





Jessica Soares Xavier<sup>1</sup>   
Amanda Cibelly Brito Gois<sup>2</sup>   
Letícia de Carvalho Palhano  
Travassos<sup>3</sup>   
Leandro Pernambuco<sup>1,3,4</sup> 

# Oropharyngeal dysphagia frequency in older adults living in nursing homes: an integrative review

## Frequência de disfagia orofaríngea em idosos institucionalizados: uma revisão integrativa

### Keywords

Swallowing Disorders  
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Homes for the Aged

### Descritores

Transtornos de Deglutição  
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### ABSTRACT

**Purpose:** To synthesize the scientific knowledge on the frequency of oropharyngeal dysphagia in older adults living in nursing homes. **Research strategies:** The study question followed the PECO strategy and the search was performed in the Pubmed/Medline, Web of Science, Scopus, LILACS and SciELO databases, using keywords and specific free terms. **Selection criteria:** articles with no time or language restrictions that reported the frequency of oropharyngeal dysphagia in older adults living in nursing homes and the diagnostic criteria. **Data analysis:** it was analyzed the population characteristics, the concept of “oropharyngeal dysphagia”, the methods for identifying the outcome and the frequency of oropharyngeal dysphagia. The evaluation of the methodological quality of the articles followed the criteria of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). **Results:** Fifteen articles were included. There was great variability in relation to the sample size, with a predominance of longevous old women. The concept of dysphagia, when mentioned, was heterogeneous. Diagnostic criteria were diverse and mostly comprised of questionnaires or clinical trials results. No studies used instrumental tests. The frequency of oropharyngeal dysphagia in the studied population ranged from 5.4% to 83.7%, being higher in studies that used clinical tests, but with greater precision of confidence intervals in studies that used questionnaires and large sample size. **Conclusion:** The frequency of oropharyngeal dysphagia in older adults living in nursing homes has wide variability. Methodological discrepancies among studies compromise the reliability of frequency estimates and highlight the need for research with better defined and standardized methodological criteria.

### RESUMO

**Objetivo:** Sintetizar o estado do conhecimento científico sobre a frequência de disfagia orofaríngea em idosos institucionalizados. **Estratégia de pesquisa:** A pergunta de pesquisa foi formulada de acordo com a estratégia PECO e a busca foi realizada nas bases de dados Pubmed/Medline, Web of Science, Scopus, LILACS e SciELO, utilizando descritores e termos livres específicos. **Critérios de seleção:** Artigos sem restrição de tempo ou idioma, que relatassem a frequência de disfagia orofaríngea em idosos institucionalizados e o critério utilizado para diagnóstico. **Análise dos dados:** Foram analisadas as características da população, conceito de “disfagia orofaríngea”, métodos para identificação do desfecho e a frequência de disfagia orofaríngea. A avaliação da qualidade metodológica dos artigos seguiu os critérios do *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE). **Resultados:** Foram incluídos quinze artigos. Houve grande variabilidade quanto ao tamanho da amostra, com predomínio de idosos longevos do sexo feminino. O conceito de disfagia, quando mencionado, foi heterogêneo. Os critérios diagnósticos foram diversos e compostos, em sua maioria, por resultados de questionários ou testes clínicos. Nenhum estudo utilizou exames instrumentais. A frequência de disfagia orofaríngea na população estudada oscilou entre 5.4% e 83.7%, sendo mais elevada nos estudos que utilizaram testes clínicos, porém, com intervalos de confiança mais precisos naqueles que usaram questionários e amostras maiores. **Conclusão:** A frequência de disfagia orofaríngea em idosos institucionalizados possui ampla variabilidade. As discrepâncias metodológicas entre os estudos comprometem a confiabilidade das estimativas de frequência e apontam a necessidade de pesquisas com critérios metodológicos mais bem definidos e padronizados.

### Correspondence address:

Leandro Pernambuco  
Departamento de Fonoaudiologia,  
Universidade Federal da Paraíba –  
UFPB  
Cidade Universitária, João Pessoa  
(PB), Brasil, CEP: 58051-900.  
E-mail: leandropernambuco@gmail.com

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<sup>1</sup> Programa Associado de Pós-graduação em Fonoaudiologia, Universidade Federal da Paraíba – UFPB - João Pessoa (PB), Brasil.

<sup>2</sup> Programa de Pós-graduação em Saúde Coletiva, Universidade Federal do Rio Grande do Norte – UFRN - Natal (RN), Brasil.

Programa de Pós-graduação em Modelos de Decisão e Saúde, Universidade Federal da Paraíba – UFPB – João Pessoa (PB), Brasil.

<sup>4</sup> Departamento de Fonoaudiologia, Universidade Federal da Paraíba – UFPB - João Pessoa (PB), Brasil.

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## INTRODUCTION

The proportion of elderly people in the world is increasing and population aging is one of the most significant phenomena of the 21st century<sup>(1,2)</sup>. In 2018, the number of elderly people exceeded the number of children under five years old<sup>(1)</sup>. It is estimated that the proportion of elderly people in the world will reach 11.7% in 2030, 15.9% in 2050, and 22.6% in 2100<sup>(1,2)</sup>. The number of people over 80 years old is increasing even faster, since in 1990 there were only 54 million people aged 80 or over in the world and in 2019 that number almost tripled to 143 million<sup>(1)</sup>. In Brazil, according to the 2010 Census, there are more than 20 million people aged 60 or over, who represent 10.8% of the total population<sup>(3)</sup>. Thus, the Brazilian population presents a standard age structure, in which the base of the age pyramid is narrowing due to decreasing fertility levels and the top is widening due to decreasing mortality levels<sup>(3)</sup>.

Aging is inevitably associated with functional decline, which is characterized by impairment in the performance of activities of daily living, including limitations related to eating<sup>(4)</sup>. Feeding dynamics has an important cultural role in society and in the expression of the personal identity of the elderly<sup>(5)</sup>. Since it is related to the act of eating, swallowing ensures pleasure and is inserted into a context of social and affective relationships<sup>(6)</sup>. In this scenario, the swallowing function is extremely essential, from the visual presentation of food to ingestion<sup>(7)</sup>.

From the age of 60, individuals are more vulnerable to various types of diseases and disabilities. Among them, a greater risk of developing deglutition disorders due to the natural changes that occur in the dynamics of this function, and specific diseases or degenerative conditions that may interfere with this function, such as cerebral vascular accident and dementias<sup>(8)</sup>.

The main characteristics of deglutition difficulty in the elderly include decreased taste sensitivity and perception of food viscosity, weakening of the lingual musculature for bolus propulsion, slowness at the beginning of the pharyngeal response for deglutition, slowness on hyoid elevation, and changes in swallowing efficiency due to the presence of oropharyngeal residues, with signs of laryngotracheal penetration/aspiration<sup>(9-11)</sup>. In addition to anatomic-physiological aspects, changes in pleasure from eating and the negative impact on socialization should also be considered<sup>(12)</sup>.

The whole scenario can make swallowing in the elderly less efficient, contributing to the onset of oropharyngeal dysphagia<sup>(13)</sup>. Swallowing is the act of moving food from the oral cavity into the stomach in order to maintain the nutritional and water status, without allowing material to enter the airways<sup>(14)</sup>. When disorders arise in this process and neurological, anatomical or physiological changes of pathological order are added, oropharyngeal dysphagia appears<sup>(15)</sup>.

It is observed that the occurrence of oropharyngeal dysphagia ranges according to the group studied and can reach rates of 70% to 90% in older populations<sup>(16)</sup>, constituting one of the major health problems present in older adults living in

nursing homes<sup>(17,18)</sup>. In the United States, it is estimated that 40% to 60% of the elderly living in long-term care facilities (LTCF) have clinical evidence of oropharyngeal dysphagia compared to 13% to 33% of non-institutionalized elderly people<sup>(19)</sup>.

Some studies have found that oropharyngeal dysphagia in LTCF residents is frequently related to cerebral vascular accident, dependency, advanced dementia, poor oral hygiene, multiple diagnoses, and environmental factors<sup>(20-22)</sup>. In addition, there is also sarcopenia, a geriatric syndrome to which dysphagia can be associated<sup>(23)</sup> that is characterized by a decline of physical function due to decreased muscle strength caused by the loss of skeletal muscle mass<sup>(24)</sup>. In addition, the problems experienced by the elderly during meals are not restricted to dysphagic signs, including cognitive, behavioral, physical, and environmental changes which, together, can predispose the elderly to a change in feeding dynamics and risks of bronchoaspiration pneumonia, malnutrition, and dehydration<sup>(25)</sup>.

Dysphagia impairs swallowing safety and efficiency, causing pneumonia and damaging the nutritional and water needs of the elderly, respectively<sup>(26)</sup>. Thus, understanding the frequency of oropharyngeal dysphagia frequency in older adults living in nursing homes allows to knowing the impact of this condition in the health of the elderly, enabling the management of the feeding and swallowing problems of this population in order to determine individual and collective interventions, both by speech therapy and interdisciplinary, aimed to the well-being of each older adult and to the reduction of health costs<sup>(27)</sup>.

There is a notable variability in the literature regarding the records of oropharyngeal dysphagia frequency in older adults living in nursing homes, which impairs more accurate dimensioning of the magnitude of this health condition in older adults residing in LTCF. Understanding this scenario is important for the proper planning and execution of care and attention actions for oropharyngeal dysphagia aimed to this population.

## PURPOSE

The aim of this study was to synthesize the scientific knowledge on the frequency of oropharyngeal dysphagia in older adults living in nursing homes.

## RESEARCH STRATEGY

This study is an integrative literature review. Therefore, there was no need for submission to evaluation by the institution's Ethics and Human Research Committee. The methodological procedures followed the steps recommended in the literature for this type of review<sup>(28)</sup>.

Initially, the research question was formulated according to the PECO approach, an acronym that represents the elements Patient, Exposure, Comparator, and Outcomes, respectively. The first element of the strategy (P) corresponded to older adults residing in nursing homes; the second element (E) corresponded

to “oropharyngeal dysphagia”; the third element (C), equivalent to the “comparison group”, was not applied in this review; and the fourth element (O) was the frequency of oropharyngeal dysphagia. Thus, the research question was defined as follows: “What is the frequency of oropharyngeal dysphagia in older adults residing in LTCF?”.

The search included the electronic databases Medline/PubMed, Web of Science, Scopus, SciELO, and Lilacs. The search strategies included combinations between Medical Subjects Headings (MeSH) descriptors and free terms considered relevant to the search (Appendix A).

## SELECTION CRITERIA

The following selection criteria were applied: articles that investigated the frequency of oropharyngeal dysphagia in older adults living in nursing homes, without time or language restrictions. The exclusion criteria applied were, as follows: review articles of any kind, editorials, letters to the editor, conference proceedings, theses, and dissertations. Articles that did not describe the diagnostic criterion to determine the presence of oropharyngeal dysphagia and those that included older adults living in nursing homes in the sample but did not present the frequency of oropharyngeal dysphagia in this population group were also excluded.

## DATA ANALYSIS

The studies were independently evaluated by two researchers. Subsequently, they compared analyzes and the disagreements were resolved by a third reviewer. After identifying the articles in the databases and filtering them to exclude duplicates, the screening was conducted, in which the respective titles and abstracts were read and those that did not meet the selection criteria were excluded. In the stage of eligibility, the other articles that potentially addressed the subject were subjected to a full text review. In this stage, the reference lists of the articles were also checked manually and studies not previously identified by the search strategy were investigated.

The articles that met the eligibility criteria were subjected to the extraction of the following data to compose the analysis matrix: study location, population, sample size, sex of participants, age, conclusion of the study, diagnostic instruments, concept of oropharyngeal dysphagia, and frequency of oropharyngeal dysphagia. In order to determine the accuracy of frequency estimates in each study, the authors of this review calculated the confidence interval (CI) and the margin of error of the CI.

The evaluation of the methodological quality of the studies followed the criteria of *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE)<sup>(29,30)</sup>.

## RESULTS

A total of 1,361 articles were initially found. After applying the filters of eligibility, the final sample consisted of fifteen articles. The selection process is shown in Figure 1.

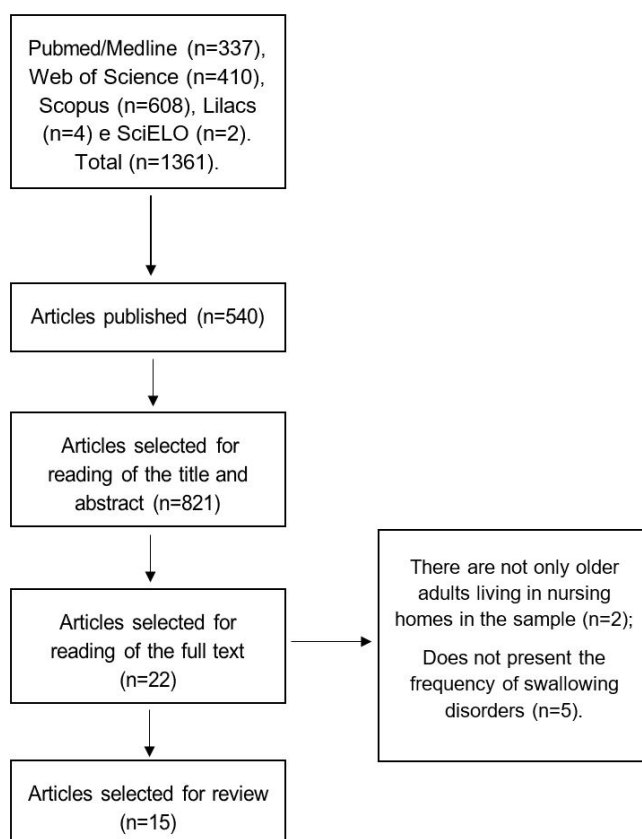


Figure 1. Flowchart for article selection

**Chart 1.** Analysis matrix with the characteristics of the studies included in the integrative review

Author, year, and location (ascending)	Sample	Sex	Age	Concept of oropharyngeal dysphagia	Instrument	Frequency of oropharyngeal dysphagia*
Roque et al., 2010, Brazil <sup>(31)</sup>	30 older adults living in one LTCF	100% female	83.7 ± 10.7 years	Not defined clearly	Meal characteristics; environment; attitudinal and behavioral aspects; dependency for food-related activities and assistance required/ provided; oral aspects; swallowing problems, and difficulty breathing evaluated	23.3%
						(CI of 95%: 8.17-38.42)
						Margin of error of the estimate = 30.25%
Camacho et al., 2011, Spain <sup>(32)</sup>	1.777 older adults living in 66 LTCFs	80.8% female	>85 anos 52,08%, de 75 a 84 anos 36,45% e de 65 a 74 anos 11,45%	Difficulty swallowing food or drinks	Questionnaire prepared by the Geriatric Home Care Unit (UADG) advised by Nestlé Nutrition	5.4%
						(CI of 95%: 4.34-6.45)
						Margin of error of the estimate = 2.10%
Ferrero López et al., 2012, Spain <sup>(33)</sup>	40 older adults living in five LTCFs	72.5% female	83.7 ± 6.3 years	Both structural and functional changes in swallowing	Volume-Viscosity Swallow Test (V-VST) for t detection of Oropharyngeal Dysphagia	65%
						(CI of 95%: 50.21-79.78)
						Margin of error of the estimate = 29.56%
Bomfim et al., 2013, Brazil <sup>(12)</sup>	30 older adults living in one LTCF	100% female	83.7 ± 10.5 years	Changes in feeding dynamics	Based on the speech therapy Dysphagia Risk Evaluation Protocol - DREP	63.3%
						(CI of 95%: 46.05-80.54)
						Margin of error of the estimate = 34.49%
Park et al., 2013, South Korea <sup>(34)</sup>	395 older adults living in two LTCFs	76.5% female	80.7 ± 8.0 years	Swallowing impairment	Gugging Swallowing Screen (GUSS)	52.7%
						(CI of 95%: 47.77-57.62)
						Margin of error of the estimate = 9.84%
Nogueira and Reis, 2013, Portugal <sup>(35)</sup>	266 older adults living in eight LTCFs	75% female	82 ± 10 years	Addresses presbyphagia	3-oz Water Swallow Test (3OZwst) and Dysphagia Self-Test (DST)	38.2%
						(CI of 95%: 32.36-44.03)
						Margin of error of the estimate = 11.67%
Van der Maarel-Wierink et al., 2014, Netherlands <sup>(18)</sup>	8119 residents aged ≥65 in 119 LTCFs	74% female	84.0 ± 7.0 years	Symptom that refers to difficulty or discomfort during the progression of the bolus from the oral cavity into the stomach	Questionnaire filling by caregivers and resident's answer to the question: "Do you experience swallowing problems?"	9%
						(CI of 95%: 8.37-9.62)
						Margin of error of the estimate = 1.24%
Sarabia-Cobo et al., 2016, Spain <sup>(36)</sup>	2384 older adults living in 12 LTCFs	73.4% female	88.7 ± 6.8 years	Indicates difficulty in moving food or liquids from the mouth and esophagus into the stomach	Eating Assessment Tool-10 (EAT_10) and 3-oz Water Swallow Test (3OZwst)	69,60%
						(CI of 95%: 67.75-71.44)
						Margin of error of the estimate = 3.69%
Yatabe et al., 2017, Japan <sup>(37)</sup>	236 residents aged ≥60 in eight LTCFs	76.2% women in the dentate group and 52.6% in the edentulous group	87.7 ± 6.4 years	Disturbance of any part of the swallowing process	Modified Water Swallow Test (MWST)	16.9%
			for the dentate group and 89.0 ± 7.1 years for the edentulous group			(CI of 95%: 12.11-21.68)
			Margin of error of the estimate = 9.56%			

\*Confidence interval and margin of error of the estimate calculated by the authors of this study

**Caption:** CI = Confidence interval; LTCF = long-term care facilities



Chart 1. Continued...

Author, year, and location (ascending)	Sample	Sex	Age	Concept of oropharyngeal dysphagia	Instrument	Frequency of oropharyngeal dysphagia*
Streicher et al., 2017, Europe and North America <sup>(38)</sup>	23,549 residents aged ≥65 in 926 LTCFs	75.7% female	Between 79-90 years	Impaired and potentially unsafe intake of liquids and / or solid foods	Local staff information and resident medical record	13.4%
						(CI of 95%: 12.96-13.83)
						Margin of error of the estimate = 0.87%
Namasivayam-MacDonald et al., 2017, Canada <sup>(39)</sup>	639 older adults living in 32 LTCFs	69.9% female	86.8 ± 7.8 years	Swallowing impairment	Iowa Oral Performance Instrument Screening Tool for Acute Neuro Dysphagia	59.2%
						(CI of 95%: 55.38-63.01)
						Margin of error of the estimate = 7.62%
Fernández-Getino Sallés, 2018, Spain <sup>(40)</sup>	30 individuals aged ≥80 living in 31 LTCFs	90% female	89.3 ± 1.1 years	Decreased safety and efficacy of swallowing	Volume-Viscosity Swallow Test (V-VST) for detection of Oropharyngeal Dysphagia	41.5%
						(CI of 95%: 23.86-59.13)
						Margin of error of the estimate = 35.26
Jukic Peladic et al., 2018, Italy <sup>(41)</sup>	1490 older adults aged ≥65 living in 31 LTCFs	71.5% female	83.5 ± 8.1 years	Difficulty swallowing liquids and/or solid foods	Clinical evaluation	12.8%
						(CI of 95%: 11.10-14.49)
						Margin of error of the estimate = 3.39%
Huppertz et al., 2018, Netherlands <sup>(42)</sup>	6349 residents of a nursing home aged ≥65 admitted to psychogeriatric or somatic wards	70.12 female	84.5 ± 7.5 years	Not defined clearly	Based on two questions: "Does the client have swallowing problems?" and "Does the client sneeze or cough while swallowing food or liquids?"	12.1%
						(CI of 95%: 11.29-12.90)
						Margin of error of the estimate = 1.60%
Hoshino et al., 2020, Japan <sup>(43)</sup>	312 older adults living in a LTCF	79.5% female	85.2 ± 7.6 years	Not defined clearly	Modified water swallowing test (MWST) combined with cervical auscultation	83.7%
						(CI of 95%: 79.60-87.79)
						Margin of error of the estimate = 8.19%

\*Confidence interval and margin of error of the estimate calculated by the authors of this study

**Caption:** CI = Confidence interval; LTCF = long-term care facilities

The analysis matrix with the characteristics of the studies that met the eligibility criteria<sup>(12,18,31-43)</sup> is shown in Chart 1.

The articles included were published between 2010 and 2020, with emphasis on the greater concentration of studies published by European researchers. The samples were heterogeneous regarding the number of LTCF participants and the number of older adults, with the smallest sample consisting of 30 older adults and the largest of 23,549 in a multicenter study. In all articles, the population was predominantly female, with a mean age above 80 years old.

The concept of oropharyngeal dysphagia was different between studies and without an explicit definition in three cases. None of the methods described in the articles reported the use of instrumental exams for the evaluation and diagnosis of

oropharyngeal dysphagia. Eleven studies used the clinical evaluation of swallowing and four developed their own questionnaires to determine the presence of oropharyngeal dysphagia.

The frequency of oropharyngeal dysphagia ranged widely between 5.4% (CI of 95%: 4.34-6.45)<sup>(32)</sup> and 83.7% (CI of 95%: 79.60-87.79)<sup>(43)</sup>. Frequency estimates were higher in studies that used clinical tests<sup>(12,33,34,39,40,43)</sup>. However, more precise confidence intervals were observed, that is, with lower margins of error, in studies with larger samples and that used questionnaires<sup>(18,32,38,42)</sup>.

The methodological quality of the studies included in this review is shown in Chart 2. According to the STROBE guidelines, the most unsatisfactory items were 12c, 13c, 14b, and 22. None of the fifteen studies met all the evaluation criteria of methodological quality.

**Chart 2.** Classification of methodological quality of studies according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines

STROBE items		Roque et al., 2010 <sup>(31)</sup>	Camacho et al., 2011 <sup>(32)</sup>	Ferreiro López et al., 2012 <sup>(33)</sup>	Bonfim et al., 2013 <sup>(12)</sup>	Park et al., 2013 <sup>(34)</sup>	Nogueira et al., 2013 <sup>(35)</sup>	Maarel-Wierink et al., 2014 <sup>(18)</sup>	Sarabia-Cobo et al., 2016 <sup>(36)</sup>	Yatabe et al., 2017 <sup>(37)</sup>	Streicher et al., 2017 <sup>(38)</sup>	Namasivayam-MacDonald et al., 2017 <sup>(39)</sup>	Fernández-Getino Salles, 2018 <sup>(40)</sup>	Jukic Peladic et al., 2018 <sup>(41)</sup>	Huppertz et al., 2018 <sup>(42)</sup>	Hoshino et al., 2020 <sup>(43)</sup>	
<b>Title and abstract</b>																	
1a Indicate the study's design with a commonly used term in the title or the abstract		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
1b Provide in the abstract an informative and balanced summary of what was done and what was found		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Introduction</b>																	
2 Explain the scientific background and rationale for the investigation being reported		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3 State specific objectives, including any prespecified hypotheses		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Methods</b>																	
4 Present key elements of study design early in the paper		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5 Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6 Give the eligibility criteria, and the sources and methods of selection of participants		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7 Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8 For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9 Describe any efforts to address potential sources of bias		+	+	?	+	+	-	+	-	+	+	+	+	?	+	+	+
10 Explain how the study size was arrived at		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11 Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why		+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12a Describe all statistical methods, including those used to control for confounding		?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12b Describe any methods used to examine subgroups and interactions		-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12c Explain how missing data were addressed		-	-	-	+	-	-	-	-	-	-	-	-	?	+	+	?
12d If applicable, describe analytical methods taking account of sampling strategy		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12e If applicable, describe analytical methods taking account of sampling strategy		-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+

**Caption:** +: match item criteria, -: does not match item criteria, ?: partially match item criteria or has unclear data

Chart 2. Continued...

STROBE items		Roque et al., 2010 <sup>(31)</sup>	Camacho et al., 2011 <sup>(32)</sup>	Ferrero López et al., 2012 <sup>(33)</sup>	Bomfim et al., 2013 <sup>(12)</sup>	Park et al., 2013 <sup>(34)</sup>	Nogueira et al., 2013 <sup>(35)</sup>	Maarel-Wierink et al., 2014 <sup>(18)</sup>	Sarabia-Cobo et al., 2016 <sup>(36)</sup>	Yatabe et al., 2017 <sup>(37)</sup>	Streicher et al., 2017 <sup>(38)</sup>	Namasivayam-MacDonald et al., 2017 <sup>(39)</sup>	Fernández-Getino Salles, 2018 <sup>(40)</sup>	Jukic Peladic et al., 2018 <sup>(41)</sup>	Huppertz et al., 2018 <sup>(42)</sup>	Hoshino et al., 2020 <sup>(43)</sup>	
<b>Results</b>																	
13a Report numbers of individuals at each stage of study?eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
13b Give reasons for non-participation at each stage		-	-	-	-	+	+	+	+	?	+	+	+	+	?	+	+
13c Consider use of a flow diagram		-	-	-	-	+	-	-	-	-	+	-	-	-	-	+	+
14a Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
14b Indicate number of participants with missing data for each variable of interest		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	?
15 Report numbers of outcome events or summary measures over time		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
16a Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included		-	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+
16b Report category boundaries when continuous variables were categorized		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
16c If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period		-	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+
17 Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses		-	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+
<b>Discussion</b>																	
18 Summarize key results with reference to study objectives		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
19 Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias		+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
20 Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
21 Discuss the generalizability (external validity) of the study results		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Other information</b>																	
22 Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Caption: +: match item criteria, -: does not match item criteria, ?: partially match item criteria or has unclear data

## DISCUSSION

This review indicated wide variability in the frequency of oropharyngeal dysphagia in older adults living in LTCF, besides indicating heterogeneous methodological approaches between studies. There was a greater concentration of research in European countries, in which the occurrence of oropharyngeal dysphagia in older adults living in nursing homes exceeded 60%<sup>(33,36,44)</sup>. It is estimated that up to 40 million Europeans, 16 million Americans, and 8 million Japanese are in need of care for dysphagia<sup>(45)</sup>, figures that should increase even more with the increasing number of very old adults, that is, those over 85 years old in developed countries and over 80 in underdeveloped countries<sup>(2)</sup>.

In all articles, the mean age of the individuals was above 80 years old. In general, the profile of very old adults comprises individuals who require more assistance for to the presence of dementia<sup>(46)</sup>, dependency, and various comorbidities that impair various activities of daily living, including feeding<sup>(47)</sup>. Studies have already shown, in these cases, family's absence, family's difficulty in caring, and conflictual family relations combined with the lack of income and homelessness as factors associated with the increased need of these older adults for support from long-term care facilities<sup>(48,49)</sup>.

The sample profile of all studies included was presented predominance of females. The predominance of females among individuals aged 60 years or older is reported in several other studies and is related to what is called the feminization of aging, characterized by women's higher rates in the population of older adults, especially at older ages<sup>(50-52)</sup>. This is caused by aspects such as better and more frequent self-care in health, less exposure to death from external causes when younger, less exposure to unhealthy occupational environments, stricter care with food, and preservation of a lifestyle that is less harmful to health<sup>(53,54)</sup>.

Contrary to the age and sex profile, the samples showed great heterogeneity regarding the number of older adults in terms of the number of people living in LTCFs. The smallest sample comprised 30 older adult women<sup>(12,31-40)</sup> and the largest 23,549 older adults<sup>(38)</sup>. Differences in sample size in the different studies and geographical locations highlight the difficulty to accurately determine the frequency of oropharyngeal dysphagia in older adults living in nursing homes, which was evident when the margins of error of the estimates were observed. Thus, it is worth highlighting the importance of the sample calculation design and the sampling process for obtaining more accurate and reliable data. The conduction of prevalence studies, that is, with representative and population-based samples, should be encouraged in order to have the real dimension of the problem in the community of older adults residing in LTCF.

The results revealed a heterogeneous understanding of the researchers on the conceptual definition of oropharyngeal dysphagia. In general, most articles recognized this outcome as a change, difficulty, discomfort, disorder, or impairment in swallowing<sup>(12,19,32-37,39,41)</sup>. Only two studies mentioned efficacy and/or insecurity in their definitions<sup>(38,40)</sup> and three did not make

the concept explicit<sup>(31,42,43)</sup>. This result indicates that the lack of conceptual standardization is critical and limits obtaining valid, accurate, and reliable information on the frequency of oropharyngeal dysphagia in LTCFs.

The results of this review showed that the estimate of the frequency of oropharyngeal dysphagia in older adults living in nursing homes has wide variation in the literature (5.4% to 83.7%), which evidenced the difficulty in determining this data in the studied population. Besides aspects aforementioned, such as sample size and the concept of oropharyngeal dysphagia, another characteristic that may explain this wide variation of frequency is the use of different instruments to determine the presence of the outcome.

In this review, the lowest frequencies were observed in research that used questionnaires and the highest when the clinical evaluation of swallowing was conducted. Questionnaires are faster and cheaper alternatives in studies with more robust samples, in which diagnosis through clinical tests is less viable, and when the objective is to conduct an epidemiological diagnosis. In this review, frequent use of questionnaires in studies with larger samples was observed, which resulted in lower estimates, although being more accurate if compared to those obtained by clinical tests. It is necessary to emphasize that, to date, there are no questionnaires with methodological quality and sufficient psychometric properties for screening oropharyngeal dysphagia in older adults<sup>(55)</sup>, although there are efforts in this direction, especially considering the applicability in epidemiological studies<sup>(56)</sup>. Thus, the questionnaires used in the studies included in this review have this limitation and this is an aspect that must be considered when analyzing the frequency estimates found.

In addition, it is known that the population of older adults accepts swallowing disorders as an untreatable and natural event of aging<sup>(57)</sup>, which ends up impairing the recognition of oropharyngeal dysphagia symptoms and the reliability of self-reported information. The absence of questionnaires validated together with a possible attitude of resignation to the symptom by the population can help explain the result observed in this review. Considering this scenario, it is clear that there is a lack of prevalence studies that use appropriate instruments for the epidemiological diagnosis of oropharyngeal dysphagia in older adults. Thus, we recommend researchers to be careful and select to use the instrument with the best evidence of validity and reliability possible when planning their research.

Regarding the clinical resources to detect oropharyngeal dysphagia in older adults, there is no consensus on the use of a single instrument<sup>(58)</sup>, which was observed in this review by the diversity found. In addition, no study used instrumental exams to evaluate oropharyngeal dysphagia. It is known that the clinical evaluation of swallowing in some situations is not sufficient to accurately detect the presence of dysphagia, since it is not sensitive, for example, to the detection of residues in difficult locations, which can lead



to delayed aspiration, requiring the use of instrumental methods for evaluation<sup>(59)</sup>.

However, the use of instrumental diagnostic procedures is not always accessible in daily practice for economic restrictions, limitation of professionals, and lack of equipment<sup>(60)</sup>. In addition, it is not necessary or viable to conduct a complete evaluation on all individuals<sup>(61)</sup>, and for these reasons non-instrumental diagnostic procedures should be focused on producing results with the best accuracy possible.

Accuracy is a property of efficiency of the diagnostic procedure and represents the degree of agreement between the result of the procedure and the outcome of the best method available to determine the presence or absence of a health condition<sup>(62-64)</sup>, which in the case of oropharyngeal dysphagia could be the videofluoroscopy or videoendoscopy of swallowing<sup>(61)</sup>. Accuracy determines the power of the diagnostic test to discriminate who is affected or not by the health condition investigated<sup>(64)</sup> and reflects the various relationships between true and false positives and negatives through indicators such as sensitivity, specificity, positive and negative predictive value, positive and negative likelihood ratio, and ROC curve (receiver operator characteristic curve)<sup>(65)</sup>.

The different evaluation instruments used in the studies included in this integrative review also have different or even uninvestigated accuracy, which directly interferes with the reliability and accuracy of the estimates found and reflects the difficulty in determining an evaluation or tracing instrument that gathers sufficient evidence to be implemented in practice.

Thus, the results presented in this review attested that although oropharyngeal dysphagia is a condition known to be present in older adults residing in LTCFs, the studies available so far addressing the frequency of this condition in this population are very different methodologically and do not allow estimating data accurately. In addition, it is necessary to reflect on the conceptual standardization on the outcome, the need for epidemiological studies, and the development of viable instruments that produce valid and reliable results for the diagnosis of oropharyngeal dysphagia in older adults living in nursing homes.

## CONCLUSION

The frequency of oropharyngeal dysphagia in older adults living in nursing homes ranged between 5.4% and 83.7%, with methodological discrepancies regarding sample size, the concept of oropharyngeal dysphagia, and evaluation instruments used for diagnosis.

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#### Authors' contribution

*JSX contributed to the data collection and analysis, writing, and final review of the article; ACBG and LCPT contributed to the data collection and analysis; LP contributed to the design, guidance, data analysis, writing, and final review of the article.*

**Appendix A.** Search strategies used in databases

Database	Descriptors
Pubmed/Medline	((((("nursing homes"[MeSH Terms]) OR ("nursing home"[Title/Abstract])) OR ("long term care facilities"[Title/Abstract])) OR ("home for the aged"[Title/Abstract])) AND (((("deglutition"[MeSH Terms]) OR (deglutition disorder[MeSH Terms])) OR (dysphagia[Title/Abstract])) OR (swallowing[Title/Abstract])) OR (deglutition[Title/Abstract]))
Web of Science	TS=((dysphagia OR (deglutition OR swallow*)) AND ("nursing home" OR ("nursing homLes" OR "long term care facility" OR "long term care facilities")))
Scopus	TITLE-ABS-KEY((dysphagia OR (deglutition OR swallow*)) AND ("nursing home" OR ("nursing homes" OR "long term care facility" OR "long term care facilities")))
LILACS	"DISFAGIA" [Palavras] and "INSTITUICAO DE LONGA PERMANENCIA PARA IDOSOS" [Palavras]
SciELO	"DISFAGIA" [Palavras] and "INSTITUICAO DE LONGA PERMANENCIA PARA IDOSOS" [Palavras]