with Two Health Index Questionnaire (SF-36 and SGRQ)

¹R Ayiesah*, ²S Riza & ¹ZY Choong

¹Physiotherapy Program, Faculty of Allied Health Sciences
Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur

²Physiotherapy Unit, Universiti Kebangsaan Malaysia Medical Centre
Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia

ABSTRACT

Introduction: The health related quality of life (HRQoL) of chronic obstructive pulmonary disease (COPD) patients is greatly influenced by their health status. The Health Index Questionnaire - Short Form 36 (SF-36) and St George Respiratory Questionnaire (SGRQ) are commonly used to assess the HRQoL of COPD patients. **Objective:** This study investigates differences in HRQoL following sessions of pulmonary rehabilitation program (PRP) with a control group (CG) that had no intervention. **Method:** This quasi-experimental study involving 17 subjects assigned to the CG and 16 subjects in the intervention group (IG). Ethical approval was obtained from the relevant authority. Both groups were given the health index questionnaires- SF-36 and SGRQ prior and 5 weeks after the intervention. The CG only had medication while the IG performed exercises (cycling, treadmill walking, upper limb strengthening exercise and stair climbing exercise). **Results:** Data analysis using SPANOVA demonstrated significant improvement in HRQoL measured from SF-36 in domains of bodily pain ($p=0.005$), vitality ($p=0.021$) and mental health ($p=0.002$) in IG unlike the CG. Similarly, SGRQ, also shows improvement in symptom ($p=0.028$), activity ($p=0.004$) and total score ($p=0.012$). **Conclusion:** The 5 weeks pulmonary rehabilitation program demonstrated improvement in HRQoL among COPD patients.

Keywords: HRQoL, Pulmonary rehabilitation program (PRP), COPD, SF-36, SGRQ

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a disease characterized by the presence of airflow limitation due to chronic bronchitis or emphysema. The airflow obstruction is generally progressive, and may be accompanied by airway hyper-reactivity, which is partially reversible [1]. Currently, COPD is becoming a major public health problem with global concern. It is the sixth leading cause of death worldwide and the fourth leading cause of hospital admissions in Malaysia (Ministry of Health Malaysia 2005). The total number of deaths in the world for COPD are projected to increase by more than 30% in the next 10 years and this would be the fourth leading cause of death worldwide by 2030 [2]. In Asian countries, the number of COPD cases has exceeded three times the total number compared to the rest of the world. In Malaysia, the prevalence of patients with moderate to severe COPD was 4.7% (448,000 cases). [3]

The first symptom of COPD is cough [4] with breathlessness that drives the patients to seek medical consultation [5]. Once the Forced Expiratory Volume in the first second (FEV1) falls below 50% of the predicted normal, the essential activities of daily living will be affected [6]. According to the ATS (1995), the HRQoL in COPD varies according to the stages of the disease [1]. As the disease progresses, the patients would experience greater deterioration of HRQoL with greater impairment in the ability to perform their work and participation in social and physical activities [7].

The Health Index Short Form 36 (SF-36) have proved useful in demonstrating favourable changes resulting from pharmacologic intervention and pulmonary rehabilitation [8]. It is widely used following sessions of pulmonary rehabilitation and found to be strongly correlated with the physical health component of quality of life [9]. The reduced activities of daily living is usually associated with decreased HRQoL [10]. Similarly, reduced physical impairment have been reported to have a significant impact on the physical health component of quality of life [11, 12].

The health status when measured by SGRQ [13], have also reported improvement following PRPs together with a self-management education program of only 4 months duration. In contrast, another study has reported that their exacerbations actually increased with just self-management education, though there is no improvement in HRQoL [14]. However, this is contradictory to the findings of other studies that reported self management education improved

*Corresponding author: kamalia086@gmail.com

outcomes and reduced hospitalisation costs in patients with COPD^[15]. It is the purpose of this study to find out the differences in HRQoL outcome following attendance to a pulmonary rehabilitation program (PRP) among Malaysian COPDs.

METHODS

Study Design

This is a quasi-experimental study involving a control group (CG) who only had medication compared to an intervention group (IG) who participated in a 5 week PRP at the physiotherapy department, University Kebangsaan Malaysia Medical Centre (UKMMC). Inclusion criteria included subjects diagnosed as COPD by the medical officer, with spirometric evidence of significant chronic air-flow limitation (FEV1 < 80% predicted, FEV1/FVC <70% predicted) and no evidence of cardiovascular and neuromuscular disorder. Exclusion criteria included patients with other lung diseases, cardiovascular disease, gastro-esophageal reflux or malignancy and presents with haemoptysis or persisting respiratory symptoms and not responding to therapy, recent abdominal or thoracic surgery or having treatment with corticosteroids, hormones or chemotherapy. This study received ethical approval from the Research and Ethical Committee UKMMC.

Procedure

All subjects were evaluated using both health related index questionnaire (SF-36 and SGRQ) prior to the study and 5 weeks later following attendance to PRP. Information regarding demographic data such as weight, height, body mass index (BMI), history of smoking were also recorded.

The CG, are COPD patients who were not willing to participate in the PRP but willing to be subjects in this study. They only had medication and were given pamphlets regarding activities of PRP whilst those in the IG, are subjects who were willing to participate in pulmonary rehabilitation as outpatient in the physiotherapy department. The PRP included both educational and exercise sessions. The education sessions comprised of information regarding COPD, aim of physiotherapy treatment, correct methods of breathing during breathlessness, how to cough effectively and methods of secretion clearance, nutritional factors and pharmacological information as well as advice on smoking cessation by multidisciplinary team. The exercise session included cycling (30 minutes), treadmill (10 minutes), stair climbing (10 minutes) and dumbbell exercises (10 minutes) which progresses with 65% of the maximal heart rate. Allocation for warming up exercises and cooling down exercises after the training session were also taken into consideration during the course of the programs.

Outcome Measures

Health Index Short Form-36 (SF-36)

SF-36 is a generic questionnaire used to assess HRQoL for a variety of chronic medical conditions including COPD and asthma. It is a 36-item questionnaire that measures general HRQoL in eight domains.^[16] There were 10 questions related to physical functioning, 4 on role limitation due to physical problems, 2 related to bodily pain, 2 on social functioning, 3 on role limitations relating to emotional problems, 6 about general health perceptions, 4 about vitality and 5 about mental health. Each dimension is scored separately on a 0 to 100 scale with 0 indicating maximal impairment and 100 indicating the minimal impairment.^[17] It takes about 10 minutes of the patient's time to complete the questionnaire.

St George Respiratory Questionnaires (SGRQ)

The SGRQ is designed to measure the impact of chest diseases on HRQoL and wellbeing^[6]. It is a 50 items respiratory-specific self-administered questionnaire which requires about 15 minutes to complete. There are 3 domains namely: symptoms (deals with respiratory symptoms), activity (activities that causes breathlessness) and impacts (relates to aspects of social function and psychosocial disturbances that result from respiratory diseases).^[18] Each of this domains and the total score range from 0 (no reduction in HRQoL) to 100 (maximal reduction in HRQoL). A change in score of 4 units has been identified clinically significant^[17].

Data Analysis

All data were analyzed using SPSS version 16.0. Demographic data were analyzed by descriptive analysis. Normality test were conducted to determine whether scores on the data base were the same. Following normality test, independent t-tests were conducted on normally distributed data and Mann Whitney U test was conducted on data that are not normally distributed. A 2-way mixed ANOVA test (SPANOVA) was carried out to determine the effect size, and mean differences between the two questionnaires (SF-36 and SGRQ) before and after intervention.

RESULTS

Findings demonstrated that there were a total of 16 subjects in the IG and 17 subjects in the CG. There were more males in both groups with 14(87.5%) subjects in IG and 15(88.2) of them in CG compared to 2(12.5%) of them in IG and another 2 (11.8%) in CG. The age of subjects was between 61 to 70 years with 8 (50%) of them from IG and 9 (52.9%) from the CG. The subjects were mainly Chinese (60.6%) since most of them come from around the Cheras region, which is an area densely populated with Chinese. Among them, 6 (18.2%) subjects were smokers and the other 23 (69.7%) had quit smoking, while 4 subjects (12.1%) had no history of smoking.

Table 1 : Characteristics of subjects in intervention and control group

Characteristic		Intervention Group		Control Group	
		N	%	n	%
Gender	Female	2	12.5	2	11.8
	Male	14	87.5	15	88.2
Race	Malay	6	37.5	5	29.4
	Chinese	8	50.0	12	70.6
	Indian	2	12.5	0	0.0
Smoking history	Current smoker	3	18.8	3	17.6
	Ex-smoker	10	62.5	13	76.5
	Non-smoker	3	18.8	1	5.9
Age	50	0	0.0	0	0.0
	51-60	4	23.5	1	6.2
	61-70	9	52.9	8	50.0
	71	4	23.5	7	43.8

n-no of subjects, %-percentage

In SF-36, the main effect between groups, demonstrated significant difference between groups with significant interaction effect in domains of physical function ($f(1, 31) = 5.730, p < 0.05$, partial eta squared = 0.156), bodily pain ($f(1, 31) = 9.186, p < 0.05$, partial eta squared = 0.229), vitality ($f(1,31) = 5.940, p < 0.05$, partial eta squared = 0.161) and mental health ($f(1,31) = 11.803, p < 0.05$, partial eta squared = 0.276) indicating improvement in HRQoL (Table 2). This demonstrated the beneficial effect of PRP on COPD patients who participated in the intervention group compared to the CG who had no intervention.

Table 2 : Analysis with SPANOVA between intervention and control group using Health Index SF-36

	F	df1	df2	Sig	Partial Eta Squared
Physical Function (between groups)	13.497	1.000	31.000	0.001*	0.303
Physical Function (interaction)	5.730	1.000	31.000	0.023*	0.156
Role limitation (physical) (between groups)	0.994	1.000	31.000	0.327	0.031
Role limitation(physical) (interaction)	1.707	1.000	31.000	0.201	0.099
Bodily pain (between groups)	0.120	1.000	31.000	0.731	0.004
Bodily pain (interaction)	9.186	1.000	31.000	0.005*	0.229
General health (between groups)	12.105	1.000	31.000	0.002*	0.281
General health (interaction)	0.005	1.000	31.000	0.942	0.000
Social function (between groups)	0.038	1.000	31.000	0.846	0.001
Social function(interaction)	0.696	1.000	31.000	0.411	0.022

Continuation**Table 2 :** Analysis with SPANOVA between intervention and control group using Health Index SF-36

	F	df1	df2	Sig	Partial Eta Squared
Role limitation(emotion) (between groups)	7.129	1.000	31.000	0.012*	0.817
Role limitation(emotion) (interaction)	1.694	1.000	31.000	0.203	0.052
Vitality (between groups)	2.369	1.000	31.000	0.134	0.071
Vitality (interaction)	5.940	1.000	31.000	0.021*	0.161
Mental health (between groups)	6.629	1.000	31.000	0.015*	0.176
Mental health (interaction)	11.803	1.000	31.000	0.002*	0.276

* p< 0.05

Similarly, in SGRQ (Table 3), the main effect between groups, showed significant difference with positive interaction effect between domains: symptoms ($f(1, 31) = 5.302$, $p < 0.05$, partial eta squared = 0.146), activities ($f(1, 31) = 9.973$, $p < 0.05$, partial eta squared = 0.243) and total score ($f(1,31) = 7.167$, $p < 0.05$, partial eta squared = 0.188).

Table 3 : Analysis with SPANOVA between intervention and control group using St George Respiratory Questionnaire

	F	df1	df2	Sig	Partial Eta Squared
Symptom (between groups)	0.204	1.000	31.000	0.654	0.007
Symptom (interaction)	5.302	1.000	31.000	0.028	0.146
Activity (between groups)	21.796	1.000	31.000	0.000	0.413
Activity (interaction)	9.973	1.000	31.000	0.004	0.243
Impact(between groups)	18.993	1.000	31.000	0.000	0.380
Impact (interaction)	3.911	1.000	31.000	0.057	0.112
Total (between groups)	10.582	1.000	31.000	0.000	0.375
Total (interaction)	7.167	1.000	31.000	0.012	0.188

* p< 0.05

DISCUSSION

Pulmonary rehabilitation program evidently improves the HRQoL of COPD patients' similar to other studies [19, 20]. In SF-36, domains of physical function, bodily pain, vitality and mental health showed significant improvements in their scores of SF-36 while domain of role physical, social function, role emotional and general health showed no significant improvement. This is consistent with studies of Fernanda *et al.* (2001) that reported similar improvement in domains of SF-36 (physical function, vitality, emotional role, general health and mental health) following PRP and no improvement in other domains [21].

Domains of role physical and role emotional did not show significant changes as this required a longer duration of attendance for the subjects to improve themselves. Even domains of social function did not show improvement, possibly due to the short duration (5 weeks) of intervention resulting in limited time spent together to share their problems with one another. The tight schedules of the sessions also made it impossible for them to communicate freely with one another as their focus was only to carry out the exercises as instructed by the therapists. Another possible reason could be similar to the findings of Bosley and colleagues (1996) who reported that COPD patients are generally perceived as having poor quality of life and are socially deprived [22]. Their reduced daily activities can make them more depressed and unable to talk about their condition. Therefore, rather than their physical limitation, psychosocial factors like isolation can become a major determinant for reduced quality of life [23].

The domains of symptoms, activity and total score of SGRQ also showed significant improvements (Table 4) consistent with studies of Rossi *et al.* (2005) and Finnerty *et al.* (2001). According Rossi *et al.* (2005), total SGRQ

showed clinically and significantly improvement after 6 weeks PRP^[24]. Finnerty *et al.* (2001) demonstrated significantly improved HRQoL by 10.4 score among 65 COPD patients that participated in an outpatient pulmonary rehabilitation of 12 weeks duration^[25]. The improvement observed in the symptom subscale demonstrates that the frequency in which the patient presents with cough, shortness of breath, and sputum production was less than usual. This further leads to reduce dyspnoea as observed in the dyspnoea subscale that measures the extent to which certain activities would cause shortness of breath and the subject feeling more comfortable following sessions of PRPs. In the activity subscales, the patient was able to carry out their activities of daily living better with reduced effort. The subjects presented with reduced complains of breathlessness and they were able to carry out their daily activity without the need to slow down or rest. The impact subscale of SGRQ assesses how the chest problems interferes with their social life, household activities, paid employment and involvement with sports demonstrating that among the IG, their conditions improved and it does not have an impact on their life as they are able to carry out their daily activities appropriately.

There is no cure for COPD and standard medical therapy is only partially effective in reducing symptoms, so what is more important for these patients is to prevent further deterioration in physical function and improve their HRQoL^[26]. Therefore, despite attendance for only 5 weeks of PRP, the COPD patients can minimize their symptoms, improve their quality of life and educate themselves to be independent and to tackle unpredicted events in their daily routine.

LIMITATION OF STUDY

The number of subjects in the study is small due to poor patient's compliance to the PRP. There were 5 patients in IG who initially attended the program but failed to complete the sessions due to transportation problems and ill health. Those in the CG were mainly patients who were not able to attend the program regularly but were still willing to take part in the study.

CONCLUSION

In conclusion, 5 weeks of pulmonary rehabilitation were sufficient to improve the patient's HRQoL as demonstrated from the health index questionnaires. The improved HRQoL helped the COPD patients to carry out daily activities independently unlike the CG patients whose condition would eventually deteriorate with time.

ACKNOWLEDGEMENT

My appreciation goes to all the colleagues who have contributed to this research directly or indirectly and who have given me lots of encouragement and motivation throughout the study.

REFERENCES

- [1] American Thoracic Society. Standards for the diagnosis and care of patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1995 152 (suppl): S77-120.
- [2] WHO. Working Together For Health The World Health Report 2006.
- [3] Tan WC. COPD prevalence in 12 Asia Pacific countries and regions: Projections based on the COPD prevalence estimation model. *Respirology* 2003; 8: 192-198.
- [4] Georgopoulos D and Anthonisen NR. Symptoms and signs of COPD. In: Cherniack NS Ed Toronto: WB Saunders 1991.
- [5] Pauwels RA, Buist AS, Calverley PM, Jenkins CR and Hurd SS. 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: 1256-1276.
- [6] Jones PW, Quirk FH and Baveystock CM. The St George's Respiratory Questionnaire. *Respir Med* 1991; 85(Suppl B): 25-31.
- [7] Ståhl E, Jansson SA, Jonsson AC, Svensson K, Lundbäck B and Andersson F. Health-related quality of life, utility and productivity outcomes instruments: Ease of completion by subjects with COPD. *Health and Quality of Life Outcomes* 2003; 1.
- [8] Guyatt GH, King DR, Feeny DH, Stubbings D and Goldstein RS. Generic and specific measurement of health-related quality of life in a clinical trial of respiratory rehabilitation. *J Clin Epidemiol* 1999; 52: 187-192.

- [9] Mahler DA and Mackowiak JI. Evaluation of the Short Form 36-item questionnaire to measure health-related quality of life in patients with COPD. *Chest* 1995; 107: 1585-1589.
- [10] Moody L, McCormick K and Williams AP. Disease and symptom severity, functional status, and quality of life in chronic bronchitis and emphysema (CBE). *J Behav Med* 1990; 23: 297-306.
- [11] Schrier AC, Dekker FW, Kaptein AA and Dijkman JH. Quality of life in elderly patients with chronic no-specific lung disease seen in family practice. *Chest* 1990; 98: 894-899.
- [12] Viramontes JL and O'Brien B. Relationship between symptoms and health-related quality of life in chronic lung disease. *J Gen Intern Med* 1994; 9: 46-48.
- [13] Jones PW, Quirk FH, Baveystock CM and Littlejohns P. A self-complete measure of health status for chronic airflow limitation. The St. George's Respiratory Questionnaire. *Am Rev Respir Dis* 1992; 145: 1321-1327.
- [14] Monninkhof E, van DV, van der PJ, van Herwaarden C and Zielhuis G. Effects of a comprehensive self-management programme in patients with chronic obstructive pulmonary disease. *Eur Respir J* 2003; 22: 815-820.
- [15] Bourbeau J, Julien M, Maltais F, *et al.* Reduction of hospital utilization in patients with chronic obstructive pulmonary disease: a disease-specific self-management intervention. *Arch Intern Med* 2003; 163: 585-591.
- [16] Ware JE. SF-36 Health Survey Manual and Interpretation Guide. Boston. The Health Institute, New England Medical Center 1993.
- [17] Hodgkin JE, Bartolane RC and Gerilynn LC. *Pulmonary Rehabilitation* 3rd ed Philadelphia: Lippincott Williams & Wilkins 2009.
- [18] Ferrer M, Alonso J, Morera J, *et al.* For the Quality of Life of Chronic Obstructive Pulmonary Disease Study Group. Chronic obstructive pulmonary disease stage and health-related quality of life. *Ann Intern Med* 1997; 127: 1072-1079.
- [19] Janssens JP, Rochat T, Frey JG, Dousse N, Pichard C and Tschopp JM. Health-related quality of life in patients under long-term oxygen therapy: A homebased descriptive study. *Respir Med* 1997; 91: 592-602.
- [20] Griffiths TL, Burr ML, Campbell IA, *et al.* Results at 1 year of outpatient multidisciplinary pulmonary rehabilitation: A randomised controlled trial *Lancet* 2000; 355: 362-368.
- [21] Fernanda MV, Becki LB, Karen AG and Barry JM. Quality of life measure with a generic instrument (Short-Form 36) improves following pulmonary rehabilitation on patients with COPD. *Chest* 2001; 119: 77-84.
- [22] Bosley CM, Corden ZM, Rees PJ and Cochrane GM. Psychological factors associated with use of home nebulized therapy for COPD. *Eur Respir J* 1996; 9: 2346-2350.
- [23] Morgan MDL, Singh SJ and Hyland ME. The relationship between physical activity and quality of life in chronic lung disease. *Eur Respir Rev* 1997; 7: 57-59.
- [24] Rossi G, Florini F, Romagnoli M, *et al.* Length and clinical effectiveness of Pulmonary Rehabilitation in outpatients with Chronic Airway Obstruction. *Chest* 2005; 127: 105-109.
- [25] Finnerty JP, I. K, Bullough I and J. J. The effectiveness of outpatient pulmonary rehabilitation in chronic lung disease. A randomized controlled trial. *Chest* 2001; 119: 1705-1710.
- [26] Ketelaars CA, Schlösser MA, Mostert R, Abu-Saad HH, Halfens RJ and Wouters EF. Determinants of health-related quality of life in patients with Chronic Obstructive Pulmonary Disease *Thorax* 1996; 51: 39-43.