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COPD-Related Factors Affect the Quality of Life of Patients

Maha Dardouri and Manel Mallouli

Abstract

Over the past decades, health-related quality of life (HRQL) has become a major topic of research in the context of chronic conditions, including chronic obstructive pulmonary disease (COPD). HRQL assessment became a part of the mandatory criteria for judging the effectiveness of a therapeutic care plan. COPD still imposes an enormous burden on patients and health care systems. Daily symptoms, poor pulmonary function, and medication use can affect the social and physical life components of patients. Indeed, HRQL predictors in COPD patients were controversial in the literature. To this end, we conducted a review of the literature to describe COPD-related factors that influence the HRQL of patients. This study included research articles published in English from 2010 to 2020. This review of sparse and well-designed literature gave a current state-of-the-art that could be useful for clinicians, and in establishing advanced COPD management plans.

Keywords: COPD, quality of life, dyspnea, exacerbation, comorbidity, disease management

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a lung disease that is characterized by a persistent blockage of the flow of inhaled gases. It tends to be an under-diagnosed condition, which engages the life prognosis [1]. In fact, COPD is a growing global health problem that caused 4.07% of total disability adjusted life years in adults aged 50 to 69 years [2]. It is currently the fourth leading cause of death worldwide [3]. More than 3 million people worldwide died of COPD in 2012, which was equal to 6% of all deaths globally [4].

Although this condition is not curable, pharmacological and non-pharmacological treatments can slow the progression of the disease [1]. Symptoms, such as dyspnea, cough, and sputum, can lead to exercise intolerance and restriction in daily life activities of patients with COPD [5, 6]. Consequently, they progressively impair the health related quality of life (HRQL) [6]. According to Roche and Similowski, impaired HRQL is a major issue in chronic disease management. Its measurement is currently part of the mandatory criteria for judging the effectiveness of a treatment or a plan of chronic condition management [7].

Indeed, HRQL was defined by the World Health Organization since 1984 as the individual's perception of his place in life, in the context of the culture and value system in which he or she lives, in relation to his objectives, expectations, standards and concerns. It is a very broad concept, influenced in a complex way by the physical health of the person, his or her psychological state, his or her level

of independence, his or her social relations, as well as his or her relationship to the essential elements of his or her environment [8]. This perception may vary with age, health status, maturity, and over time [9, 10]. Thus, it is important to periodically assess the HRQL of patients.

In fact, HRQL assessment is an important indicator in healthcare since it provides an overview of the impact of the disease on the patient's life. It is substantial for optimizing patient comfort and improving care [7]. In research, HRQL assessment is interesting to justify various forms of treatment. It helps in improving therapies and providing significant data to judge the Cost/Effectiveness ratio of healthcare therapies [11].

One of the main objectives of COPD treatment was to improve the general health condition of patients. As a result, HRQL has become a major topic of research in COPD patients [12, 13]. Several studies assessed the factors determining the HRQL in patients with COPD using various methods and instruments. Indeed, predictors of HRQL were controversial in the literature. Furthermore, it is crucial to identify clinical factors related to COPD that affect the HRQL of patients. This could be useful and time-saving for health care providers in developing advanced and evidence-based COPD management programs.

In this chapter, we aimed to describe the findings of studies that analyzed clinical factors determining the HRQL of COPD patients published in the past decade.

2. Methods

2.1 Study design

This was a literature review of analytical studies that assessed the clinical factors determining the HRQL in patients with COPD.

2.2 Sources of information and data search

The data search was carried out using three electronic databases, namely, MEDLINE, ScienceDirect, and Mendeley. Data collection was conducted from December 2020 to January 2021. Studies identified in the references of the selected articles, and that met the inclusion criteria were included in this review.

The terms used for the search were 'quality of life', 'Pulmonary Disease, Chronic Obstructive', 'epidemiologic factors', 'risk factors', 'influencing factors', 'outcomes and process assessment' in different combinations.

2.3 Inclusion criteria

Studies were primarily assessed basing on their titles and abstracts. After exclusion of duplicates, studies were included in this review according to the following inclusion criteria: English language articles published in scientific journals, the study included generic or specific instruments or both of them to collect information on predictors of HRQL among COPD patients, the study included only COPD patients, the work included quantitative information on clinical predictors of HRQL and articles published from 2010 to 2020.

2.4 Data extraction

For each study included in this literature review, the following variables were recorded: author and country, study design, study period, sample size, tools

for HRQL assessment, and findings of the study regarding clinical factors influencing HRQL.

3. Results

Basing on the titles and abstracts, forty-two articles seemed to meet the objectives of this review. Twenty-six articles were excluded for one of the following reasons: articles not written in English language, articles published before 2010 ($n = 24$), samples were not exclusively COPD patients, articles aimed to assess HRQL without identifying predictive factors. Consequently, the final sample was reduced to sixteen studies.

Table 1 shows the characteristics of the included studies. The studies were conducted in different regions in the world, namely European countries, South Korea, China, Egypt, Tunisia, and United States. Most of the studies used a multicenter, cross-sectional analytical design, with studies' periods ranged from 3 months to 6 years. Five studies used a multicenter, prospective analytical design, with 6-month to 5-year period [14–18]. The minimal sample size used in the studies was $n = 42$, and the maximum one was 5619. The mean age of studied populations ranged from 59 ± 10.1 to 72.2 ± 8.11 . Patients with all COPD severity stages (GOLD I to IV) and with co-morbidities were included in the studies.

Various tools of HRQL assessment were used in the literature (**Table 1**). The St George's Respiratory Questionnaire (SGRQ), which is a COPD-specific tool, was largely used (10 studies). Two studies used the COPD Assessment Test [19, 20].

Regarding generic instruments, the Medical Outcome Study 36-Item Short-Form Health Survey (SF-36) and the EuroQol-5 Dimension (EQ-5D) were used in 6 studies. Also the Medical Outcome Study 12-Item Short-Form Health Survey (SF-12) was used in one study as a second tool. The severity of dyspnea was mainly assessed by the "Medical Research Council (MRC) dyspnea scale".

All of the studies reported a significant HRQL impairment in patients with COPD. The prospective studies recorded the changes of HRQL status over time at 6 months to 5 years' follow-up.

Twelve papers identified more than one clinical factor affecting the HRQL in COPD subjects, and five articles identified only one factor [18, 19, 21–23]. COPD symptoms [14–16, 18, 21, 23–26], COPD severity [5, 6, 12, 24, 27], and co-morbidities [5, 12, 16, 20, 24, 26, 27] were commonly identified as predictors of HRQL in COPD subjects.

4. Discussion

The current review reported sixteen studies with two different designs: cross sectional and prospective. The cross sectional study design is limited in its ability to draw valid conclusions as to the association between COPD-related factors and HRQL. Also, cross-sectional studies can present a memorization bias. Nevertheless, the sample size used in most of the documented studies was large enough to assess HRQL with adequate precision. In regards with prospective studies ($n = 5$), they eliminate the memorization bias as there is no need for information recall. Follow-up can provide more information concerning the changes that patients experience and their possible impact on HRQL. For instance, Monteagudo and colleagues observed a clinically important changes in HRQL in nearly two thirds of the study population (36.7% improving and 29.2% worsening HRQL). However, the loss to follow-up is common in prospective studies, which is an important limitation [28].

Author(s), year, country of the study	n	Study period	Study design	HRQL Instrument(s)	Clinical factors predicting HRQL of patients with COPD
Jones et al. (2011), Europe	1817	5 months	Cross-sectional epidemiological, non-randomized study.	St George's Respiratory Questionnaire, Short Form 12.	Severity of COPD, exacerbation, presence of three or more co-morbidities.
Zamzam et al. (2012), Egypt	40	1 year	Cross-sectional study	St George's Respiratory Questionnaire.	Severity of COPD, Smoking index, forced expiratory volume in 1 second (FEV1), FEV1/FVC ratio (FVC: Forced vital capacity), Peak expiratory flow rate (PEFR), Forced expiratory flow at 25%- 75% of maximal lung volume (FEF25-75%).
Monteagudo et al. (2013), Spain	791	1 year	Multi center, prospective study	St George's Respiratory Questionnaire.	Factors associated with HRQL improvement: Poly-medication, pulmonology visits, and a balanced diet; ending respiratory rehabilitation, quitting smoking habit, infrequent exacerbation. Factors associated with HRQL worsening: Symptoms (dyspnea, expectoration), hospital admissions
Negi et el (2014), India	126	6 months	Cross-sectional study	St George's Respiratory Questionnaire.	Severity of COPD, body mass index, FEV1, dyspnea, depression, anxiety, smoking index.
Liang et al. (2014), China	491	1 year	Prospective cohort study	St George's Respiratory Questionnaire.	MRC dyspnea grade, number of exacerbations
Sundh et al. (2015), Sweden	373	11 months	Multicenter, cross-sectional study	EuroQol-5 dimension, COPD Assessment Test.	Co-morbid conditions: chronic bronchitis, depression, osteoporosis, and musculoskeletal symptoms
Kendrovà et al. (2015), Slovakia	80	7 months	Cross-sectional study	St George's Respiratory Questionnaire, Short Form-36	Symptoms: cough, dyspnea
Deslee et al. (2016), France	178	—	Cross-sectional multicenter study	St George's Respiratory Questionnaire.	Current cough in the previous 7 days.

Author(s), year, country of the study	n	Study period	Study design	HRQL Instrument(s)	Clinical factors predicting HRQL of patients with COPD
Martinez et al. (2016), United States	5619	—	Cross-sectional study	St George's Respiratory Questionnaire.	Dyspnea severity.
Kwon & Kim (2016), South Korea	2,734	6-year data	Cross-sectional surveys	EuroQol-5 dimension	Severity of COPD, co-morbidities (Depression, osteoporosis, diabetes, cardiovascular disease)
Lee et al. (2017), South Korea	1,264	4 years	Multi center, prospective study	St George's Respiratory Questionnaire.	Symptoms (dyspnea and cough), number of co-morbidities.
Mallouli et al. (2017), Tunisia	335	3 months	Cross-sectional study	Medical Outcome Study 36-Item Short-Form Health Survey (MOS SF-36)	COPD severity (Moderate to very severe), 2 or more co-morbidities, MRC dyspnea grade 4 and 5.
Brien et al. (2018), United Kingdom	735	2 years	Cross-sectional study	5 level EuroQol-5 dimension (EQ-5D 5 L)	Dyspnea, depression, anxiety, 12-month exacerbations.
Amini et al. (2020), Iran	175	11 months	Cross-sectional study	Chronic Obstructive Pulmonary Disease Assessment Test	Inhaler technique
Esteban et al. (2020), Spain	543	5 years	Prospective cohort study	St George's Respiratory Questionnaire.	Inhaled medication, smoking habit, FEV1, 6MWT distance, body mass index, residual volume, diffusing capacity of the lung for carbon monoxide, physical activity, and hospitalization.
Park (2020), South Korea	42	6 months	Longitudinal study	Medical Outcome Study 36-Item Short-Form Health Survey (MOS SF-36)	COPD symptoms

Table 1.
Characteristics of the Studies analyzing clinical outcomes influencing the HRQL of patients with COPD.

Regarding to the populations' characteristics, most of the studies addressed middle-age adults and/or older adults. Besides, most of the patients were between moderate and very severe COPD severity stages. They presented different comorbidities, such as diabetes, osteoporosis, depression, anxiety, and cardiovascular diseases.

HRQL is a multidimensional, subjective, and dynamic concept, which make it difficult to assess. Nevertheless, there are reliable and valid HRQL measurement tools in the literature. Indeed, Mercier and Schraub distinguished two methods to assess HRQL [29]. The first one is via psychological interview that allows a comprehensive evaluation of HRQL and has therapeutic value. The second method is via psychometric tools that consist of scales or questionnaires. It performs a restrictive evaluation of HRQL and allows standardized measurement. This method is generally easy to use. For that, we included the studies that used this type of HRQL evaluation in this review.

In the literature, the specific questionnaire mostly used to assess the HRQL was the St George's Respiratory Questionnaire. The generic questionnaires SF-36 and the EQ-5D were also widely used in the literature. These instruments reported that COPD altered the HRQL of patients even in a mild stage [5, 6, 14, 15, 21, 23–25].

HRQL is the result of the interaction of multiple physical, psychological and social components. Consequently, several factors can affect it, especially in COPD subjects.

This review demonstrated that multiple COPD-related factors had a significant negative influence on the HRQL of patients with COPD.

4.1 COPD-related factors

COPD-related factors include pulmonary function, physical activity, chronic cough, chronic wheeze, dyspnea, exacerbations, and hospitalizations. The first concept related to a chronic disease is the severity stage. Therefore, the impact of COPD severity on HRQL was often analyzed. Five studies demonstrated that HRQL was deteriorated across severity stages of COPD [5, 6, 12, 24, 27]. Indeed, the more the disease worsens the more the HRQL deteriorates. Thus, it is important to note that HRQL should be considered as a substantial health status indicator in this population.

Symptoms, including chronic cough/sputum, wheeze, and dyspnea, were commonly identified as predictors of HRQL (9 studies). Eight of nine studies showed that an advanced dyspnea grade was associated with a worsening of HRQL scores [14–16, 21, 23–26]. Frequent cough [21, 22] and expectoration [14] also deteriorated the HRQL scores.

The negative impact of exacerbations was reported in the literature. Authors declared that the degree of HRQL impairment depended on the frequency of exacerbations [5, 14, 15]. Indeed, Liang and colleagues revealed that COPD patients who had 3 exacerbations or more in the past 1 year had significantly an impaired HRQL [15].

One the main objectives of COPD treatment was to improve the patient's health status. Indeed, Montegudo and colleagues revealed that patients taking multiple medications and ending respiratory rehabilitation had improved HRQL at 1-year follow-up [14]. Recently, Esteban and colleagues showed that using 2 out of long-acting beta agonists, long-acting muscarinic antagonists, and inhaled corticosteroid, or 3 of them was significantly associated with HRQL scores [17]. Amini and colleagues demonstrated that appropriate inhaler technique was associated with better HRQL in patients with COPD [19]. This data suggested that optimizing inhaler technique should be considered in COPD management programs.

Pulmonary function was significantly associated with HRQL [6, 17, 24]. It was shown that residual volume, diffusing capacity of the lung for carbon

monoxide, and low forced expiratory volume in 1 second (FEV1) predicted HRQL of COPD patients.

In brief, dyspnea had significantly and independently the highest impact on HRQL in comparison with other COPD-related factors and co-morbidities [12, 14–16, 24, 26]. Several research studies demonstrated that dyspnea was the best predictor of HRQL in COPD patients, especially MRC dyspnea grade 4 and 5 [15, 16, 26]. Indeed, Monteagudo and colleagues revealed that the onset of new symptoms negatively influenced HRQL more than their persistence [14].

4.2 Co-morbidities

Patients with COPD often have at least one associated co-morbidity. Co-morbidities were significantly associated with HRQL impairment. Studies showed that the degree of impairment depended on the number of co-morbidities [5, 12, 16]. Indeed, COPD patients who had 2 to 3 or more co-morbidities had significantly lower HRQL score. Anxiety, depression and other chronic diseases, such as diabetes, hypertension, osteoporosis, and cardiovascular disease, were associated with HRQL impairment [20, 24, 26, 27]. In fact, several studies showed that depression was commonly associated with HRQL worsening [20, 24, 26, 27]. Brien and colleagues reported that depression was associated with higher HRQL [26]. Besides, Kwon and Kim showed that osteoporosis and depression had the highest impact on HRQL in comparison with cardiovascular disease, diabetes, cancer and hypertension [27]. However, Sundh and colleagues revealed that chronic bronchitis phenotype in COPD patients indicated a higher risk of low HRQL in comparison with musculoskeletal symptoms, osteoporosis and depression [20].

Coping strategies can enhance the HRQL of COPD patients, but this might fail in case of co-morbid conditions [30]. Therefore, COPD management interventions should address co-morbid conditions along with COPD-related factors. Patient-tailored care could be an appropriate strategy for optimal management of the disease and its associated factors.

5. Conclusions

To conclude, COPD is a burdensome disease that progressively deteriorates the HRQL of patients. This literature review reported that disease severity, frequent symptoms and exacerbations, poor lung function, inappropriate medication use and co-morbidities were significantly associated with HRQL impairment. Dyspnea had the highest impact on HRQL in comparison with other COPD-related factors. Besides, depression was commonly associated with a higher impairment of HRQL. These factors should no longer be a matter of controversy. Disease management interventions should be delivered as early as possible in order to prevent the onset of new co-morbidities and to optimize the disease control.

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Conflict of interest

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