

## Original Article

## Health-Related Quality of Life in Patients with Chemical Warfare-Induced Chronic Obstructive Pulmonary Disease

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**Background:** It is well known that inhalation of chemical warfare, mostly sulfur mustard, causes injury of the respiratory system. Chronic obstructive pulmonary disease is a common disease among these patients. Health-related quality of life is a common feature of studies in chronic obstructive pulmonary disease. The objective of our study was to assess the quality of life in these patients.

**Methods:** A total of 43 male patients with stable chronic obstructive pulmonary disease due to chemical gas injury were enrolled into this study. Severity of disease was defined by the global initiative for chronic obstructive lung disease (GOLD) guideline. Health-related quality of life was assessed using the St George Respiratory Questionnaire. Symptoms, activity, impact, and total score were calculated for each patient.

**Results:** The mean  $\pm$  SD age of patients was  $42.5 \pm 7.4$  years. According to the GOLD guideline, most (72%) of the patients were in stage 2 (mean: FEV<sub>1</sub>  $1.9 \pm 0.75$  L, 53.1%  $\pm$  18.5% predicted). The mean  $\pm$  SD scores for each section of the St George Respiratory Questionnaire were  $77.9 \pm 16.3$  for "symptoms;"  $70.2 \pm 19.6$  for "activity;"  $57.8 \pm 22.5$  for "impact", and  $64.9 \pm 19.5$  as the "total score." There was a reverse correlation between FEV<sub>1</sub> (% predicted) with symptoms ( $r = -0.47$ ), activity ( $r = -0.61$ ), impact ( $r = -0.44$ ), and total score ( $r = -0.51$ ) of the St George Respiratory Questionnaire.

**Conclusion:** This study showed that lower lung functions as assessed by the St George Respiratory Questionnaire worsen the quality of life in patients with chemical warfare-induced chronic obstructive pulmonary disease.

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**Keywords:** Chemical warfare • chronic obstructive pulmonary disease • quality of Life • St George Respiratory Questionnaire

### Introduction

Since 1983, during Iran-Iraq war many Iranian veterans were exposed to chemical warfare, mostly sulfur mustard. Chronic obstructive pulmonary disease (COPD) is one of the most prevalent diseases involving respiratory tract in these patients.<sup>1,2</sup>

COPD has a great influence on the quality of life leading to problems in daily activities, and

social and physical activities of the patients.<sup>3</sup> The use of health-related quality of life measures in patients with COPD currently gained acceptance. Most clinical and therapeutic research on COPD involves the use of different types of health-related quality of life instruments.<sup>4</sup> Literature review suggested that the St George Respiratory Questionnaire was a validated tool for assessing quality of life.<sup>5,6</sup>

Quality of life measures are particularly relevant to the management of patients with COPD, because much of this care is palliative and directed to improving patient's experience of health and well-being.<sup>7</sup>

The St George Respiratory Questionnaire has been used extensively in descriptive and therapeutic evaluation studies (e.g., bronchodila-

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tors, oxygen therapy, psychotherapy, and respiratory rehabilitation).<sup>8-11</sup>

Aaron et al showed that those patients who had frequent exacerbations, had significantly worse quality of life scores.<sup>12</sup> Moreover, Ferrer et al indicated that survival was shorter in patients with worse quality of life scores; according to their findings, every four-point increase in the quality of life score is associated with an increased risk of global mortality by 5.1%.<sup>13</sup>

Presence of many chemical warfare victims in our country, their affliction in the middle age group and the consequences of this disease on their daily activities, all show the importance of evaluating health-related quality of life in these patients.

The main objective of this study was, therefore, to assess the quality of life in patients with chemical warfare-induced COPD.

## Patients and Methods

This study was conducted on 43 males with chemical warfare-induced COPD, referred to the Pulmonary Clinic of Ghaem Hospital in Mashhad, from March through September 2004. All of them had documented exposure to chemical warfare.

COPD was diagnosed based on clinical and spirometric findings ( $FEV_1 \leq 80\%$  of predicted value,  $FEV_1/FVC < 0.7$  with  $FEV_1$  change of  $<200$  mL or 15% in the bronchodilator test). The severity of disease was assessed using  $FEV_1$  measures based on the global initiative for chronic obstructive lung disease (GOLD) guideline (*stage 1*:  $FEV_1/FVC < 70\%$ ,  $FEV_1 > 80\%$ ; *stage 2*:  $FEV_1/FVC < 70\%$ ,  $50\% < FEV_1 < 80\%$ ; *stage 3*:  $FEV_1/FVC < 70\%$ ,  $30\% < FEV_1 < 50\%$ ; *stage 4*:  $FEV_1/FVC < 70\%$ ,  $FEV_1 < 30\%$ ).<sup>14, 15</sup>

Conventional spirometry was assessed with spirometer (Fukuda ST 95, Japan) before and 15 min after inhalation of two puffs of salbutamol.

The questionnaire was translated to Persian and its validity and reliability then tested. To validate the questionnaire, it was translated to Persian under supervision of a Persian literature professor and a professor of pulmonary disease and epidemiology. Regarding the translated questionnaire used for the first time in a pilot study, a quality research was done to determine the validity of translated questionnaire by a research team. After short manipulation of questionnaire, the research team was satisfied with the validity of the questionnaire.

Different social, cultural, and lifestyle concepts of our country were also considered. The test-retest method was used to estimate the reliability of translated questionnaire. At first, the questionnaire was filled by ten chemical warfare patients (to prevent bias, they were not in the research sample). Contingency coefficient for any question was calculated ( $r > 0.79$ ). Data were collected by a pulmonary subspecialist and a trained nurse on forced spirometry using standard techniques.

Patients with COPD due to smoking or other causes, those with uncompleted questionnaire, and those with coexistent acute exacerbation of COPD at the time of investigation were excluded from the study.

The St George Respiratory Questionnaire is a standard questionnaire that is designed to be completed without assistance. It measures health status in persons with obstructive airway disease.<sup>5</sup>

The St George Respiratory Questionnaire contains 76 items, divided into three sections: "symptom", that deals with the frequency and severity of the respiratory manifestations; "activity", which is related to activities that cause or are limited by dyspnea; and "impact", which covers aspects of social function and psychologic disturbances that result from respiratory disease.<sup>5, 6</sup>

Each item has a predetermined weight. Component scores were calculated for each of the three sections and a total score including all items was derived. The least possible score is 0 (best status) and the most 100 (worst status).<sup>5, 6</sup> The patients were informed that the calculated data would be used for research purposes.

## Statistical analysis

Kruskal-Wallis test was used to compare health-related quality of life scores with functional categories of COPD. The Spearman correlation coefficient was calculated to assess the association between health-related quality of life scores and functional variables. Difference in health-related quality of life scores was tested by Student's *t* test. A *P* value  $< 0.05$  was considered statistically significant.

## Results

A total of 43 patients were included in the study. Demographic and clinical characteristics of the study sample are shown in Table 1. All of the patients were male. Most patients (51%) were 30 –

**Table 1.** Baseline characteristics of the patients.

Characteristic	Mean $\pm$ SD	Min	Max
Age	42.5 $\pm$ 7.4 yr	31	62
Disease period	17.2 $\pm$ 4.5 yr	3	20
FEV <sub>1</sub> *	1.9 $\pm$ 0.75 L (53.1 $\pm$ 18.5%)	0.58	3.19
FVC**	2.6 $\pm$ 0.73 L (55.3 $\pm$ 16.2%)	0.97	4
FEV <sub>1</sub> % <sup>†</sup>	59.2 $\pm$ 15.1%	25	83

\*FEV<sub>1</sub> = forced expiratory volume in the first second;  
\*\*FVC = forced vital capacity. <sup>†</sup>FEV<sub>1</sub>%: FEV<sub>1</sub>/FVC.

40 years old. Two patients had stage 1 disease, 31 (72%) with mean  $\pm$  SD FEV<sub>1</sub> of 53.1  $\pm$  18.5% of predicted value had stage 2 disease, six had stage 3, and four had stage 4 disease. Fifty-five percent of patients suffered from comorbid neuropsychologic diseases (mostly headache) and 35% suffered from skin lesions.

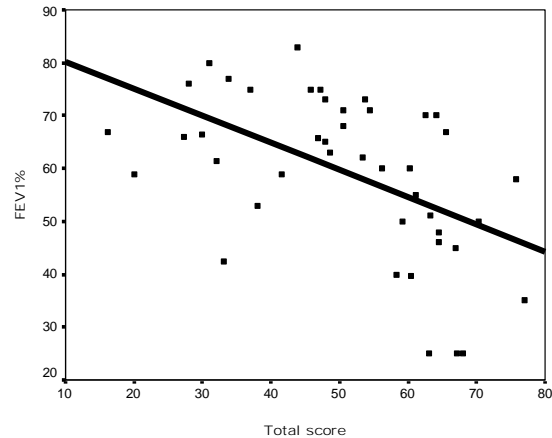
The mean  $\pm$  SD scores of each section of the St George Respiratory Questionnaire were 77.9  $\pm$  16.3 for symptoms, 70.2  $\pm$  19.6 for activity, and 57.8  $\pm$  22.5 for impact; the mean  $\pm$  SD total score was 64.9  $\pm$  19.5. This study showed a decreased health-related quality of life with an increased stage of spirometric parameters as assessed by the GOLD guideline (Table 2).

The scores obtained in different sections of the St George Respiratory Questionnaire were correlated inversely with FEV<sub>1</sub>, with correlation coefficients (r) ranging from -0.47 to -0.61. A significant ( $P = 0.004$ ) reverse correlation ( $r = -0.042$ ) was observed between the duration of clinical manifestations and FEV<sub>1</sub> percentage of the predicted value. Statistical analysis showed no correlation between duration of the disease and quality of life assessed by considering the disease symptoms ( $r = 0.16$ ;  $P = 0.31$ ), activity ( $r = 0.1$ ;  $P = 0.52$ ), impact ( $r = 0.13$ ;  $P = 0.41$ ), and total score ( $r = 0.14$ ;  $P = 0.36$ ). No statistically significant correlation was observed between the age of the patients and disease symptoms ( $r = 0.13$ ;  $P = 0.42$ ), activity ( $r = 0.22$ ;  $P = 0.16$ ), impact ( $r = 0.03$ ;  $P = 0.87$ ), and total scores ( $r = 0.05$ ;  $P = 0.75$ ).

**Table 2.** Correlation coefficients between SGRQ\* scores and spirometric values.

SGRQ* score	FEV <sub>1</sub> (% pred)	FVC (% pred)	FEV <sub>1</sub> %
Symptom	-0.47 <sup>b</sup>	-0.43 <sup>b</sup>	-0.52 <sup>c</sup>
Activity	-0.61 <sup>d</sup>	-0.5 <sup>b</sup>	-0.52 <sup>b</sup>
Impact	-0.44 <sup>b</sup>	-0.3 <sup>b</sup>	-0.46 <sup>b</sup>
<b>Total</b>	<b>-0.51<sup>c</sup></b>	<b>-0.38<sup>a</sup></b>	<b>-0.52<sup>c</sup></b>

\*St George Respiratory Questionnaire; Statistically significant = <sup>a</sup> $P < 0.05$ ; <sup>b</sup> $P < 0.01$ ; <sup>c</sup> $P < 0.001$ ; % pred = % of predicted value.

**Figure 1.** Correlation between the St George Respiratory Questionnaire total score and FEV<sub>1</sub>% predicted.

Student's *t* test showed a significant ( $P < 0.05$ ) difference between symptoms, impact, and total scores in patients with and without neuropsychologic disorders, while no significant difference was observed between their activity scores.

## Discussion

This study was conducted with the objective of evaluating the health-related quality of life in chemical warfare patients with COPD. We found that health-related quality of life decreases as disease severity increases (Figure 1).

Some reports revealed that health-related quality of life was not significantly associated with the percentage of predicted FEV<sub>1</sub>.<sup>16-19</sup> However, those investigators used only generic measures of health-related quality of life, like sickness impact profile (SIP). SIP is a well-known generic health status questionnaire constructed to facilitate comparison between different health conditions over a range of important functional aspects; it may be less sensitive than the St George Respiratory Questionnaire for assessing persons with pulmonary disease.<sup>13, 19</sup>

Our study showed that spirometric parameters have a reverse correlation with the St George Respiratory Questionnaire scores. This findings correspond to studies performed by Ferrer et al,<sup>13</sup> Stewart et al,<sup>7</sup> Ketelaars et al,<sup>20</sup> and Cesar et al.<sup>21,22</sup> Moreover, we showed that there is a relationship between functional class of pulmonary disease (FEV<sub>1</sub>) with impaired quality of life.

Considering our findings, it can be concluded that symptoms like cough, dyspnea, and wheezing have the most influence on quality of life.

Comorbid conditions in patients with COPD were common in this study. This proportion is consistent with the findings of medical outcomes study in which 66.5% of patients had comorbid diseases.<sup>7</sup> In contrary to its high prevalence, comorbidity has often been neglected in clinical studies of patients with chronic pulmonary disease.<sup>13</sup>

The St George Respiratory Questionnaire scores were significantly higher among patients with comorbid disease (e.g., neuropsychologic). It has been demonstrated that it may also reflect the impact of comorbidity on the health-related quality of life. These results indicate that assessment of comorbid condition should be included in the clinical management of patients with COPD due to chemical gas injury, and that treatment of these coexisting conditions can improve the quality of life.<sup>13</sup>

Health-related quality of life measurements have a number of drawbacks for use in clinical setting. Comparison with reference norms is a popular method of interpreting several clinical measures, such as general population-based norms for spirometric reference.<sup>2</sup> We suggest that more studies be conducted on the St George Respiratory Questionnaire in the general population, in order to develop a reference value for comparing with patient's population.

In conclusion, health-related quality of life should be considered in addition to pulmonary function tests to more appropriately assess patients with chemical warfare-induced COPD who are mainly middle aged and are considered as an active part of the society.

## References

- 1 Emad A, Rezaian GR. The diversity of sulfur mustard gas inhalation on respiratory system 10 years after a single heavy exposure: analysis of 197 cases. *Chest*. 1997; **112**: 734 – 738.
- 2 Balali M. Clinical and laboratory findings in Iranian fighters with chemical gas poisoning proceeding of the First World Congress on Biological and Chemical Warfare. *Ghent Universal Press*. 1984; (suppl): 254 – 259.
- 3 Okbadejo AA, Jones PW, Wedzich JA. Quality of life in patients with COPD and severe hypoxemia. *Thorax*. 1996; **51**: 44 – 47.
- 4 Domingo-Salvany A, Lamarca R, Ferrer M, Garcia-Aymerich J, Alonso J, Felez 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 – 685.
- 5 Jones PW, Quirk FH, Baveystock CM. The St George Respiratory Questionnaire. *Respir Med*. 1991; **85**: 25 – 31.
- 6 Jones PW, Quirk FH, Baveystock CM, Littlejohns P. A self complete measures of health status for chronic airflow limitation. The St George Respiratory Questionnaire. *Am Rev Respir Dis*. 1992; **145**: 1321 – 1327.
- 7 Stewart AL, Greenfield S, Hays RD, Wells K, Rogers WH, Berry SD. Functional status and well being of patients with chronic conditions: results from the medical outcomes study. *JAMA*. 1989; **262**: 907 – 913.
- 8 Jones PW, Bosh TK. Quality of life changes in COPD patients treated with salmeterol. *Am J Respir Crit Care Med*. 1997; **155**: 1283 – 1289.
- 9 Okubadejo AA, Paul EA, Jones PW, Wedzich JA. Does long-term oxygen therapy affect quality of life in patients with COPD and severe hypoxemia? *Eur Respir J*. 1996; **9**: 2335 – 2339.
- 10 Eiser N, West C, Evans S, Quirk F. Effects of psychotherapy in moderately severe COPD: a pilot study. *Eur Respir J*. 1997; **10**: 1581 – 1584.
- 11 Ketelaars CA, Abu-Saad HH, Scholossr MA, Mostert M, Wouters EF. Long-term outcome of pulmonary rehabilitation in patients with COPD. *Chest*. 1997; **112**: 363 – 369.
- 12 Aaron SD, Vandemheen KL, Clinch JJ, Ahuja J, Brison RJ, Dickinson G, et al. Measurement of short-term changes in dyspnea and disease-specific quality of life following an acute COPD exacerbation. *Chest*. 2002; **121**: 688 – 696.
- 13 Ferrer M, Alonso J, Morera J, Marrades RM, Khalaf A, Aguar MC, et al. Chronic obstructive pulmonary disease stage and health-related quality of life. The Quality of Life of Chronic Obstructive Pulmonary Disease Study Group. *Ann Intern Med*. 1997; **127**: 1072 – 1079.
- 14 No authors listed. Standards for the diagnosis and care of patients with chronic obstructive pulmonary disease. American Thoracic Society. *Am J Respir Crit Care Med*. 1995; **152**: S77 – S121.
- 15 Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of COPD: NHLBI/WHO Workshop report. US Department of Health and Human Services. Bethesda: NIH Publication; 2001.
- 16 Prigatano GP, Wright FC, Levin D. Quality of life and its predictors in patients with mild hypoxemia and COPD. *Arch Intern Med*. 1984; **144**: 1613 – 1619.
- 17 McSweeney AJ, Heaton RK, Adams KM. Life quality of patients with COPD. *Arch Intern Med*. 1982; **142**: 473 – 478.
- 18 Alonso J, Anto JM, Gonzalez M, Fiz JA, Izquierdo J, Morera J. Measurement of general health status of non-oxygen-dependent chronic obstructive pulmonary disease patients. *Med Care*. 1992; **30** (5 suppl): S125 – S135.
- 19 Engstrom CP, Person CO, Larsson S, Sullivan M. Health-related quality of life in COPD: why both disease specific and generic measures should be used. *Eur Respir J*. 2001; **18**: 67 – 76.
- 20 Ketelaars CA, Scholossr MA, Mostert R, Huyer Abu-Saad H, Halfens RJ, Wouters EF. Determination of

- health-related quality of life in patients with COPD. *Thorax*. 1996; **51**: 39 – 43.
- 21** Cesar LA, Ramires JA, Serrano Junior CV, Meneghetti JC, Antonelli RH, da-Luz PL, et al. Comorbidity contributes to predict mortality of patients with COPD. *Eur Respir J*. 1997; **10**: 2794 – 2800.
- 22** Cesar LA, Ramires JA, Serrano Junior CV, Meneghetti JC, Antonelli RH, da-Luz PL, et al. Interpretation of quality of life scores from the St George Respiratory Questionnaire. *Eur Respir J*. 2002; **19**: 405 – 413.

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