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Symptoms of Gastroesophageal Reflux Disease and Dysphagia in Patients with Chronic Obstructive Pulmonary Disease: Associated Factors

Sintomas da Doença do Refluxo Gastroesofágico e de Disfagia em Pacientes Portadores de Doença Pulmonar Obstrutiva Crônica: Fatores Associados

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Abstract

To analyze the presence of gastroesophageal reflux disease (GERD) and dysphagia in patients with chronic obstructive pulmonary disease (COPD) and evaluate associated factors. Cross-sectional study part of a large cohort study. The Dysphagia Handicap Index (DHI), Gastroesophageal Reflux Disease Symptoms Questionnaire (QS-GERD) and The Eating Assessment Tool (EAT-10) were applied. A medical consultation, spirometry examination, and health status assessments (by modified Medical Research Council scale - mMRC, COPD Assessment Test - CAT, Saint George Respiratory Questionnaire - SGRQ) were performed on the same day as the DHI, QS-GERD and EAT-10. Thirty-four individuals participated in the study, with a mean age of 65.2 (SD=7.9) complete years with COPD, 52.9% being female, and a body mass index of 26.6 (SD=6.3) kg/m^2. Eleven individuals were classified as having risk for dysphagia. The evaluation of gastroesophageal reflux symptoms through the QS-DRGE showed moderate correlation with EAT-10. The GERD-SQ instrument showed moderate correlation with the SGRQ, as well as in the three domains, finding that the presence of GERD symptoms is a factor that is associated with worsening quality of life. It is concluded that patients with COPD present symptoms of dysphagia and gastroesophageal reflux. In this study, it was found that the presence of GERD symptoms and swallowing disorders are factors associated with worsening quality of life.

Keywords: Deglutition. Deglutition Disorders. Pulmonary Disease, Chronic Obstructive. Gastroesophageal Reflux. Quality of Life.

Resumo

Avaliar a presença de sintomas da doença do refluxo gastroesofágico (DRGE) e disfagia em pacientes portadores de doença pulmonar obstrutiva crônica (DPOC) e analisar os fatores associados. Estudo transversal aninhado a um estudo de coorte. Foram aplicados os instrumentos Índice de Desvantagem da Deglutição (IDD), Questionário de Sintomas na Doença do Refluxo Gastroesofágico (QS-DRGE) e o Instrumento de Autoavaliação da Alimentação (EAT-10). No mesmo dia da aplicação dos instrumentos foram realizadas a consulta médica, exame espirometria e avaliação do estado de saúde e qualidade de vida, avaliados por meio do Saint George Respiratory Questionnaire (SGRQ). Participaram do estudo 34 indivíduos com média de idade de 65,2 (DP=7,9) anos completos portadores de DPOC, sendo 52,9% do sexo feminino e índice de massa corporal de 26,6 (DP= 6,3) kg/m^2. Onze indivíduos ficaram classificados como tendo risco para disfagia. A avaliação dos sintomas de refluxo gastroesofágico através do QS-DRGE apontou correlação moderada com EAT-10. O instrumento QS-DRGE apresentou correlação moderada com o SGRQ, assim como nos três domínios, constatando-se que a presença de sintomas de DRGE é um fator que está associado à piora da qualidade de vida. Conclui-se que pacientes com DPOC apresentam sintomas de disfagia e de refluxo gastroesofágico. Nesse estudo, constatou-se que a presença de sintomas de DRGE e os distúrbios da deglutição são fatores que estão associado à piora da qualidade de vida.

Palavras-chave: *Deglutição. Transtornos de Deglutição. Doença Pulmonar Obstrutiva Crônica. Refluxo Gastroesofágico. Qualidade de Vida.*

1 Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease characterized by respiratory signs and symptoms, in addition to persistent airflow limitation[1]. Considered one of the three leading causes of world mortality, the disease affects one to ten adults in the global population[2].

Alterations in the respiratory pattern may impair the coordination between Swallowing and breathing, which is fundamental to the efficient protection of the lower airways[3]. Therefore, patients with COPD, due to ventilatory difficulties, tend to be susceptible to Swallowing alterations, interrupting breathing during Swallowing, resuming it in the inspiratory phase and potentiating the risk of bronchoaspiration[4].

Another risk factor for worsening COPD is the gastroesophageal reflux disease (GERD)[5], which is defined as the return of gastric content to the esophagus. It results in mucosal and esophageal motility damage and symptoms such as pyrosis and/or acid regurgitation[6]. GERD is one of the most common causes of chronic cough and is a risk factor for COPD exacerbation. Additionally, patients with this disease, due to their weakness in diaphragmatic muscles and other associated factors, are more vulnerable to developing GERD, mentioned in some studies as a risk factor for exacerbation and an aspiration determining factor[7-9]. Thus, the objective of this study was to evaluate the presence of GERD symptoms

and dysphagia in patients with COPD and to analyze the associated factors.

2 Material and Methods

This is an observational, cross-sectional and quantitative study, based on a cohort study called *Follow COPD cohort study*. The study was approved under legal opinion number 2.657.440 by the Ethics and Research Committee of the Federal University of Santa Catarina and all the participants signed the Free and Informed Consent Form.

The sample selection was by convenience and inclusion criteria were individuals over 40 years old with confirmed diagnosis of COPD and as exclusion criteria, individuals who at the time of collection were in unstable clinical conditions, such as exacerbation of the disease.

Upon accepting to participate in the research, the patients were submitted to medical consultation, spirometry examination and health status assessment (modified *Medical Research Council* scale – mMRC[10],*COPD Assessment Test* – CAT[11], *Saint George Respiratory Questionnaire* - SGRQ)[12]. Afterward, a previously trained researcher, collected data on the identification of staging and global classification of COPD, regular use of medications, history of smoking, comorbidities, previous phono audiological evaluation and history of pneumonia, exacerbations and hospitalizations.

The following instruments were applied Swallowing Handicap Index (DHI)[13], Questionnaire of Symptoms in Gastroesophageal Reflux Disease (QS-GERD)[14], *Saint George Respiratory Questionnaire* (SGRQ)[12] and the Eating Assessment Tool (EAT-10)[15].

IDD[9] is an instrument composed of 25 questions of possible problems related to Swallowing, divided among three domains: physical, functional and emotional. Its objective is to measure the effects of dysphagia on the quality of life of individuals from different diagnoses. EAT-10[15] consists of ten questions that assess complaints related to dysphagia and its limitations in social and emotional life. It provides information on functionality, emotional impact and physical symptoms that a Swallowing problem can lead to an individual's life. QS-GERD[14],is a questionnaire with 11 questions to evaluate symptoms in gastroesophageal reflux disease before and after therapeutic interventions. Finally, SGRQ[12] is an instrument that measures health damage and perception of well-being through 76 items distributed in three domains (symptoms, activities and impact). The total and each domain scores are presented as a percentage of the maximum score, with higher scores representing a poorer quality of life.

The data collected were stored in an Excel® spreadsheet with a double conference to ensure the quality of the results, for later statistical analysis using the SPSS version 22 program(IBM Corporation, Armonk, NY, USA). The Shapiro-Wilk test was conducted to assess the data normality. The descriptive statistics was performed to summarize the data obtained that are presented through central tendency and dispersion for continuous variables and through absolute and relative frequency for categorical variables. Pearson's chi-square test and Fisher's exact test were used to test association when appropriate. Spearman's correlation was performed to evaluate the magnitude and direction of the variables tested. The level of significance established was $p \leq 0.05$[16].

3 Results and Discussion

Between June 2019 and March 2020, thirty-four patients diagnosed with COPD were included in the study with a mean age of 65.2 (SD=7.9) years old, most of them (52.9%) female.

As for comorbidity, 52.9% had some comorbidity associated with COPD, 2.9% had been hospitalized, 38.9% had an episode of COPD exacerbation, 8.8% of the patients reported a diagnosis of pneumonia in the last year. Patients with COPD often present other comorbidities associated with the disease, such as cardiovascular diseases, metabolic disorders, osteoporosis, skeletal muscle dysfunction, anxiety, depression, gastrointestinal diseases and other respiratory diseases such as asthma, bronchiectasis, pulmonary fibrosis and lung cancer[17]. Exacerbations are episodes of worsening of symptoms that require some health resource and manifest in the course of the disease. A higher frequency of exacerbations is associated with worsening pulmonary function, quality of life and mortality[18].

The smoking load analyzed in pack/year showed an average of 44.8 (SD=28.7) and the time of cessation of tobacco use ranged from 30 days to 40 years and 64.7% reported being ex-smokers. The literature points out that men and women have different susceptibility to tobacco. Women develop COPD earlier and with more severe conditions with lower exposure to tobacco. They have more frequent respiratory infections and asthmatic women are more susceptible to COPD, have a poorer quality of life and tend to use health resources more frequently[19].

Regarding the use of respiratory drugs, 94.1% of the individuals used medications such as corticoids and bronchodilators, 5.9% did not use any respiratory drugs. No patient reported speech-language evaluation or previous Swallowing examination.

Regarding the classification of COPD severity, 47.1% of them are in the moderate stage, and in the global classification, 52.9% of them are in group B, which indicates individuals who presented less exacerbations of the disease and without hospitalizations, but more symptomatic (mMRC >2 and CAT >10). Regarding CAT, which is an instrument that makes it possible to evaluate the impact of COPD on health status and quality of life, the mean of 16.5 indicates a greater commitment to health status. The mMRC scale for dyspnea graduation 38.2% of the individuals were in level four, showing greater dyspnea ("feels so much shortness of breath that I no more leave home, or when I am getting dressed"). Table 1 shows in

detail the detailed profile of all the participants.

Table 1 - Profile of the 34 participants of this study

Variables	M (DP)	n (%)
Weight, kg	69.1 (18.6)	
Height, cm	160.8 (8.4)	
BMI, kg/m^2	26.6 (6.3)	
Nutritional Status		
Low weight		6.0 (17.6)
Normal weight		9.0 (26.5)
Overweight		9.0 (26.5)
Obesity		10.0 (29.4)
Pulmonary Function		
FVC	2.5 (0.8)	
FEV_1(L)	1.3 (0.5)	
FVC_1/FEV	0.5 0(.1)	
FEV (%)	74.4 (19.)2	
FVC_1	48.4 (17.4)	
Health Status		
CAT		
	16.5 (9.4)	
mMRC		
0- Dyspnea in intense exercises		9.0 (26.5)
1- Dyspnea when walking in a hurry		5.0 (14.7)
2- Needs to stop to breathe even walking slowly		2.0 (5.9)
3- Stops to breathe after walking less than 100 m		5.0 (14.7)
4- Feel so much shortness of air that I no more leave home		13.0 (38.2)
COPD classification according to GOLD		
Global Classification		
A - Lower risk and lower symptoms		8.0 (23.5)
B- Lower risk and more symptoms		18.0 (52.9)
D- Higher risk and more symptoms		8.0 (23.5)
Severity Classification		
Stage I – Light		1.0 (2.9)
Stage II – Moderate		16.0 (47.1)
Stage III – Severe		10.0 (29.4)
Stage IV - Very severe		7.0 (20.6)
Respiratory drugs		
Yes		32.0 (94.1)
No		2.0 (5.9)
Proton pump inhibitors		
Omeprazole		14.0 (41.2)
Use of the inhibitor regularly		8.0 (23.5)

Acronyms: BMI = body mass index; FVC (L) = Forced vital capacity; FEV_1L = Forced expiratory volume in one second; FEV_1/FVC = Ratio between forced expiratory volume in one second and Forced vital capacity; FVC (%) = Forced vital capacity FEV_1 (%) = Forced expiratory volume in one second; COPD = chronic obstructive pulmonary disease; GOLD: *Global Initiative for Chronic Obstructive Lung Disease*.

Source: Resource data.

Regarding the results obtained through the application of the questionnaires used in this study, 41.2% of the patients reported being satisfied with the reflux symptoms evaluated through QS-GERD. In relation to IDD – Swallowing Severity, 67.6% self-classified as having a normal Swallowing. Only 32.4% presented a risk for dysphagia according to the cut-off point established by EAT-10. Among the 31 participants who completed the SGRQ, 67.7% presented worsening of quality of life. Table 2 shows all the results obtained for the four instruments applied.

Table 2 - Scores allocated by the participants, according to each evaluation instrument

Instrument	M (DP)	N (%)
QS-GERD – Total score	9.7 (6.9)	
QS-GERD – Degree of satisfaction		
Very satisfied		4.0 (11.8)
Satisfied		14.0 (41.2)
Neutral		8.0 (23.5)
Dissatisfied		8.0 (23.5)
IDD – Total score	2.2 (1.6)	
IDD - Swallowing severity		
Normal		23.0 (67.6)
Moderate		9.0 (26.5)
Severe		2.0 (5.9)
EAT-10 – Total score	5.8 (8.7)	
EAT-10 – Cut-off point >3		11.0 (32.4)
SGRQ – Cut-off point > 25[a]		21.0 (67.7)
SGRQ – Total score [a]	38.3 (22.6)	
SGRQ (symptoms) [a]	41.2 (27.8)	
SGRQ (activity) [a]	47.1 (27.1)	
SGRQ (impact) [a]	32.8 (23.0)	

Note: [a] values computed for 31 patients. Acronyms: QS-GERD = Gastroesophageal Reflux Disease Symptoms Questionnaire; IDD = Swallowing Severity Index; EAT-10 = Eating Assessment Tool; SGRQ = *Saint George Respiratory Questionnaire.*

Source: Resource data.

Regarding the reflux symptoms, 41.2% reported being satisfied with their current situation, eight dissatisfied and 23.5% neutral, (the question that obtained the highest scores in the answers was regarding the sensation of pyrosis after meals. In a recent systematic review, the prevalence of gastroesophageal reflux in COPD patients ranged from 19% to 29%. When objective measurements were used for evaluation such as 24-hour prolonged esophageal pH-metry, the prevalence of gastroesophageal reflux in patients with COPD ranged from 19% to 78%[21]. Therefore, demonstrating that the evaluation of symptoms is important, however, the prevalence of asymptomatic gastroesophageal reflux[20] is expressive and objective methods for evaluation are fundamental.

Julie et al.[21], carried out a study aimed at investigating the EAT-10 ability to identify laryngotracheal aspiration during the objective examination of Swallowing in COPD patients. Thirty individuals were evaluated and instructed to complete the questionnaire and immediately carry out the objective evaluation. It was observed that the EAT-10 detected aspiration with a high level of precision. The instrument is fast, easy, and can help in the diagnosis and need of referrals for a specialized evaluation and also identify dysphagia early.

It was analyzed to what extent the quality of life is

associated with symptoms of gastroesophageal reflux disease, risk for dysphagia and Swallowing severity. No statistically significant associations were found for any of these variables: $p = 0.72$; $p = 0.14$ and $p = 1.00$, respectively. However, a study by Gonzalez et al.[22]evaluated 571 patients (59% of the female sex) with COPD through a questionnaire to identify dysphagia symptoms and associated risk factors. The results showed that 33% reported some symptom of dysphagia, and the most symptomatic participants were in GROUP B and D of GOLD and a significant relationship between dysphagia and dyspnea symptoms and when related to CAT.

In the study conducted by Garand et al.[23], 10 patients with COPD in advanced stages of the disease and low weight were evaluated in order to identify Swallowing disorders through objective examination of Swallowing (video fluoroscopy), questionnaires (IDD and EAT-10) and quality of life evaluation through SGRQ. The results showed that all patients presented Swallowing impairment when assessed by the objective exam, and the symptoms reported by the patients through the questionnaires were minimal and not consistent with the difficulties encountered in the objective exam. The study also mentions that the decrease in pharyngeal sensitivity may be responsible for the patient's limitation in observing his or her Swallowing difficulty, and may be putting the individual at risk increasing the probability of laryngotracheal penetration/aspiration.

Correlation analyzes were conducted and, for parsimony purposes, the results are separated into two tables, observing the number of participants who completely filled in the instruments analyzed here. Spearman's correlation was performed to obtain the correlation coefficient involving the following variables: total scores of QS-GERD, EAT-10, IDD, CAT and mMRC questionnaires and the correlation matrix is available in Table 3.

Table 3 - Spearman's correlation matrix among the total scores of mMRC, CAT, QS-GERD, EAT-10 and IDD (n=34)

Variables	mMRC	CAT	QS-GERD	EAT-10	IDD
mMRC	–				
CAT	0.81	–			
QS-GERD	0.46	0.61	–		
EAT-10	0.51	0.62	0.63	–	
IDD	0.48	0.61	0.49	0.83	–

Acronyms: mMRC = Modified *Medical Research Council* scale ; CAT = *COPD Assessment Test;* QS-GERD = Gastroesophageal Reflux Disease Symptoms Questionnaire; EAT-10 = Eating Assessment Tool ; IDD = Swallowing Severity Index.
Source: Resource data.

Table 4 shows the Spearman's correlation matrix that involved SGRQ. The correlations between the total SGRQ score, each of the dimensions of this instrument, as well as the total scores of the QS-GERD, EAT-10 and IDD questionnaires were analyzed.

Table 4 - Spearman's correlation matrix among the total scores of QS-DRGE, EAT-10, IDD, SGRQ-T, SGRQ-S, SGRQ-A and SGRQ-I (n=31)

Variables	QS-GERD	EAT10	IDD	SGRQ-T	SGRQ-S	SGRQ-A	SGRQ-I
QS-GERD	–						
EAT10	0.63	–					
IDD	0.49	0.83	–				
SGRQ-T	.568	0.86	0.84	–			
SGRQ-S	.660	0.54	0.51	0.55	–		
SGRQ-A	.350	0.57	0.53	0.52	0.53	–	
SGRQ-I	.598	0.66	0.62	0.62	0.78	0.77	–

Acronyms: mMRC = Modified *Medical Research Council* scale ; CAT = *COPD Assessment Test;* QS-GERD = Gastroesophageal Reflux Disease Symptoms Questionnaire; EAT-10 = Eating Assessment Tool ; IDD = Swallowing Severity Index; SGRQ-T = *Saint George Respiratory Questionnaire* – Total score; SGRQ-S = *Saint George Respiratory Questionnaire* – Symptoms; SGRQ-A = *Saint George Respiratory Questionnaire* – Activities; SGRQ-I = *Saint George Respiratory Questionnaire* – Impact.
Source: Resource data.

In the present study, the QS-GERD instrument presented a moderate correlation with the SGRQ-T and all domains, and it was observed that the presence of GERD symptoms is a factor that is associated with the worsening of quality of life. The study by Martinez et al.[24], the presence of GERD was verified in COPD patients with GERD, who presented worse quality of life (SGRQ), higher dyspnea (mMRC) and higher frequency of exacerbations.

Regarding the instruments related to Swallowing, IDD and EAT-10 presented a high correlation. IDD presented an average score of 2.2, which can be considered a minimum limitation in the quality of life related to Swallowing. Most of the participants (67,6%) in the classification of the Swallowing severity, referred as having a normal Swallowing, 26,5% as having a moderate problem and only 5,9% as having a serious Swallowing problem. The question that obtained the highest scores in the answers was related to the sensation of dry mouth, corroborating with Theander et al.[25], in which

xerostomia is a common problem in COPD patients due to oral breathing and the use of inhaled bronchodilators and corticosteroids. Still, Clayton et al.[26], add that previous and current smoking, the use of inhalational medications and oxygen therapy may affect pharyngeal and laryngeal mucosa receptors, causing a decrease in sensitivity.

The IDD presented a low correlation with QS-GERD, pointing out that individuals who have difficulties swallowing also present GERD symptoms. Also, it presented a moderate correlation with the SGRQ-T, showing that swallowing disorders are correlated with worsening quality of life in COPD patients.

EAT-10 presented an average of 8.7 in the classification and 11 individuals were above the cut-off point and classified as having risk for dysphagia. The assessment of gastroesophageal reflux symptoms through QS-GERD showed a moderate correlation when assessed with EAT-10. In other words, the more symptoms of GERD, the greater the chances of these patients presenting swallowing disorder. The EAT-10 and IDD instruments, when correlated with the SGRQ-T, also presented moderate correlations, therefore, swallowing disorders are factors associated with worsening quality of life in COPD patients.

The study of Prestes et al.[3] evaluated the relation between the risk of dysphagia and the health status in individuals with COPD through CAT and EAT-10 in which it presented a moderate relations, explaining that the better the health status, the lower the chances of developing swallowing difficulties.

Julie et al.[27], carried out a study aimed at investigating the EAT-10 ability to identify laryngotracheal aspiration during the objective examination of Swallowing in COPD patients. Thirty individuals were evaluated and instructed to complete the questionnaire and immediately carry out the objective evaluation. It was observed that the EAT-10 detected aspiration with a high level of precision.

The scarce literature on the subject, and the lack of screening instruments for dysphagia and symptoms of gastroesophageal reflux translated and validated for the Portuguese language, was limited for discussion. The EAT-10 instrument still needs validation in Brazilian sampling to confirm the applicability and reliability, already proven in other countries. However, it is important to note that the instruments have been shown to be complementary and of great importance for the evaluation and decision-making in the treatment of patients with COPD.

4 Conclusion

It is concluded that patients with COPD present symptoms of dysphagia and gastroesophageal reflux. In this study, it was found that the presence of GERD symptoms and Swallowing disorders are factors associated with worsening quality of life.

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