Literature review

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Signs and symptoms of oropharyngeal dysphagia in institutionalized older adults: an integrative review

Sinais e sintomas de disfagia orofaríngea em idosos institucionalizados: revisão integrativa

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Abstract

Purpose: To identify the most prevalent signs and symptoms of oropharyngeal dysphagia in elderly adults who live in old folks' home. **Research strategy**: Integrative review carried out in four databases: Embase, Lilacs, MEDLINE/Pubmed, and Web of Science using English terms and filters for language and age. **Selection criteria**: Studies available in the full-text form in English, Portuguese or Spanish, with no publication time restrictions, related to elderly people living in care homes who reported oropharyngeal dysphagia. Studies related to elderly people in the community or in hospitals and with other health issuesthat were not related to swallowing disorders were excluded. **Results**: Of 389 studies, 16 were included in this review, published between 1986 and 2020. There was a predominance of female participants whose minimum mean age was 71 and maximum, 87. The most frequent signs and symptoms of oropharyngeal dysphagia were the presence of coughing and choking, in addition to other relevant ones, such as diminished tongue pressure, wet voice, weight loss, and slow swallowing. **Conclusion**: According to the reviewed studies, the most frequent signs and symptoms related to oropharyngeal dysphagia in elderly people living in care homes were (the) presence of coughing and choking, before, during or after swallowing.

Keywords: Homes for the Aged; Signs and Symptoms; Deglutition disorders; Elderly; Review

Resumo

Objetivo: identificar quais são os sinais e sintomas de disfagia orofaríngea mais presentes nos idosos residentes em Instituições de Longa Permanência. **Estratégia de pesquisa:** revisão integrativa realizada em quatro bases de dados: Embase, LILACS, MEDLINE/PubMed e Web of Science, com uso de termos na língua inglesa e aplicação de filtros por idioma e idade. **Critérios de seleção:** estudos disponíveis na forma de texto completo em inglês, português ou espanhol, sem restrição de tempo de publicação, relacionados a idosos residentes em Instituições de Longa Permanência que referiram disfagia orofaríngea. Foram excluídos estudos relacionados a idosos da comunidade ou que estavam em hospitais, e com outras condições de saúde não relacionadas aos problemas de deglutição. **Resultados:** de 389 estudos, 16 foram incluídos nesta revisão, publicados entre os anos de 1986 e 2020. Houve predomínio de participantes do sexo feminino, com média mínima de idade de 71 anos e máxima de 87 anos. Os sinais e sintomas mais frequentes de disfagia orofaríngea foram presença de tosse e engasgo, além de outros relevantes, como pressão de língua diminuída, voz molhada, perda de peso e deglutição lenta. **Conclusão:** de acordo com os estudos revisados, os sinais e sintomas mais frequentes relacionados à disfagia orofaríngea nos idosos institucionalizados foram presença de tosse e engasgo, antes, durante ou após a deglutição.

Palavras-chave: Instituição de Longa Permanência para Idosos; Sinais e sintomas; Transtornos de Deglutição; Idoso; Revisão

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INTRODUCTION

The greater longevity in the population has been making it grow increasingly older, which requires attention to the care provided to older adults and their needs. The family is the main responsible for assisting them in their difficulties, although changes in family routine have been shifting this responsibility[1]. An alternative they or even the older adults themselves have found are the nursing homes (NH), either public or private ones[2], where their health and socioeconomic needs are met and external circumstances, such as loneliness and fear of urban violence, are solved[3].

NHs are either governmental or non-governmental institutions characterized by common housing for people aged 60 years or older, with or without family support, where they can enjoy their freedom, dignity, and citizenship[4]. They welcome both independent and dependent older adults, who need help in their activities of daily living[2].

Older adults who live in an institution may develop eating problems, often caused by their attitude towards food, inadequate food consistencies imposed by the NH, posture and position difficulties when eating, the caregiver's manner of serving the food, dental changes, and food refusal[5].

Moreover, institutionalized older adults are usually more fragile and oftentimes cannot compensate for the changes inherent to the aging process – which is characterized by a set of biological events that change the stomatognathic structures and functions[6]. They are accompanied by health impairments associated with eating, in which swallowing may not be compensated, leading to dysphagia[7].

Dysphagia in older adults can impair the anticipatory and esophageal phases. Also, a focus on the outcomes of oropharyngeal dysphagia (OD) reveals it as a swallowing disorder in the preparatory, oral, and pharyngeal phases, characterized by a set of signs and symptoms that compromise the efficiency and safety when taking food from the oral cavity to the esophagus[8]. It mainly involves difficulties with mastication, bolus management, food escape and oral residues after eating, coughs, chokes, wet voice, frequent phlegm, a need for swallowing the food several times, swallowing pain, taking longer to finish meals, uncommon head or neck posture when swallowing, and weight loss[9,10].

This disorder can be potentialized when the person lives in a NH, where the signs and symptoms may be overlooked by the institution and/or the older adult themselves. It may also pose risks of malnutrition, dehydration, and aspiration, causing pneumonia, which helps increase the mortality rates among older adults[11]. Furthermore, it can significantly impact their quality of life, sleep, willingness to eat, social interaction, and mental health[12].

Hence, the signs and symptoms related to these population's swallowing changes must be identified early. They can point to the importance of systematizing OD tracking as a standard procedure to be performed by any duly calibrated health professional. Thus, institutionalized older adults with possible changes in swallowing efficiency and/or safety can be identified, and protocols can be implemented to follow up the evolution of dysphagic conditions that have been tracked. These conditions must be confirmed with speech-language-hearing assessments to define, among other things, dysphagia management and intervention procedures.

PURPOSE

The objective of this literature review is to identify the signs and symptoms of OD most present in older adults who live in NHs.

RESEARCH STRATEGY

The integrative review was conducted in the following stages: development of the research question; definition of the inclusion and exclusion criteria; search in databases using keywords; selection of studies; extraction of relevant data, such as the objective, methodology, sample size, and main outcomes[13].

The following research question was developed to ground the study: "What are the signs and symptoms of OD in institutionalized older adults?". Then, the literature was surveyed to select studies that answered the question in Embase, Latin American and Caribbean Literature in Health Sciences (LILACS), MEDLINE/PubMed, and Web of Science (Chart 1). The search was conducted using terms in English, selected from descriptors surveyed in MeSH (Medical Subject Headings), from PubMed, algorithms from Embase, and health descriptors ("Deglutition Disorders" [MeSH], "Nursing Homes" [MeSH], "Homes for the Aged" [MeSH], Dysphagia, Institutionalized elderly), to which language (English, Portuguese, and Spanish) and age (60 years or older) filters were applied, with no restriction of time of publication.

SELECTION CRITERIA

The inclusion criteria were as follows: original studies electronically available in full-text, published in any period, in English, Portuguese, or Spanish, approaching older adults who lived in NHs, answering the research question, and reporting measures related to OD. Congress abstracts, research approaching older adults who lived in the community or were hospitalized, and/or addressing other health conditions unrelated to swallowing disorders were excluded.

Chart 1. Database search strategy

DATABASE	SEARCH STRATEGY
Embase	dysphagia:ti,ab,kw AND ('institutionalized elderly':ti,ab,kw OR 'nursing home':ti,ab,kw OR 'home for the aged':ti,ab,kw) AND ([english]/lim OR [portuguese]/lim OR [spanish]/lim) AND [aged]/lim
LILACS	"DEGLUTITION DISORDER" [Palavras] and "HOMES FOR THE AGED" [Palavras]
MEDLINE/PubMed	"Deglutition Disorders"[Mesh] AND ("Nursing Homes"[Mesh] OR "Homes for the Aged"[Mesh])
Web of Science	TÓPICO: (dysphagia) AND TÓPICO: ("nursing homes" OR "institutionalized elderly" OR "homes for the aged")

DATA ANALYSIS

The screened articles were analyzed in three stages. Initially, a quantitative analysis of the studies was made based on the search strategies, using the Mendeley software to retrieve studies and remove duplicates[14]. Then, all studies were entered into Rayyan[15], which is an application that does the initial screening for the analysis of titles and abstracts of the studies that will be selected for the subsequent stage, following the eligibility criteria. In the third stage, all the selected articles were fully read, and their introduction, methodology, results, and discussion were analyzed, applying the eligibility criteria for the selection of the studies that would comprise this review. The second and third stages were conducted by two independent evaluators; after the articles had been read, a consensus meeting was held, in which a third reviewer would make the final decision in case there were any disagreements.

The studies included in the review were assessed regarding the risk of bias with the Meta-Analysis of Statistics: Assessment and Review Instrument (MASTARI) for Observational Studies from the Joanna Briggs Institute (JBI)[16]. Two reviewers separately assessed the risk of bias and judged the included articles, checking "yes", "no", "unclear" or "not applicable" in each assessment criteria. The risk of bias was classified as high when 49% of the criteria analyzed in the study were checked "yes"; moderate, when 50% to 69% were checked "yes"; and low, when more than 70% were checked "yes". When necessary, the disagreements were solved by a discussion with the third reviewer.

After the three stages, the studies included in the review were organized and summarized in a chart with concise information on the authors of the studies, year of publication, country of origin, characteristics of the sample (number of participants, distribution per sex, and mean age), objective, type of study, level of evidence[17], method, and main outcomes.

RESULTS

A total of 389 records were found; most of the studies were retrieved from Embase (n = 157), followed by MEDLINE/PubMed (n = 124), and Web of Science (n = 104); there were fewer in LILACS (n = 4). After removing the duplicates, 304 studies were selected to have their titles and abstracts read.

After all the stages in the process of constructing this integrative review, 16 studies were included, following the eligibility criteria (Figure 1).

The studies included in the review were in English, whereas only one was in Portuguese[18]. Only two of them were Brazilian studies, one from the South Region[19] and the other from the Northeast Region[18]. The years of publication ranged from 1986[20] to 2020[21]. There was a predominance of older women in the study populations; the lowest mean age was 71 years and the highest, 87 years. The study sample size ranged from a few (n = 12)[22] to a quite large number of participants (n = 6,349)[23]. Concerning the characteristics of the NHs, some were subdivided according to the level of care the older adults needed and/or their health status, whereas some were women-only homes.

The most frequent signs and symptoms of OD were coughs[18,20-31] and chokes[22-24,26-28,30] before, during, or after swallowing. Other signs and symptoms were also found, namely: decreased tongue pressure[21,27,31,32], wet voice[18,20,28,29], weight loss[24,25,29,33], slow swallowing[20,24,29,30], taking longer to finish meals[18,25,30,32], anterior saliva loss[20,29,30], mastication difficulties[20,24,29], spitting out the food[20,25,30], decrease in daily food intake[18,32], drinking liquids during meals[24,28], and presence of food residue after swallowing[18,30].

The less frequent symptoms were xerostomia[19], throat discomfort[24], food sticking in the throat[24], discomfort sensation when ingesting solid foods[24], lip and tongue dysfunction, nasal regurgitation[20], and posterior oral food escape[20].

The description of the articles included in the review is presented in Chart 2, which details the main information on the topic, regarding the objectives, the methodology employed, and main outcomes concerning the signs and symptoms of OD.

Concerning the risk of bias, eight studies were judged as high risk[18,19,21-25,28], four as moderate risk[20,26,32,33], and four as low risk[27,29-31]. The methodological limitations in all studies included in this review were related to deficient reports of the sample inclusion and exclusion criteria, description of the study subjects, confounding factors, and strategy to control these factors. Most studies were classified as low risk of bias in the items related to reliable outcome measures and appropriate statistical analyses. Tables 1 and 2 summarize the assessments obtained with JBI-MASTARI[17].

DISCUSSION

A predominance of older females living in NHs was observed in the selected studies. This tendency is present in studies with older adults, in which more women than men participate, with a mean age above 70 years[34,35].

In general terms, many older adults frequently complain of OD, especially regarding coughs and chokes before, during, or after meals. These symptoms presuppose a change between the oral and pharyngeal phases of swallowing[29,36] and can indicate difficulties with the ability to swallow safely. Such difficulties result from a cognitive decline or an impairment in the oral motor function, caused by stroke or neurodegenerative diseases – which are significant indicators associated with OD in institutionalized older adults[11,20,28,37].

When the swallowing difficulty is in the pharyngeal phase, the older adults choke and cough; they may also bronchoaspirate while or after swallowing and develop pneumonia[38]. Coughs are a classic sign of the presence of OD-related penetration/aspiration and an indicator of the existence of sensitivity in the laryngeal region, which stimulates the reflex act to protect the airways[39]. Moreover, many older adults in NHs often have their meals in bed, which helps trigger coughs and chokes and causes asphyxia and aspiration[25].

The perception of choking is common among institutionalized older adults, and they mainly view this symptom as caused by aging[40,41], associated with the presence of negative feelings/sensations, relating them to death, shortness of breath, fear, or denial of the symptom[40].

It must be pointed out that the presence of wet voice in older adults may be related to the risk of penetration (as a sign indicative of stasis of secretions, liquids, or food in the laryngeal vestibule) and aspiration[18,42]. In older adults, the onset of pharyngeal and laryngeal events, including airway closure, is significantly slower than in adults[43]. Hence, when

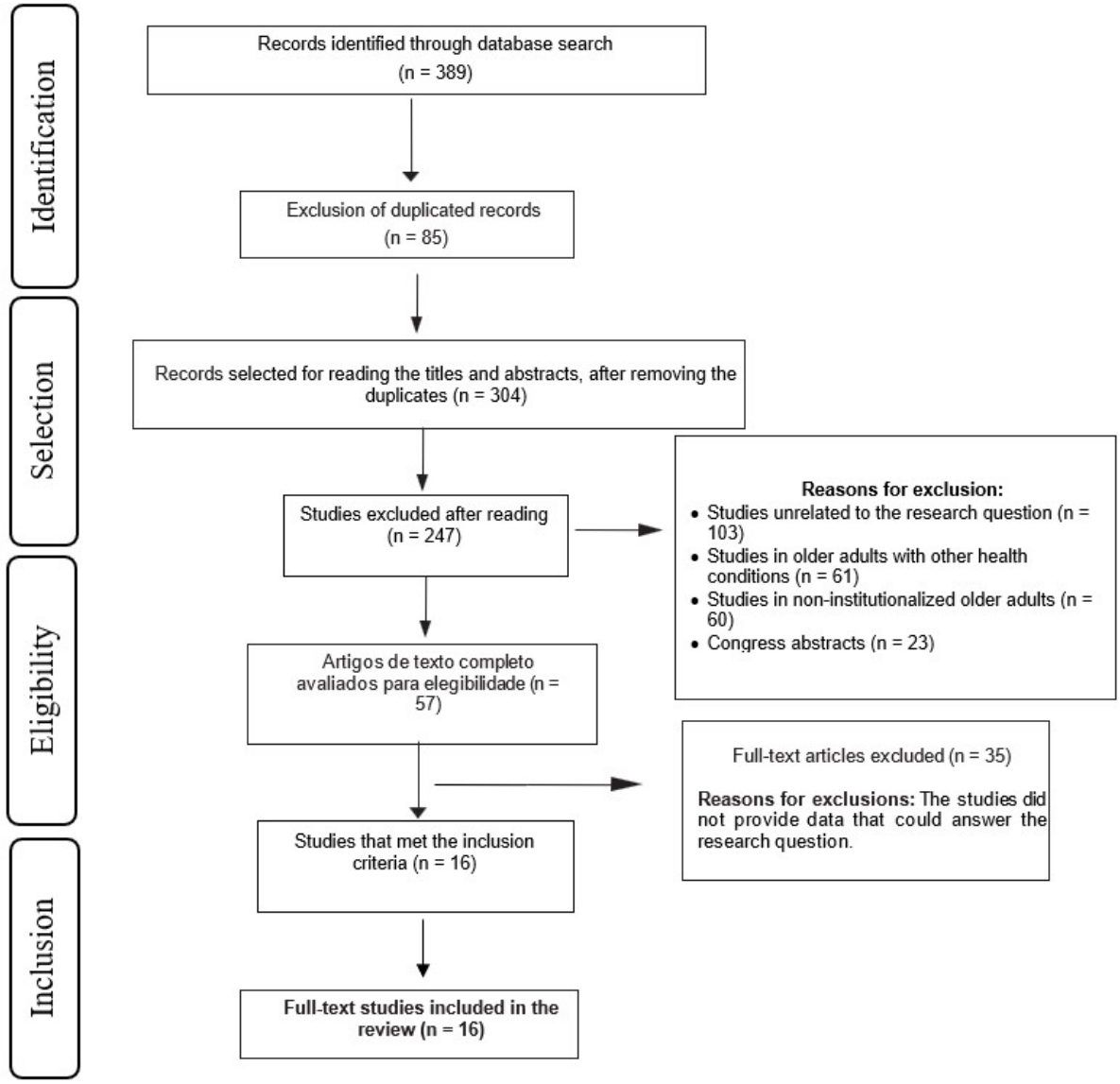

Figure 1. Flowchart of the stages in the integrative review process
Subtitle: n = number of studies

the functioning of this swallowing mechanism is changed, the risk of penetration into the airways may be even greater[44].

Slow swallowing may indicate a disorder at the beginning of the process of transferring the bolus to the pharyngeal region. This is possibly due to aging, which interferes with the triggering of the pharyngeal reflex[43] and the efficiency of mastication, which in turn may be significantly more delayed in older adults than in those under 45 years old[44]. This changed process may lead to the presence of residues in the oral cavity, requiring multiple swallows because of the difficulty in oral propulsion[45].

The low frequency of nasal regurgitation of foods and liquids is justified, as this is one of the least common symptoms in older adults[46].

The literature indicates that the tongue pressure peak moderately decreases with advancing age, observing also that those classified with extremely weak tongue pressure were significantly the oldest ones[46-48]. Moreover, the pattern of tongue movement was unstable in people who had lost occlusal support due to tooth loss – which may contribute to the lower mean pressure peak and consequently to the deficient retention and manipulation of the bolus and its propulsion from the oral cavity to the pharynx[48,49].

Anterior oral food or liquid escape following bolus uptake[42] may be caused by insufficient lip closure. This dysfunction, when accompanied by tongue dysfunction, varies according to the person's characteristics[47] and may also favor extraoral saliva escape. Additionally, over time, it may make laryngeal contraction and elevation more difficult in spontaneous swallowing of saliva[42,50].

Although only one study in this literature review presented results related to xerostomia, when dry mouth sensation is present, it may be caused by an increased number of medications being taken, especially the antipsychotics, antidepressants, antiparkinsonians, and anticholinergics, which are necessary

Chart 2. Characterization of the studies included in the integrative review

Author, year, country	Sample	Objectives	Method	Main outcomes	TS/LE
Brochier et al. (2018), Brazil[19]	115 in 3 NHs, 67% females, over 81 years old.	To assess the association of the sociodemographic and behavioral variables and oral conditions with the presence of OD in institutionalized older adults.	Sensory oral-motor assessment and clinical diagnosis of OD were conducted with indirect swallowing test, oral assessment, and xerostomia inventory (XI).	Xerostomia was the only sign with a positive association with OD. ($p<0.001$).	Cross-sectional Level VI
Ekberg et al. (2002), Germany, France, Spain, and United Kingdom[24]	360 in 37 NHs, 67% females, mean age 71.6 years.	To determine the effects of dysphagia on social and psychological aspects related to the quality of life and investigate the relationship between the condition and its diagnosis and treatment.	The assessment was based on interviews with the modified revision of the questionnaire developed by Gustafsson and Tibbling to elicit problems related to dysphagia (basic information, eating habits, personal feelings, help-seeking, and medical condition).	The following were found: symptoms of food sticking in the throat (55%), uncomfortable or sore throat (41%), chokes and coughs (46%), and discomfort when eating solid foods (55%), slower mastication and swallowing (32%), a habit of drinking liquids during meals (27%), and weight loss (44%).	Cross-sectional Level VI
Gilmore-Bykovskyi et al. (2018), United States[22]	12 in 1 NH for dementia, 50% females, mean age 84 years.	To identify temporal associations between the caregiver's approach, behavioral symptoms, and events of aspiration among NH residents with dementia.	Two meals were assessed with video observation regarding the actions of the caregiver centered on the person (resident) and on the caregiver's task and defined indicators of aspiration, such as coughs and chokes during or after swallowing.	Signs of coughs and chokes during meals were identified, which were observable indicators of events of laryngotracheal aspiration, associated with the actions centered on the caregiver's tasks (96%).	Cross-sectional Level VI
Huppertz et al. (2018), Netherlands[23]	6,349 in 65 NHs, 70.2% females, mean age 84.5 years.	To assess the association between OD and malnutrition in Dutch NH residents.	A questionnaire, based on the literature and consultation to specialists, was applied; it included questions on relevant symptoms to detect OD: "Do you have trouble swallowing and sneeze or cough when you swallow? Malnutrition was indicated based on the Body Mass Index (BMI).	It was observed that almost half of those with dysphagia showed signs of coughs when swallowing (46.9%), and almost all these coughing residents had overall swallowing problems (82.2%).	Cross-sectional Level VI
Jukic Peladic et al. (2018) Italy[33]	1,299 for 6 months and 971 for 12 months, 71.5% females, mean age 83.5 years.	To estimate the prevalence of dysphagia and associated factors and investigate the influence of dysphagia and nutritional therapies conducted with dysphagic subjects on clinical outcomes.	Clinical assessment with the collection of information on swallowing problems and review of the medical history. The nutritional status was assessed with the information on weight loss.	The subjects with dysphagia presented with signs of greater weight loss than the non-dysphagic subjects (14.6%, $p<0.001$).	Prospective cohort Level IV

Subtitle: NH = Nursing home; OD = oropharyngeal dysphagia; % = percentage; TS = Type of study; LE = Level of evidence; n = number of older adults

Chart 2. Continued...

Author, year, country	Sample	Objectives	Method	Main outcomes	TS/LE
Kayser-Jones and Pengilly (1999), United States[25]	82 in 2 NHs, without data on sex, mean age 83.4 years.	To identify the factors that influence nutritional intake in NHs.	All three meals were observed throughout about 6 months. Each resident was screened for dysphagia at the bedside by a speech-language-hearing therapist.	Signs of delay finishing the oral phase, weight loss, older adults who spat their food, and frequent coughs when eating or drinking liquids were observed and reported by the residents.	Cross-sectional Level VI
Lin et al. (2002), Taiwan[26]	1,221 in 18 NHs, 48.1% females, mean age 77.07 years.	To investigate the prevalence of impaired swallowing in NH residents in Taiwan.	The assessment was based on self-reported questionnaires on swallowing difficulties and timed liquid-swallowing tests.	The individuals pointed out signs and symptoms of swallowing difficulties, and the occurrence of coughs and chokes was verified during the timed swallowing test.	Cross-sectional Level VI
Namasivayam et al. (2016), Canada[32]	20 in 1 NH, 12.60% females, mean age 85 years.	To explore the tongue force and its associations with signs of deficient swallowing, based on dysphagia screening and observations made during meals, time taken to eat, and amount of food ingested.	The modified version of the Screening Tool for Acute Neurological Dysphagia (STAND) was used, as well as the Iowa Oral Performance Instrument (IOPI) to measure the maximum tongue pressures; the meals were also observed to determine their duration and the food intake.	It was identified that those with reduced maximum tongue force had signs of swallowing difficulties during meals; they took 20 minutes more on average to finish their meals and their daily food intake was reduced ($p < 0.05$).	Cross-sectional Level VI
Namasivayam-MacDonald et al. (2017), Canada[27]	639 in 32 NHs, 68.9% females, mean age 87 years.	To study associations between nutritional status, food intake measures during meals, clinical signs suggestive of dysphagia, and reduced tongue force.	The older adults' behavior during meals was observed; the Screening Tool for Acute Neurological Dysphagia (STAND) was used, as well as the Iowa Oral Performance Instrument (IOPI) to measure tongue force, in a subset of 80 residents.	Signs of coughs and, less frequently, chokes in most residents were recorded. Signs of less tongue pressure were also observed in older adults with suspicion of dysphagia ($p<0.05$).	Cross-sectional Level VI
Nogueira and Rei (2013), Portugal[28]	266 in 8 NHs, 75% females, mean age 82 years.	To determine the prevalence of swallowing disorders in older adults living in NHs and identify its relationship with their cognitive and functional performance and the variables that explain the self-perceived swallowing disorders.	The swallowing and diet profiles were assessed with the 3-ounce Water Swallow Test (3 oz. WST) and Dysphagia Self-Test (DST) for older adults who managed to answer the questionnaire.	Based on the 3 oz. WST, signs of coughs and wet voice were recorded, the second one being more prevalent (10.3%). The most frequent symptoms self-reported with the DST were chokes or coughs with solid or liquid foods (49%) and the need for drinking something after swallowing (47%).	Cross-sectional Level VI

Subtitle: NH = Nursing home; OD = oropharyngeal dysphagia; % = percentage; TS = Type of study; LE = Level of evidence; n = number of older adults

Chart 2. Continued...

Author, year, country	Sample	Objectives	Method	Main outcomes	TS/LE
Nomura et al. (2020), Japan[21]	69 in 1 NH, 81.15% females, mean age 86.23 years.	To analyze the relationship between oral functions and the consistency of the food that is served.	The following were verified: oral moisture, oral hygiene status, maximum occlusal pressure, tongue pressure with the Dental Prescale, tongue and lip function with oral diadochokinesia, mastication with the Gluco GSII sensor, swallowing with an OD symptom-related questionnaire.	The symptom of waking up due to coughs in sleep had a relatively high association with swallowing difficulties, and many of these older adults presented with signs of tongue and lip dysfunction (p=0.027).	Cross-sectional Level VI
Park et al. (2013), South Korea[29]	395 in 2 NHs, 76.5% females, 76.7% aged 75 years or more.	To assess the prevalence of dysphagia in NH residents in South Korea and identify the factors associated with dysphagia.	Information on the warning symptoms, signs of dysphagia, and swallowing problems was collected regarding the swallowing capacity and severity of dysphagia with the Gugging Swallowing Screen (GUSS).	Among the signs found, wet voice (14,4%), saliva loss (9.1%), slow swallowing (58.2%), coughs (24%), mastication difficulties (63.5%), and weight loss (31.7%) were risk factors significantly associated with dysphagia (p<0.001).	Cross-sectional Level VI
Roque et al. (2010), Brazil[18]	30 in 1 NH, females, mean age 83.73 years.	To describe the dynamics of the diet of institutionalized older women regarding the clinical aspects of swallowing, as well as cognitive, behavioral, and environmental aspects related to the diet.	A meal was observed in real time and audiovisually recorded to verify the older women's attitudinal and behavioral aspects and required dependence; their oral cavity was also inspected.	The most recurrent signs were food residues (23.3%) and vice changes (16.7%) after swallowing and coughs (20%) during meals. Poor oral intake (26.7%) and taking longer to eat (53.3%) were also identified.	Cross-sectional Level VI
Siebens et al. (1986), United States[20]	131 in 1 NH, 79% females, mean age 81.7 years.	To identify the factors associated with the loss of the ability to eat.	A questionnaire was administered approaching the diet, frequency of self-feeding, dysfunction of the upper limbs, and signs of dysphagia. Their cognition, capacity to swallow liquids and semisolids, and motor functions of the oropharyngeal structures were also assessed.	Dependent older adults had greater signs in the oral phase, such as spitting the food, chokes (n=28), incapacity to masticate (n=19), saliva loss (n=26), nasal regurgitation (n=3), oral food escape (n=13), and delayed swallowing (n=27). In the pharyngeal phase, signs of coughs when swallowing liquids (n=51), chokes during meals (n=36), and wet voice (n=12) were identified.	Cross-sectional Level VI
Steele et al. (1997), Canada[30]	372 in 1 NH, in levels of care, 280 females, mean age 87 years.	Prevalence of identifiable diet-related difficulties in a multi-care institution for older adults and determine their distribution in various levels of attention.	A single meal was observed, taking notes of the occurrence and frequency of a list of 12 specific problems related to eating/ swallowing or any mastication difficulties.	A greater prevalence of signs of delay to finish meals (29 minutes), coughs or chokes (28%), saliva loss (71%), absent or slow swallowing (31%), oral residues, and spitting the food (33%) were observed.	Cross-sectional Level VI

Subtitle: NH = Nursing home; OD = oropharyngeal dysphagia; % = percentage; TS = Type of study; LE = Level of evidence; n = number of older adults

Chart 2. Continued...

Author, year, country	Sample	Objectives	Method	Main outcomes	TS/LE
Yoshida et al. (2006), Japan[31]	145 in 5 NHs, 109 females, mean age 83 years.	To determine the relationship between tongue force and signs of cough and demonstrate the clinical value of the tongue pressure measure in swallowing assessments.	The swallowing problems were identified based on the report of coughs during meals, classified from mild to intense; to assess tongue pressure, a prototype device that registers tongue pressure was used.	Most older adults reported symptoms of mild coughs, and those with defined swallowing problems reported intense coughs. Less tongue pressure was identified and was significantly related to coughs during meals ($p<0.001$).	Cross-sectional Level VI

Subtitle: NH = Nursing home; OD = oropharyngeal dysphagia; % = percentage; TS = Type of study; LE = Level of evidence; n = number of older adults

Table 1. Assessment of the risks of bias of the cross-sectional studies

Question	Answers														
	Brochier et al. (2018)[19]	Ekberg et al. (2002)[24]	Gilmore-Bykovskyi et al. 2018[22]	Huppertz et al. (2018)[23]	Kayser-Jones; and Pengilly 1999[25]	Lin et al. (2002)[26]	Namasivayam et al. (2016)[32]	Namasivayam-MacDonald et al. (2017)[27]	Nogueira and Reis (2013)[28]	Nomura et al. (2020)[21]	Park et al. (2013)[29]	Roque et al. (2010)[18]	Siebens et al. (1986)[20]	Steele et al. (1997)[30]	Yoshida et al. (2006)[31]
1. Were the criteria for inclusion in the sample clearly defined?	N	Y	N	N	N	N	Y	Y	N	N	Y	N	N	Y	Y
2. Were the study subjects and the setting described in detail?	N	Y	N	N	N	N	N	Y	N	N	Y	Y	N	Y	N
3. Was the exposure measured in a valid and reliable way?	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4. Were objective, standard criteria used for measurement of the condition?	N	Y	N	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y
5. Were confounding factors identified?	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y	N	Y
6. Were strategies to deal with confounding factors stated?	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y	N	Y
7. Were the outcomes measured in a valid and reliable way?	N	N	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
8. Was appropriate statistical analysis used?	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
% yes/risk	25% High	14.2% High	37.5% High	28.57% High	0% High	50% Moderate	37.5% High	100% Low	37.5% High	62.5% High	100% Low	28.57% High	57.14% Moderate	75% Low	87.5% Low

Subtitle: Y = Yes; N = No; % = percentage

to the health conditions that occur in the aging process. This symptom, when accompanied by cognitive hypofunction and extrapyramidal symptoms, may help develop dysphagia[48,51-53].

Mastication difficulties may result from changes in the older adults' structure and function, such as decreased mastication force and muscle fatigue caused by mastication muscle hypotonia. These lead to a slower bolus preparation and may cause discomfort in the masticatory process[53], besides making the ingestion of solid foods more difficult, which requires the ingestion of liquids to help the passage of the food bolus[47]. Other conditions also complicate masticatory efficiency, of which dental changes and/or poorly fitted dentures stand out[53], as dental support is necessary to maintain adequate oral-motor function[54]. However, older adults, even with complaints of

Table 2. Assessment of the risk of bias of the cohort study

Question	Answers
	Jukic Peladic et al. (2018)[33]
1. Were the two groups similar and recruited from the same population?	Y
2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Y
3. Was the exposure measured in a valid and reliable way?	N
4. Were confounding factors identified?	Y
5. Were strategies to deal with confounding factors stated?	Y
6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Y
7. Were the outcomes measured in a valid and reliable way?	N
8. Was the follow-up time reported and sufficient to be long enough for outcomes to occur?	N
9. Was follow-up complete, and if not, were the reasons to loss to follow-up described and explored?	Y
10. Were strategies to address incomplete follow-up utilized?	N
11. Were appropriate statistical analysis used?	Y
% yes/risk	66.66% Moderate

Subtitle: Y = Yes; N = No; % = percentage

mastication difficulties, may make personal adjustments and maintain the performance in the masticatory process and subsequent swallowing[55].

The signs and symptoms discussed above show that it is difficult for older adults to perceive these outcomes because they believe they are part of the aging process. On the other hand, health professionals, caregivers, and speech-language-hearing therapists must be attentive to any red flags for a likely swallowing disorder that might compromise their overall health status – not only because of the consequences it brings to the maintenance of their nutritional and hydration status and pulmonary health but also because it poses a risk of death and loss of quality of life. Therefore, the teams in NHs must be necessarily calibrated, which is a reality in other areas[56] and scenarios[26].

In the interpretability of the risks of bias, the studies revealed deficiencies in some aspects that indicated the presence of confounding factors regarding age, distribution per sex, perception of the disease, and health condition. These may distort the results concerning the frequency of the signs and symptoms of OD. This methodological flaw could have been solved if the studies presented clearer and more cohesive analysis criteria to answer their research questions.

The limitations of the study include that the articles focused only on the outcomes of the prevalence of OD and associated risk factors, without further analysis of the details of the signs and symptoms that could result in a swallowing disorder in older adults who live in NHs. Furthermore, some pieces of research had small samples, which hindered a better characterization of the signs and symptoms of OD, with methodologies that lacked comparison groups to control the results and confounding factors in relation to the presence of underlying diseases or the absence of diseases in older adults who maintained a good health status. Therefore, given the lack of differentiation of signs and symptoms of swallowing disorders, either associated or not with underlying diseases, the small samples, and the methodological flaws, the interpretation of the findings must be carefully analyzed because the outcomes found cannot be generalized.

CONCLUSION

The reviewed studies show that the most frequent OD-related signs and symptoms in institutionalized older adults were coughs and chokes before, during, and after swallowing, followed by decreased tongue pressure, wet voice, weight loss, slow swallowing, drooling, mastication difficulties, and taking longer to finish meals. Most pieces of research had a medium or high risk of bias.

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