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Oropharyngeal deglutition, nutrition, and quality of life in individuals with chronic pulmonary disease

Deglutição orofaríngea, nutrição e qualidade de vida no indivíduo com doença pulmonar crônica

Keywords

Deglutition
Chronic Pulmonary Disease
Deglutition Disorder
Quality of Life
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Descritores

Deglutição
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ABSTRACT

Purpose: Describe efficacy and safety of deglutition, nutritional risk, and quality of life in deglutition, and associate nutritional risk with quality of life in individuals with chronic pulmonary disease. **Methods:** The participants were 17 individuals with chronic pulmonary disease evaluated using the following instruments: Volume-Viscosity Swallow Test (V-VST), Quality of Life in Swallowing Disorders (SWAL-QOL) questionnaire, Mini Nutritional Assessment (MNA), and body mass index (BMI). **Results:** Changes in efficacy were observed in nine (52.94%) individuals and impairments in efficacy and safety were found in two (11.77%) individuals. All individuals were considered eutrophic by the nutritional assessment. Correlation was observed between nutritional risk and domains 3 ($r=-0.803$; $p=0.05$) and 5 ($r=0.636$; $p=0.026$) of the SWAL-QOL questionnaire. **Conclusion:** Changes in efficacy and safety of deglutition were observed; however, no nutritional risk was evidenced in the sample evaluated. Correlation between nutritional risk and quality of life in deglutition was also observed.

RESUMO

Objetivo: descrever a eficácia e segurança da deglutição, o risco nutricional e a qualidade de vida em deglutição e relacionar o risco nutricional com a qualidade de vida dos indivíduos com doença pulmonar crônica. **Método:** 17 indivíduos com diagnóstico de doença pulmonar crônica foram avaliados por meio do *Volume-Viscosity Swallow Test* (V-VST), *Quality of Life in Swallowing Disorders* (SWAL-QOL), *Mini Nutritional Assessment* (MNA) e índice de massa corpórea. **Resultados:** foi encontrada alteração de eficácia da deglutição em nove (52,94%) dos indivíduos e eficácia+segurança em dois (11,77%). Todos os indivíduos estavam eutróficos na avaliação nutricional. Houve relação entre o risco nutricional com os domínios 3 ($r=-0,803$; $p=0,05$) e 5 ($r=0,636$; $p=0,026$) do SWAL-QOL. **Conclusão:** houve alteração de eficácia e segurança da deglutição, no entanto não foi encontrado risco nutricional evidente na amostra avaliada. Ainda, houve relação entre o risco nutricional com a qualidade de vida em deglutição.

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INTRODUCTION

Chronic pulmonary disease (CPD) is characterized by airway obstruction and increased expiratory resistance associated with abnormal inflammatory response in the lungs; it affects 5-15% of the adult population, with 90% of cases associated with smoking⁽¹⁾.

It is estimated that three Brazilians die as a result of CPD owing to disease exacerbation every hour. The most common manifestations of CPD are chronic bronchitis and lung emphysema. It is also estimated that approximately 40,000 deaths occur in Brazil annually as a result of CPD⁽²⁾. Additionally, other clinical conditions compose this group of diseases, such as asthma, bronchiectasis, chronic obstructive pulmonary disease (COPD) and cystic fibrosis.

The specific scientific literature has shown that individuals with pulmonary complications commonly present with dysphagia, which is responsible for clinical complications such as malnutrition, dehydration, discomfort when feeding, exacerbations, and hospital admissions^(1,3). Presence of dysphagia in these patients is associated with increased morbidity and mortality due to the high risk of aspiration pneumonia and other lung problems^(4,5).

Studies have shown that because of the impairment in the breathing/swallowing synchrony caused by pulmonary hyperinflation, specifically with chronic obstructive pulmonary disease, there is recruitment of the accessory muscles of respiration, which causes deformations and changes in the shape and geometry of the thorax, affecting the deglutition function^(6,7). Furthermore, changes in the triggering of deglutition associated with the long period of apnea during swallowing have been reported in the literature as factors predisposing for exacerbations⁽⁸⁾.

Severity of dysphagia, need for immediate recognition, and effective treatment are a challenge, both because of their impact on health and the repercussions on the quality of life of individuals and their families, whose goal includes achievement of a diet closer that patients used to have before the pathology and absence of lung infections due to bronchoaspiration and/or malnutrition⁽⁹⁾.

The Volume-viscosity Swallow Test (V-VST) is among the clinical assessment instruments capable of predicting changes in the efficacy and safety of swallowing. This tool has 83.7% sensitivity and 64.7% specificity to detect presence of aspiration, 69.2% sensitivity for waste, 88.4% for multiple swallows⁽¹⁰⁾. Although V-VST has not yet been validated for Brazilian Portuguese, it presents good application in clinical practice as a screening instrument for dysphagia and referral to objective examinations of swallowing.

Considering possible biomechanical and sensory impairments in swallowing, which compromise its efficacy and safety, individuals with CPD are more susceptible to nutritional deficiencies and negative repercussions on swallowing-related quality of life. Loss of pleasure in eating can lead to poor nutritional intake. In this context, the objective of the present study was to describe the efficacy and safety of deglutition, nutritional risk, and quality of life in swallowing, and associate nutritional risk with the quality of life of individuals with CPD.

METHODS

This cross-sectional study followed the guidelines of the National Health Council (Resolution no. 466/2012), which approves the regulatory guidelines and standards for research involving human beings. Thus, all participants signed an Informed Consent Form (ICF) prior to study commencement. This survey was approved by the Research Ethics Committee of the Universidade Federal de Santa Maria under protocol no. CAAE 57250116.3.0000.5346.

The study was conducted with a convenience sample comprising patients attending the Pulmonary Rehabilitation Program of the Hospital Universitário de Santa Maria in 2016. Inclusion criteria comprised individuals with clinical and spirometry diagnosis of emphysema, chronic bronchitis, cystic fibrosis, bronchiectasis, and asthma; clinically stable, without exacerbation of the disease for at least three months; within the age groups: adult (19 to 44 years), middle-aged (45 to 64 years), and elderly (65 to 79 years).

The study sample was composed of 17 individuals: eight (47.1%) diagnosed with COPD and nine (52.9%) with bronchiectasis. Table 1 shows the clinical and nutritional characteristics of the individuals assessed.

In order to classify the current degree of obstruction of each individual, spirometric data were obtained using a spirometer (Micro Medical Limited[®]) according to the guidelines for conducting lung function tests provided by a collaborating physiotherapist⁽¹¹⁾.

Efficacy and safety of deglutition were assessed by means of the Volume-viscosity Swallow Test (V-VST). This instrument presents duration of application of 5-10 minutes, and aims mainly to define deglutition from two characteristics: efficacy – the patients' ability to ingest the calories and water they need to be nourished and hydrated (oral spillage, oral residue, multiple swallows, and pharyngeal waste) and safety - the patients' ability ingest avoiding aspiration hazards, so that respiratory complications do not occur (cough, vocal impairment, and decreased peripheral oxygen saturation)⁽¹²⁾.

Table 1. Characterization of the sample according to age, lung function, and nutritional status

Variables	n = 17
Gender, % (n)	
Male	47.1% (8)
Female	52.9% (9)
Age, years	55.35 ± 12.89
Spirometry, post-BD	
%FVC	64.25 ± 15.19
%FEV ₁	57.24 ± 19.68
%FEV ₁ /FVC	83.60 ± 30.28
Corticoid medications	100% (17)
Weight, kg	67.59 ± 15.15
Height, m	1.61 ± 0.11
BMI, kg/m²	25.95 ± 4.75
Nutritional risk (MNA), % (n)	
Normal	58.82% (10)
Risk of malnutrition	41.18% (7)
Total score	12

Caption: BD: Bronchodilator; FVC: Forced vital capacity; FEV₁: Forced expiratory volume in the 1st second; MNA: Mini nutritional assessment; BMI: Body mass index

Quality of life in deglutition was evaluated by means of the Quality of Life in Swallowing Disorders (SWAL-QOL) questionnaire. This tool consists of 44 questions assessing 11 domains: (1) swallowing as a burden; (2) eating desire; (3) feeding duration; (4) symptom frequency; (5) food selection; (6) communication; (7) fear of eating; (8) mental health; (9) social function; (10) sleep; and (11) fatigue. The total score for each domain ranges from 0 to 100: the lower the score, the worse the quality of life associated with swallowing. SWAL-QOL also has four additional questions regarding possible impairments or need for adaptation of the elderly during the feeding process⁽¹³⁾.

The Mini Nutritional Assessment (MNA[®]) was applied aiming to classify the nutritional status of each individual. This is a simple, cost-free, non-invasive evaluation of easy and quick application that is highly specific (98%) and sensitive (96%), and has good reproducibility⁽¹⁴⁾. The summarized MNA can be applied in only four minutes. Its maximum score is equals to 14. Scores ≥ 12 points denote normal nutritional status, whereas scores < 11 points indicate possibility of malnutrition; therefore, the questionnaire should be continued and the process of nutritional assessment is also considered⁽¹⁵⁾.

For calculation of the body mass index (BMI) ($\text{weight} \div \text{height}^2$), the weight in kilograms (kg) and the height in meters (m) were

measured. The BMI of the individuals evaluated was classified by cutoff points for this population: BMI =22-27kg m² for eutrophia, BMI $< 22\text{kg/m}^2$ for malnutrition, and BMI $> 27\text{kg/m}^2$ for obesity⁽¹⁶⁾.

Results were entered in a Microsoft-Excel[®] spreadsheet and analyzed using Stata[®] 22 software. The analyzed variables were presented as mean, standard deviation, and percentage. Analysis of correlation between nutritional risk and quality of life in deglutition was performed with application of the Pearson's correlation test. A significance level of 95% ($p < 0.05$) was adopted for all statistical analyses.

RESULTS

Regarding efficacy and safety of deglutition, six patients (35.29%) presented no impairment, nine (52.94%) showed changes in efficacy, and two (11.77%) had changes in efficacy and safety. Tables 2 and 3 present the distribution of changes according to swallowing safety and efficacy, respectively.

Figure 1 depicts the mean description of each domain of the Quality of Life in Swallowing Disorders (SWAL-QOL) questionnaire.

Correlation between nutritional risk and quality of life in deglutition is shown in Table 4.

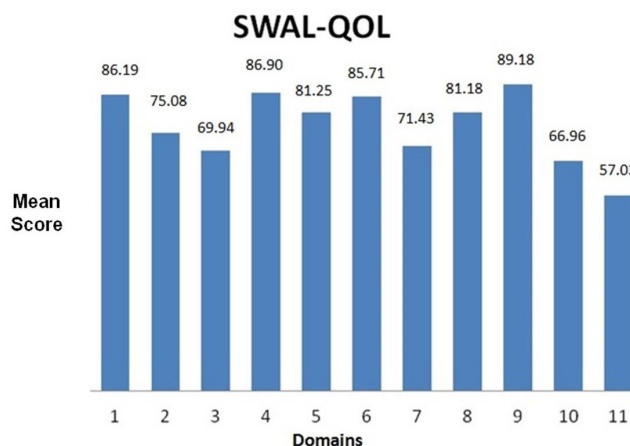
Table 2. Safety of deglutition in the individuals assessed

Safety variables	Nectar			Liquid			Pudding		
	5 ml	10 ml	20 ml	5 ml	10 ml	20 ml	5 ml	10 ml	20 ml
Cough	0.0%	5.9%	0.0%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
Vocal impairment	0.0%	0.0%	0.0%	5.9%	5.9%	5.9%	0.0%	5.9%	5.9%
SpO₂ decrease	5.9%	0.0%	0.0%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%

Caption: SpO₂; peripheral oxygen saturation

Table 3. Efficacy of deglutition in the individuals assessed

Efficacy variables	Nectar			Liquid			Pudding		
	5 ml	10 ml	20 ml	5 ml	10 ml	20 ml	5 ml	10 ml	20 ml
Oral spillage	5.9%	5.9%	0.0%	5.9%	5.9%	5.9%	0.0%	5.9%	11.8%
Oral residue	0.0%	0.0%	0.0%	5.9%	5.9%	5.9%	0.0%	5.9%	5.9%
Multiple swallows	29.4%	35.3%	58.8%	11.8%	35.3%	35.3%	23.5%	52.9%	52.9%
Pharyngeal residue	11.8%	5.9%	5.9%	11.8%	11.8%	11.8%	5.9%	11.8%	17.6%



Caption: Domain 1: Burden; Domain 2 = Eating desire; Domain 3 = Feeding duration; Domain 4 = Symptom frequency; Domain 5 = Food selection; Domain 6 = Communication; Domain 7 = Fear; Domain 8 = Mental health; Domain 9 = Social function; Domain 10 = Sleep; Domain 11: Fatigue

Figure 1. Description of the Quality of Life in Swallowing Disorders (SWAL-QOL) instrument

Table 4. Association of nutritional risk variables with quality of life in deglutition in individuals with Chronic Pulmonary Disease

Variables	Correlations [*]	p [*]
Risk of malnutrition × Domain 3	<i>r</i> = - 0.803	0.05
Risk of malnutrition × Domain 5	<i>r</i> = - 0.636	0.026

*Pearson's correlation test

Strong negative correlation was observed between risk of malnutrition and Domain 3, whereas moderate negative correlation was found between risk of malnutrition and Domain 5 of SWAL-QOL.

DISCUSSION

Recent studies have demonstrated the correlation between dysphagia and Chronic Pulmonary Diseases (CPD); however, no surveys addressing safety and efficacy of deglutition have been found in the specific scientific literature to date. Therefore, the results presented in this study provide novelty and grounding for further research, contributing to the Speech-language Pathology and Physical Therapy areas.

Studies addressing swallowing disorders in individuals with Chronic Pulmonary Obstructive Diseases (COPD) are largely found in the world scientific literature. Yawn⁽¹⁷⁾ evaluated 78 individuals and observed that 85% presented some degree of swallowing impairment. A previous survey conducted by means of videofluoroscopy found deglutition impairment mainly with regard to ingestion of liquids⁽¹⁸⁾.

Chaves et al.⁽⁶⁾ sought to identify symptoms indicative of dysphagia in individuals diagnosed with COPD using a self-perception questionnaire. They reported that participants presented symptoms of dysphagia associated with the pharyngeal and esophageal phases of swallowing, mechanism of protection of the airways, history of pneumonia, and eating symptoms.

Clayton et al.⁽¹⁹⁾ verified that individuals with COPD had several risk factors for aspiration, including lower mechanical sensitivity of the pharynx and larynx. The authors investigated 20 individuals through a questionnaire of self-perception of swallowing, clinical evaluation, and endoscopy, and found high rates of laryngeal penetration, residue in valleculae, and presence of laryngotracheal aspiration.

More than half of the individuals in the analyzed sample presented impaired efficacy (52.94%), especially with the consistencies of nectar and pudding in volumes of 20 ml regarding the item multiple swallows. Oliveira⁽²⁰⁾, in a study conducted with patients with bronchiectasis, found similar results: 50% of the participants presented multiple swallows with semi-liquid diet and 55.5% with pasty diet.

In this study, although the presence of multiple swallows was prevalent, they can be considered efficient due to low detection of pharyngeal residue in the clinical evaluation. This result may be associated with incoordination between breathing and swallowing - commonly found in these individuals, who demand longer pauses during swallowing to maintain respiratory rhythm and reduce apnea time^(7,21), compromising efficacy.

Investigating the quality of life in deglutition is important to understand the real impact of changes experienced at the

moment of feeding, which are able to reflect on nutritional status according to the individual's own perception⁽²²⁾. In this context, the present study presents an important contribution regarding the associations of domains 3 and 5 of the SWAL-QOL questionnaire with the nutritional variables of the assessed individuals.

Although all study participants were considered eutrophic in the evaluation, and most of them without risk of malnutrition, negative correlation was observed between domain 3 (feeding duration) of SWAL-QOL and body mass index (BMI). This finding may be justified, based on the literature, by the description of individuals with lower BMI, possibly presenting high energy expenditure generated by increased recruitment of respiratory muscles and frequent hospitalizations associated with acute exacerbations of the disease, which lead to greater need for oxygen and nutrients⁽²³⁾ to perform simple tasks, including eating.

Another important fact evaluated in the sample was the ingestion of oral corticosteroid medications by all patients. Studies show that the use of these drugs induces depletion of lean mass, generating dysfunctions in the peripheral musculature such as strength and resistance deficits^(24,25).

Individuals with CPD may require approximately 20% more energy supplementation compared with baseline values owing to respiratory effort. In most cases, nutritional deficiency results from unbalance between caloric intake and energy expenditure⁽²⁶⁾. Thus, it is possible to suppose that individuals who select the best quality foods may present lower risk of malnutrition, as evidenced in the present study in the negative correlation between domain 5 (food selection) of SWAL-QOL and nutritional risk.

The scarce literature on the theme has limited the discussion of the present study. In addition, it was not possible to stratify individuals according to the underlying disease due to the small sample size. Therefore, we suggest that further studies addressing swallowing in its most varied aspects be conducted with individuals with CPD through clinical and objective evaluations, and their relation with nutritional risk and quality of life in deglutition.

CONCLUSION

Changes in efficacy and safety of deglutition were observed; however, no nutritional risk was evidenced in the sample evaluated. Correlation between nutritional risk and quality of life in deglutition was also observed.

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Author contributions

DAW and EMSS were responsible for the study design and development, and writing of the manuscript; ASP and RM contributed in the study design and development, and writing and revision of the manuscript.