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# Relationship between dysphagia risk and health status in patients with chronic obstructive pulmonary disease

## *Relação entre o risco de disfagia e o estado de saúde de indivíduos com a doença pulmonar obstrutiva crônica*

### ABSTRACT

**Purpose:** To verify the relationship between the risk of dysphagia and health status in patients with Chronic Obstructive Pulmonary Disease (COPD). **Method:** Cross-sectional study with convenience sample. Twenty-three individuals with a diagnosis of COPD according to GOLD 2019 criteria. The individuals participated in a pulmonary rehabilitation program, clinically stable (without exacerbations of at least 30 days) and in optimized drug treatment were included. The study analyzed anthropometric measures (BMI), peak expiratory flow (PEF), mental status (MEEM), eating assessment tool (EAT-10), and health status (COPD Assessment Test -CAT). The mean age was  $60.39 \pm 9.90$  years, 11 individuals were female and eutrophic. **Results:** We observed a positive and moderate association ( $r = 0.57$ ,  $p = 0.004$ ) between the CAT and EAT-10 scores in the sample studied. **Conclusion:** The results demonstrated relationship between the risk of dysphagia and the health status in individuals with COPD.

### RESUMO

**Objetivo:** Verificar a relação entre o risco de disfagia e o estado de saúde de indivíduos com Doença Pulmonar Obstrutiva Crônica (DPOC). **Método:** Estudo transversal, com amostra de conveniência. Foram incluídos 23 indivíduos com diagnóstico de DPOC, de acordo com os critérios de GOLD (2019). São participantes de um programa de reabilitação pulmonar, clinicamente estáveis (sem exacerbações dos sintomas, no mínimo, de 30 dias) e em tratamento medicamentoso otimizado. Foram avaliadas as medidas antropométricas (IMC), o pico de fluxo expiratório (PFE), o estado mental (MEEM), o risco de disfagia (*Eating Assessment Tool* -EAT-10) e o estado de saúde (*COPD Assessment Test* -CAT). A média de idade dos participantes foi de  $60,39 \pm 9,90$  anos, dos quais 11 eram do sexo feminino e eutróficos. **Resultados:** Foram encontradas associações positiva e moderada ( $r=0,57$ ;  $p=0,004$ ) entre o escore obtido pelo CAT e EAT-10 de indivíduos com DPOC. **Conclusão:** Os resultados demonstraram relação entre o risco de disfagia e o estado de saúde nos indivíduos com DPOC.

Study conducted at the Universidade Federal de Santa Maria/Hospital Universitário de Santa Maria – UFSM - Santa Maria (RS), Brasil.

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**Conflict of interest:** Nothing to declare.

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## INTRODUCTION

Chronic Lung Disease (CLD) is characterized by the presence of respiratory pathologies in the airways, which result in significant interferences in quality of life. Among them, Chronic Obstructive Pulmonary Disease (COPD) stands out, which is estimated to be, by 2020, the third leading cause of mortality worldwide<sup>(1,2)</sup>.

Patients with COPD present lack of coordination between breathing and swallowing processes, but there are only few studies on the prevalence of dysphagia and other swallowing disorders in this population. Studies indicate that the presence of dysphagia varies between 17 and 85% in patients with COPD<sup>(3,4)</sup>.

Dysphagia causes several signs and symptoms, such as cough, choking and globus pharyngeus, being an important risk factor for malnutrition, dehydration and aspiration pneumonia<sup>5</sup>.

Some studies<sup>(3,4)</sup> suggest that patients with COPD may present decreased strength when swallowing, use expired air to clean the pharyngeal recesses, as well as laryngopharyngeal sensory deficits, which may increase the chance of penetration episodes and silent aspiration. Such factors can trigger aspiration pneumonia and exacerbation of the disease.

Bassi et al. (2014)<sup>(6)</sup>, showed that patients with COPD, admitted in a university hospital, presented risk for oropharyngeal dysphagia, ratifying the relationship between individuals with COPD and symptoms of dysphagia. Moreover, in the United Kingdom, a study<sup>(7)</sup> composed of 687 patients with suspected dysphagia referred for speech-language therapy evaluation sought to identify the factors influencing aspiration pneumonia in patients hospitalized over six months and COPD was among the most common causes of aspiration pneumonia in these patients<sup>(7)</sup>.

For those individuals, the coordination between breathing and swallowing is very important, since episodes of tracheal aspiration resulting from swallowing disorders can lead to an exacerbation of the disease. Conversely, an exacerbation of respiratory disease can lead to episodes of aspiration, thereby increasing the severity of the condition.

Based on the above, recognizing symptoms indicative of dysphagia in individuals with COPD allows professionals to adopt preventive and protective measures to the patient's health, preventing episodes of aspiration and exacerbation of the disease. In this sense, the aim of the study was to verify the relationship between the risk of dysphagia and the health status of individuals with COPD.

## METHOD

We developed a cross-sectional study, with a convenience sample to achieve the proposed objective. The research followed the guidelines of the *Conselho Nacional de Saúde* (Resolution 466/2012), which approves the guidelines and regulatory standards of research involving human beings. Thus, all individuals signed the Informed Consent Form to participate in the research. The study was approved by the *Comitê de Ética*

*em Pesquisa of Universidade Federal de Santa Maria*, under opinion number 1,967,549.

The research was carried out in a University Hospital, from September 2017 to June 2018. Convenience sampling was used to select twenty-three individuals of both sexes, with clinical and spirometry diagnosis of COPD according to GOLD (2019), and FEV<sub>1</sub>/FVC should be less than 70% of the predicted. Participants must be undergoing a clinically stable pulmonary rehabilitation program, i.e., without exacerbations of symptoms – which consists of acute worsening of respiratory symptoms, resulting in additional therapy, such as short-term bronchodilators, antibiotics and/or oral corticosteroids and hospitalization or consultation in emergencies<sup>2</sup> of at least 30 days, and in optimized drug treatment. Exclusion criteria were the coexistence of neurological conditions, severe orofacial pain – including trigeminal neuropathy –, uncontrolled systemic arterial hypertension, other respiratory diseases (asthma, bronchiectasis) and individuals who score less than or equal to 24 in MMSE (Mini-Mental State Examination).

## Spirometry

Spirometry is a test that measures the amount of air entering and leaving the lungs, assisting in the diagnosis and quantification of ventilatory disorders, as well as in the prevention of these disorders. The results are compared with the predicted values for the population to be evaluated and with clinical and epidemiological data<sup>(8)</sup>.

In order to classify the degree of current obstruction of each individual, spirometry data were obtained through a Micro Medical Limited® Spirometer, according to the guidelines for performing pulmonary function tests<sup>(8)</sup>, by a physiotherapist.

## Mini-Mental State Examination (MMSE)

The Mini-Mental State Examination (MMSE) was applied to screen some cognitive impairment, both for the reliability of the answers and for referrals to other professionals, when necessary. The MMSE was applied as a screening instrument for the research<sup>(9)</sup>.

## Nutritional profile

Anthropometric data were used to characterize the nutritional profile, such as: weight measurement, with a portable digital scale (Filizola brand®), for capacity to 150 kg and an interval of 100 g. For this, the patient was positioned standing barefoot, in the center of the scale and wearing light clothing. Height was measured with the portable stadiometer (Sanny brand®), and the patient was positioned standing, with their back to the evaluator, barefoot and with the weight equally distributed between the feet, with their heels together and their arms extended along the body with the palms facing the thighs. Body mass index (BMI) was calculated by adopting the reference values for COPD: BMI between 22 and 27 kg/m<sup>2</sup> for eutrophia, BMI < 22 kg/m<sup>2</sup> for malnutrition and BMI > 27 kg/m<sup>2</sup> for obesity<sup>(10)</sup>.

## Eating Assessment Tool (EAT-10)

To identify the risk of dysphagia, we used the Brazilian adapted version<sup>(12)</sup> of the Eating Assessment Tool (EAT-10)

questionnaire, which assesses complaints related to swallowing and the limitations they cause in the social and emotional life of patients. The questionnaire consists of 10 questions that provide information about functionality, emotional impact and physical symptoms that a swallowing problem can cause in an individual's life. The instrument is composed of a self-administered scale used to assess swallowing complaints, regardless of their origin. The time to answer it is about two minutes and can be filled in by the patients on their own<sup>(13)</sup>.

### Assessment of state of health

The state of health was assessed by the COPD Assessment Test (CAT) instrument, which quantifies the impact of COPD symptoms on the patient's routine clinical practice, and this instrument is already validated for the Brazilian population<sup>(11)</sup>. It is a questionnaire composed of eight items, namely: cough, sputum, chest tightness, dyspnea when climbing stairs, home activity, confidence when leaving home, sleep and energy. Items can be scored from zero to five. The result is given by the sum of the items, and higher scores determine a worst state of the patient<sup>(12)</sup>.

### Peak expiratory flow measures

The peak expiratory flow was evaluated using the Peak Flow Meter Assess – Reorder No 710 Full Range (60-880 l/min). It is a small portable device made of clear plastic material, with disposable nozzle, containing a graduated system of measurements that evaluates the force and speed of air outlet from inside the lungs in L/min<sup>(13)</sup>.

The test assesses the strength and speed of air inside the lungs, detects the airways narrowing and can be useful for monitoring asthma, classifying its severity and evaluating response to treatment<sup>(14)</sup>. Although it is not recommended for the diagnosis of airflow obstruction<sup>(15)</sup>, Hegewald et al.<sup>(16)</sup> state that PEF (Peak Expiratory Flow) measurements can be a practical method of screening and initial identification of severe cases of Chronic Obstructive Pulmonary Disease (COPD), for further confirmation by spirometry<sup>(17)</sup>.

The test was performed with the participant sitting with feet resting on the floor in an individualized room. The patient was instructed to perform a deep inspiration to their Total Lung Capacity (TLC), using a nasal clip. To obtain PEF measurements, the individual was required to perform a forced expiration through the nozzle after a maximal inspiration. During data collection, the researcher held the device vertically, taking care the fingers did not block the air outlet, and then the participant was asked to place the mouth firmly around the plastic nozzle, assuring no air escape – which could interfere with the measurements – and blow as hard and as fast as they could. Three attempts were made to measure maximum peak expiratory flow – provided that the latter was not larger than the others and there were no differences between the higher measurements.

As a benefit of the research, individuals considered at risk of dysphagia were referred for a specialized speech-language

therapy evaluation with videofluoroscopy swallowing exam, an instrumental evaluation considered “gold standard”, in which it is possible to verify issues related to the anatomy and physiology of swallowing<sup>(18)</sup>. The exam is performed using radiological contrast and allows a more accurate diagnosis of swallowing disorders, helping in the conduct and therapeutic direction<sup>19</sup>.

Data analysis was performed by the Bioestat 5.0 program (public domain). The continuous variables were measured by mean, standard deviation and Pearson correlation, while the qualitative variables were described by proportion, adopting as significant  $p < 0.05$  values.

## RESULTS

We evaluated twenty-three individuals, whose characteristics are described in Table 1. Of these, 17.39% (4) had mild COPD, 34.78% (8) moderate degree, 34.78% (8) severe degree and 13.04% (3) very severe degree, with a mean total age of  $60.39 \pm 9.90$  years old.

**Table 1.** Sample characterization

VARIABLES	n = 23
Age (years old)	60.39 ± 9.90
Height (m)	1.59 ± 0.07
BMI (kg/m <sup>2</sup> )	25.07 ± 5.79
MMSE	25.82 ± 4.23
CAT	19.52 ± 8.44
None (0-5) n (%)	1 (4.34%)
Mild (6-10) n (%)	2 (8.69%)
Moderate (11-20) n (%)	8 (34.78%)
Severe (21-30) n (%)	10 (43.47%)
Very severe (31-40) n (%)	2 (8.69%)
EAT10	0.0 - 36.0
>3 points n (%)	11 (45.8%)
≤3 points n (%)	12 (50.1%)
PEAK FLOW (l/min)	
Realized	230.65±92.03
% Predicted	51.12±20.59
SPIROMETRY (post-BD)	
% FEV <sub>1</sub> /FVC	57.90±18.86
% FEV <sub>1</sub>	53.68±19.39

**Captions:** m = meters; BMI = Body Mass Index; kg = kilogram; m<sup>2</sup> = square meter; MMSE: Mini-Mental State Exam; CAT: COPD Assessment test; EAT10: Eating Assessment Tool; l = liters; min = minute; BD: bronchodilator; FEV<sub>1</sub> = Forced Expiratory Volume in the First Second; FVC = Forced Vital Capacity

Figure 1 shows the results of association between CAT and EAT 10. The results showed a positive and moderate correlation between the variables.

$p = 0,004$   
 $r = 0,57$   
 IC 95% 0,2 a 0,8

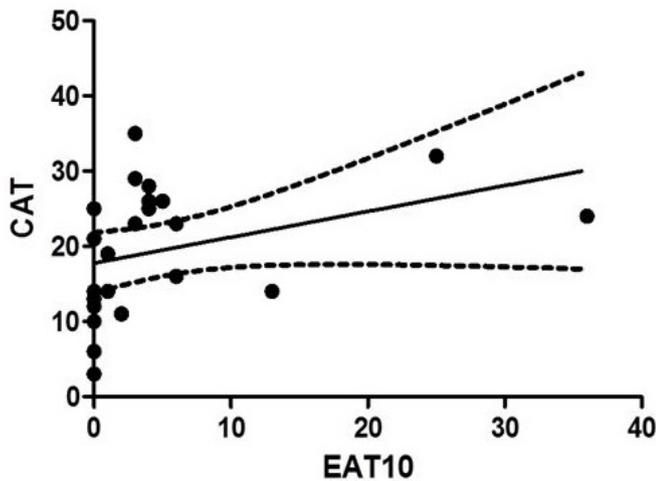


Figura 1. Relação entre as variáveis de risco de disfagia e estado de saúde nos indivíduos com DPOC

## DISCUSSION

Changes in the swallowing process in patients with Chronic Lung Disease has been much investigated in recent years, which reinforces the need for multidisciplinary screening methods, easy to apply and with low cost. Thus, the EAT10 can help identify the presence of alterations, which helps physicians and the individual in the referral for subsequent evaluations<sup>(20)</sup>.

The EAT10 questionnaire was initially developed as a self-assessment instrument for the identification of the risk of dysphagia<sup>12</sup>. However, there is still no validation in a Brazilian sample, in order to confirm the applicability and reliability, already proven in other countries<sup>(24)</sup>.

Gonçalves *et al.* (2013)<sup>(12)</sup> developed a cultural adaptation of the Brazilian version of the EAT10 with patients admitted at *Hospital São Paulo* and with good cognitive level. They concluded that, when this instrument is used by several health professionals, in addition to contributing to early interventions and reducing treatment costs, it improves quality of life, as it allows the early identification of symptoms of dysphagia. Therefore, the importance of also evaluating the impacts that such changes produce on the state of health of individuals is highlighted.

In individuals with COPD, the state of health is widely assessed by the CAT questionnaire, classified as the “gold standard” of evaluation, according to the Global Initiative for Chronic Obstructive Lung<sup>(2)</sup>. It was elaborated with the objective of determining the impact of COPD on the patient’s state of health and quality of life in a simple and reliable way<sup>(25)</sup>, it is an easy-to-apply questionnaire, which the patient can fill in<sup>(11)</sup>.

The questionnaire consists of eight questions related to COPD symptoms that most bother the patient, which are related to: cough, secretion, chest tightness, shortness of breath when climbing ramp, limitations in daily activities, confidence to leave home, sleep and energy. The score ranges from 0 to 5 points in

each item, reaching a total of 40 points; lower scores correspond to a low impact of the disease on the state of health<sup>(25)</sup>.

In the present study, the EAT10 assessment showed a positive and moderate relationship with the state of health assessed through the CAT questionnaire, i.e., the better the patients’ state of health, the lower the chances of developing changes during swallowing.

Understanding the relationship between aspects of state of health in COPD and the symptoms of swallowing disorders shows the need for programs with multidisciplinary care, in which the patient receives evaluation and treatment that can support the health in general.

A study<sup>(26)</sup> conducted in an outpatient pulmonary rehabilitation program at Austin Health, with the objective of evaluating the effect education and intervention of COPD patient on the management of oropharyngeal dysphagia, showed that education and screening improved the quality of life. It is also worth mentioning the need for instrumental assessment of swallowing as an integral part of a pulmonary rehabilitation program, since swallowing alterations in COPD include decrease in swallowing strength, use of exhaled air for cleaning of pharyngeal recesses, as well as laryngopharyngeal sensory deficits, which increases the risk of aspiration pneumonia, resulting in exacerbation of the disease.

The scarce literature on the findings of the present study limits the discussion, as well as the absence of a questionnaire to assess the quality of life in individuals with dysphagia. However, we observe that all the instruments used showed to be complementary and can be of great value for decision-making in the evaluation and treatment of the population studied.

## CONCLUSION

There was an association between the risk of dysphagia and the state of health in individuals with COPD.

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### Authors contributions

*DP developed the project, performed data collection and final writing; DFDB developed the project and assisted in the final writing of the paper; JRN developed the project, performed data collection and final writing; NCR developed the project, performed data collection, data analysis and final writing; CV developed the project, performed data collection and assisted in writing the final paper; AFSS developed the project, performed data collection and assisted in writing the paper; RM developed the project, guided and reviewed the work; ASP developed the project, guided and reviewed the paper.*