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Prevalence and risk factors for oropharyngeal dysphagia in fragile older adults with orthopedic fractures

Prevalência e fatores de risco para disfagia orofaríngea em idosos frágeis com fraturas traumato-ortopédicas

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ABSTRACT

Purpose: To estimate the prevalence of and risk factors for oropharyngeal dysphagia in older adults hospitalized for orthopedic trauma fractures. **Methods:** Sociodemographic data, clinical comorbidities, auto-perception of swallowing performance (Eating Assessment Tool) and identification of nutritional risk (Mini Nutritional Assessment) were collected. In order to evaluate the stomatognathic system and swallowing, the Orofacial Myofunctional Evaluation Protocol for older people and the Volume Viscosity Swallow Test protocols were used to assess the outcome through the Functional Oral Intake Scale (FOIS). **Results:** 58% individuals presented dietary consistency restrictions due to oropharyngeal dysphagia (FOIS ≤ 6). A risk for functional decrease was observed among patients 70 years or older, with worse dental conditions, global functionality decreased, neurologic disorders and self-perception of swallowing changes. **Conclusion:** The study observed a prevalence of oropharyngeal dysphagia in six out of ten individuals. Frailty, advanced age, multiple comorbidities and deficient oral conditions are risk factors that should be identified in order to prevent food aspiration.

Keywords: Deglutition disorders; Risk factors; Aged; Fractures bone; Bone plates

RESUMO

Objetivo: Estimar a prevalência e fatores de risco para disfagia orofaríngea em indivíduos idosos hospitalizados por fraturas traumato-ortopédicas. **Métodos:** Foram coletados dados sociodemográficos, incluindo comorbidades clínicas, autopercepção do desempenho de deglutição (*Eating Assessment Tool*) e identificação de risco nutricional (Mini Avaliação Nutricional). Para avaliar o sistema estomatognático e a deglutição, foram utilizados os protocolos Avaliação Miofuncional para Pessoas Idosas e o *Volume Viscosity Swallow Test*, compilados para composição do desfecho a partir da *Functional Oral Intake Scale* (FOIS). **Resultados:** O estudo evidenciou que 58% dos indivíduos apresentaram restrições de consistências alimentares devido à disfagia orofaríngea (FOIS ≤ 6). Observou-se, também, risco de diminuição funcional entre aqueles com idade maior ou igual a 70 anos, com piores condições dentárias, diminuição da funcionalidade global, doenças neurológicas associadas e com percepção de alterações na deglutição. **Conclusão:** Houve prevalência de disfagia orofaríngea em seis a cada dez indivíduos, sendo a fragilidade, idade avançada, múltiplas doenças e condições orais deficitárias os fatores de risco para a alteração, fatores estes que devem ser identificados para a prevenção de aspiração alimentar.

Palavras-chave: Transtornos de deglutição; Fatores de risco; Idoso; Fraturas ósseas; Placas ósseas

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INTRODUCTION

The aging process is accompanied by significant physiopathological alterations with the potential to negatively affect the functionality[1]. Trauma has a significant impact on the elderly population, impairing their physical and mental capacity, with high rates of morbidity and mortality, bringing significant economic and social consequences[2]. Some factors such as abnormal balance and gait, muscle weakness, visual disturbances, cardiovascular diseases, cognitive impairment and the use of continuous medication should be considered when evaluating the risk of falling and, as a consequence, trauma and skeletal fractures[3].

Aging is frequently followed by a metabolism decrease resulting in the reduction of lean muscle mass, particularly the metabolically active fibers. A network of pathophysiological alterations determine the progressive decline of muscle mass, a process called "sarcopenia", which eventually decreases functionality. In particular, sarcopenia and malnutrition are closely related to dysphagia[4]. This condition leads to a reduction in the physical performance and can evolve into incapacity, lack of independence and death. Moreover, it can be considered part of a geriatric syndrome[1]. It can also be associated with malnutrition, which is in itself a condition associated with oropharyngeal dysphagia[5]. In addition to the muscle tissue vulnerability, bone fractures can lead to more invasive procedures, including fracture surgery, which can reduce functional reserve and increase vulnerability to dysphagia[2].

Dysphagia among older adults is frequent and belatedly identified, frequently being associated with the physiological senescence process and, therefore, postponing the investigation. The precocious identification of these individuals is fundamental to minimize or avoid clinical complications[6]. However, it can be observed in 27% of community older adults, increasing to 47.5% among hospitalized individuals, leading to dehydration, malnutrition, asphyxia and recurrent respiratory infections, contributing directly to the increase of length of stay and mortality[5]. Bedside screening among high-risk groups is widely recommended[7] with the use of measuring instruments with adequate diagnostic accuracy to identify individuals who are at risk of aspiration[8].

Considering these characteristics, the aim of this study is to estimate the prevalence of and risk factors for oropharyngeal dysphagia in older individuals hospitalized because of trauma-orthopedic fractures.

METHODS

The data were collected in a trauma exclusive hospital and was approved by the institution's ethics and research committee (nº 3.125.527). Participants were invited to the study after presenting the objectives and methods of data collection and signed the free and informed consent form.

The study included consecutively individuals aged 65 years or older[9], hospitalized for orthopedic trauma fractures, who hadn't undergone surgery when accessed for eligibility and in cognitive conditions to answer all the items of the research protocol. Patients who do not had verbal responsibility for the investigation were not eligible. Those with maxillofacial fractures and those discharged from the Intensive Care Unit during the hospitalization were excluded.

Procedures

Before the beginning of data collection, the evaluators had been trained on the protocol instruments to obtain agreement in the methods of clinical evaluation. In order to control measurement bias, researchers did not have prior knowledge of individual clinical conditions. Data collection was performed using medical records and a questionnaire developed for this study was applied at the bedside, with items answered by the individual or by the relative/caregiver if there was a necessity of assistance, through validated instruments.

In the questionnaire, sociodemographic data (age, gender, ethnicity, education and average family income estimated in number of minimal wages), trauma history and bone fracture that had led to hospitalization were collected. Complaints about swallowing and previous diagnoses of the function were also collected, as well as a description of food consumption until the hospitalization. From these reports, the consistency consumed was classified according to the International Dysphagia Diet Standardization Initiative – IDDSI[10] which provides the terminology and standards in a global level to describe the solid and liquid consistencies according to viscosity, consumption method and necessary oral abilities[10]. The evaluators also collected data about dental conditions from the adequacy of the superior and inferior dental prosthesis or presence of dentition, verified through inspection of the oral cavity; and the degree of functional dependence[11], from each individual report about their motor independence.

Based on the patient record, the consistency of the diet prescribed in the hospitalization was registered and categorized based on the IDDSI to compare the perspective of the medical prescriptions with the data obtained by the individual's report and evaluation during the study. From the medical records of the presented comorbidities, the history of previous disorders associated with oropharyngeal dysphagia (neurologic, pulmonary and gastrointestinal diseases) was collected, and a score was filled in with the mortality risk according to the Charlson Comorbidity Index[12]. The score is established based on the relative risk of each comorbidity, with grades varying from 0 to 6. The severity score is determined using registered data of the individual's secondary diagnoses, making the sum of the grades of all comorbidities that the individual has. The higher the score, the higher the mortality risk is.

To characterize the individual's self-perception about swallowing performance, the evaluators applied the Eating Assessment Tool-10 protocol (EAT-10)[13]. The questionnaire consists of ten questions about functionality, emotional impact and physical symptoms provoked by swallowing problems. Each question has a score varying from 0 to 4, being 0 = "not a problem" and 4 = "a very big problem". A score of 3 points or higher indicates risk of dysphagia and a functional assessment of the swallowing performance by a specialist is recommended.

In order to identify nutritional risk, the Mini Nutritional Assessment (MNA)[14] was used, a simple and quick method to identify old patients who are at risk of malnutrition or who are already malnourished. Its application can be made by a trained multidisciplinary team. The questionnaire consisted of

18 questions divided in two parts - screening and evaluation - subdivided in four domains: anthropometry, dietetics, global assessment and self-assessment. It categorizes the individuals in malnourished, under risk of malnutrition and normal nutritional state. The individuals answer the questionnaire in its entirety to obtain a more comprehensive estimate regarding nutritional conditions.

In order to identify, classify and grade the components and functions of the stomatognathic system, the Orofacial Myofunctional Evaluation Protocol for older people (OMES-Elders)[15] was used, divided in three categories: posture and appearance, mobility and stomatognathic functions, considering the highest scores as indications of greater performances. The speech assessment established by the protocol was not executed because it was not the focus of the study. Therefore, the minimum and maximum final scores varied between 51 and 250; and from the assessed data, a classification of the consistency of solids indicated for each individual was made according to the IDDSI[16].

In order to identify the individuals with dysphagia at risk for respiratory and nutritional complications, the protocol Volume Viscosity Swallow Test (V-VST) was applied. The assessment was made using three viscosities (nectar, liquid and pudding) and three different volumes (5, 10 and 20 mL). The alterations were verified during and after the ingestion of the volume offered and were categorized as the presence or absence of swallowing safety and efficiency[8] and as different viscosity indications for each individual[10].

From the OMES-Elders and the V-VST data, the functional level of food ingestion was graduated through the Functional Oral Intake Scale (FOIS)[16] to estimate the outcome. The FOIS graduates the performance of swallowing in seven levels, which were analyzed and equated according to the classification followed by the IDDSI in: level 7, regular diet; level 6, liquids + soft; level 5, liquids + minced and moist; level 4, pureed for solids and extremely thickened for liquids (standard viscosity for the whole diet); level 3, tube dependent + liquidised for solids and moderately thick for liquids; level 2, tube dependent + mildly thick; and 1, exclusively tube dependent + slightly thick. From this classification, the participants were divided regarding the presence or absence of swallowing alterations, considering level 7 individuals as "normal" and level 6 or lower subjects as "with alterations" to compare them regarding the investigated variables.

Sample size

The sample size was estimated considering the average number of hospitalized individuals on the orthopedic team per year in the last 3 years (N=3180). A maximum proportion of affected individuals of 20% was considered, fulfilling the eligibility criteria, with a sample error of 5% and a confidence interval of 95%. Thus, the need to allocate 229 individuals was identified in order to represent the studied population.

Data analysis

The data were analyzed using the SPSS v.22 software (Chicago: SPSS Inc). Kolmogorov-Smirnov test was used to verify the distribution of the investigated variables. The quantitative variables were described based on the average ± standard deviation and the qualitative variables were described based on absolute frequency (relative). The Chi-square test was used to compare the qualitative variables and the t-Student Test was used to compare the quantitative variables, considering a confidence interval of 95% on a significance level of 5%. The Poisson regression with robust variance was used to calculate the gross and adjusted Prevalence Ratio (PR) and its respective confidence interval of 95%. Wald's Chi-square test was used to measure the interval significance. In the adjusted model, variables of < 0.10 were included in the univariate analysis in which all the study variables were investigated. The inclusion of each variable in the final model was explored from its theoretical explanation regarding the outcome by analyzing possible confounders.

RESULTS

The study assessed 1,324 individuals for eligibility, of which 229 (17.29%) were included, according to the flowchart presented in Figure 1. The average age of the assessed population was 77.90 ± 8.21 years old. 64 (27.9%) individuals presented swallowing complaints about solid food and 26 (11.4%) about liquids. Five individuals (2.2%) mentioned having undergone prior investigation of swallowing complaints. 113 (49.3%) individuals reported some previous restriction of diet consistencies. However, in hospitalization, diet without restriction of consistencies was prescribed for 207 (90.4%) individuals.

From the data obtained through the OMES-Elders, alterations of mobility and swallowing performances were observed, leading to the restriction of solid consistencies in 132 (57.6%) individuals. Regarding the V-VST data, a risk of efficiency or safety was verified in 147 (64.2%) individuals. Thus, the patients were classified regarding the swallowing functionality according to the FOIS, from which the following results were obtained: 97 (42.4%) subjects were categorized on level 7; 73 (31.9%) on level 6; 44 (19.2%) on level 5; 14 (6.1%) level 4; no one on the levels 3 and 2; and 1 (0.4%) on level 1. When the individuals were separated in two study groups for analysis, 132 (58.0%) presented some kind of food consistency restriction with the level FOIS ≤ 6, and 97 (42.4%) did not present restrictions classified with FOIS = 7.

The study observed a higher prevalence of female (78.6%), white individuals (76%), with an elementary school education level (62.0%), one minimum wage income (25.3%) per family, with fractures caused by falling from their own height (83.4%) and hospitalized by isolated femur fracture (55.9%). Comparing the variables per groups according to the swallowing functionality (FOIS ≤ 6 and FOIS = 7), a lower education degree and a higher proportion of individuals hospitalized because of femur fracture ($p \leq 0.05$) were verified among participants with functional swallowing restrictions (FOIS ≤ 6). The sociodemographic characteristics of the sample are presented in Table 1.

Comparing the clinical variables of the groups, worse dental conditions, higher degree of dependence, history of neurologic and pulmonary diseases, higher Charlson scale score, dysphagia as indicated by the EAT-10 score, and worst nutritional conditions were observed in individuals with FOIS ≤ 6 ($p \leq 0.05$) (Table 2).

Considering the stomatognathic system conditions, worse functional conditions in individuals with FOIS ≤ 6 were observed, indicated by a lower score, in all the analyzed domains. (Table 3).

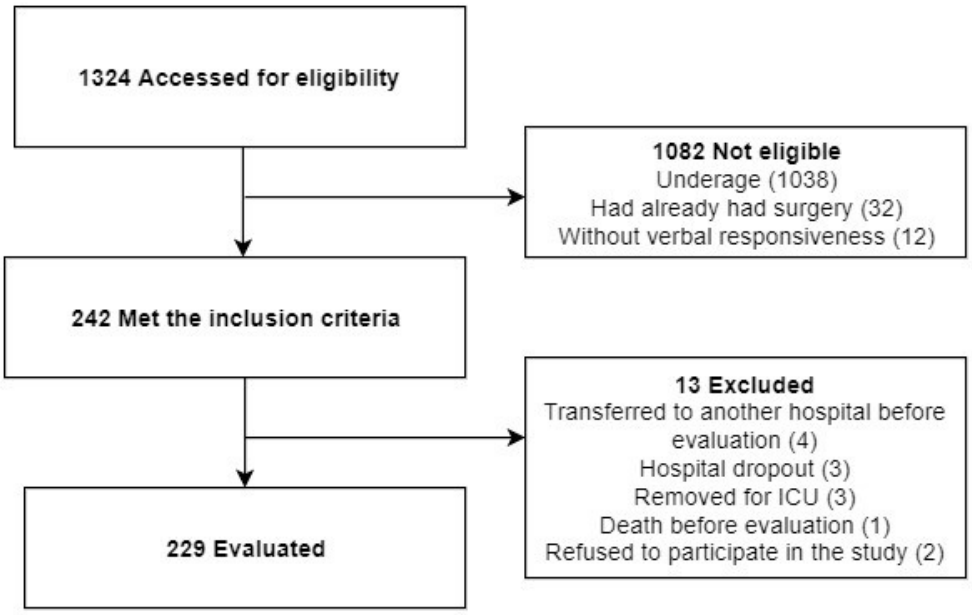

Figure 1. Flow diagram of individuals in the study

Table 1. Comparison among individuals with or without functionality implications of swallowing among the investigated sociodemographic variables

	Whole sample (n = 229)	FOIS ≤ 6 (n = 132)	FOIS = 7 (n = 97)	p value
Sex				
Male	49 (21.4)	24 (49.0)	25 (51.0)	0.16
Female	180 (78.6)	108 (60.0)	72 (40.0)	
Ethnicity				
White	174 (76.0)	94 (54.0)	80 (46.0)	0.10
Black	12 (5.2)	7 (58.3)	5 (41.7)	
Brown-skinned	43 (18.8)	31 (72.1)	12 (27.9)	
Education				
Illiterate	22 (9.6)	17 (77.3)	5.(22.7)	
Elementary School	142 (62.0)	91 (64.1)	51 (35.9)	≤0.01[a]
High School	47 (20.5)	22 (45.8)	26 (54.2)	
College	18 (7.8)	3 (16.7)	15 (83.3)	
Family income				
Not Informed	5 (2.2)	4 (80.0)	1 (20.0)	
Up to 1 minimum wage	58 (25.3)	28 (48.3)	30 (51.7)	
1 to 2 minimum wages	54 (23.6)	33 (61.1)	21 (38.9)	0.07
2 to 3 minimum wages	56 (24.5)	35 (62.5)	21 (37.5)	
3 to 4 minimum wages	40 (17.5)	27 (67.5)	13 (32.5)	
5 to 10 minimum wages	16 (7.0)	5 (31.3)	11 (68.8)	
Trauma History				
Fall from own height	191 (83.4)	114 (59.7)	77 (62.5)	0.30
Fall from stairs/bed/walker/roof	30 (13.1)	15 (50.0)	15 (50.0)	
Traffic accidents	8 (3.5)	3 (37.5)	5 (62.5)	
Kind of fracture				
Femur	128 (55.9)	86 (67.2)	42 (32.8)	
Radius/Ulna/Humerus	52 (22.7)	20 (38.5)	32 (61.5)	
Fibula/Tibia/Patella	31 (13.5)	13 (41.9)	18 (58.1)	≤0.01[a]
Hip	15 (6.6)	10 (66.7)	5 (33.3)	
Femur + Radius/Ulna/Humerus	3 (1.3)	3 (100)	0 (0)	

[a]significant difference; minimum wage in 2019 R$ 998.00

Subtitle: FOIS: Functional Oral Intake Scale; FOIS ≤ 6: with swallowing restrictions; and FOIS = 7: normal

Table 2. Comparison among individuals with or without functionality implications of swallowing among investigated clinical variables

	Whole sample (n = 229)	FOIS ≤ 6 (n = 132)	FOIS = 7 (n = 97)	p value
Dental conditions				
Own dentition or well-adapted prostheses	141 (61.6)	63 (44.7)	78 (55.3)	≤0.01[a]
Edentulous or badly-adapted prostheses	88 (38.4)	69 (78.4)	19 (21.6)	
Degree of dependence				
Autonomous	134 (58.5)	55 (41.0)	79 (59.0)	
Degree I	53 (23.1)	38 (71.7)	15 (28.3)	≤0.01[a]
Degree II	28 (12.2)	27 (96.4)	1 (3.6)	
Degree III	14 (6.1)	12 (85.7)	2 (14.3)	
Neurological disorders				
Yes	72 (31.4)	57 (79.2)	15 (20.8)	≤0.01[a]
No	157 (68.6)	75 (47.8)	82 (52.5)	
Pulmonary disorders				
Yes	27 (11.8)	22 (81.5)	5 (18.5)	≤0.01[a]
No	202 (88.2)	110 (54.5)	92 (45.5)	
Gastrointestinal disorders				
Yes	21 (9.2)	12 (57.1)	9 (42.9)	0.96
No	208 (90.8)	120 (57.7)	88 42.3)	
Charlson				
0	39 (17.0)	13 (33.3)	26 (66.7)	
1-2	102 (44.5)	60 (58.8)	42 (41.2)	≤0.01[a]
3-4	39 (17.0)	24 (61.5)	15 (38.5)	
+5	49 (21.4)	35 (71.4)	14 (28.6)	
EAT-10				
Without dysphagia	161 (70.3)	74 (46.0)	87 (54.0)	≤0.01[a]
Indication of dysphagia	68 (29.7)	58 (85.3)	10 (14.7)	
MNA screening				
Malnourished	35 (15.3	24 (68.6)	11 (31.4)	0.29
Under risk of malnutrition	78 (34.1)	51 (65.5)	27 (34.6)	
Normal nutritional state	116 (50.7)	57 (49.1)	59 (50.9)	
MNA total score				
Malnourished	38 (16.6)	31 (81.6)	7 (18.4)	≤0.01[a]
Under risk of malnutrition	125 (54.6)	79 (63.2)	46 (36.8)	
Normal nutritional state	66 (28.8)	22 (33.3)	44 (66.7)	
Safety and/or efficiency alteration in V-VST				
Yes	147 (64.2)	103 (78.1)	44 (29.9)	≤0.01[a]
No	82 (35.8)	29 (22)	53 (54.6)	

[a]significant difference

Subtitle: FOIS: *Functional Oral Intake Scale*; FOIS ≤ 6: with swallowing restrictions; and FOIS = 7: normal; Charlson: Charlson Comorbidity Index; EAT-10: Eating Assessment Tool; MNA: Mini Nutritional Assessment; V-VST: Volume Viscosity Swallow Test; n: number of participants

Table 3. Comparison among individuals with and without functionality implications of swallowing among investigated variables in the stomatognathic system assessment

	Whole sample (n = 229)	FOIS ≤ 6 (n = 132)	FOIS = 7 (n = 97)	p value
Appearance and posture	50.39 ± 5.14	48.40 ± 5.02	53.10 ± 3.93	≤0.01[a]
Mobility	93.52 ± 20.64	88.89 ± 23.19	99.82 ± 14.43	≤0.01[a]
Functions	45.66 ± 7.05	42.25 6.64	50.30 ± 4.49	≤0.01[a]
OMES-Elders score	189.58 ± 27.35	179.55 ± 29.32	203.23 ± 16.63	≤0.01[a]

[a]significant difference

Subtitle: FOIS: *Functional Oral Intake Scale*; FOIS ≤ 6: with swallowing restrictions; and FOIS = 7: normal; average ± standard deviation; OMES-Elders: Orofacial Myofunctional Evaluation; n: number of participants; mean ± standard deviation

Analyzing the quartile age distribution, elderly people hospitalized aged 70 years or older (PR = 1.65; 95% IC 1.01-2.73), with worse dental conditions (PR = 1.40; 95% IC 1.14-1.72), with a diminished global functionality indicated by the degree of dependence (PR = 1.19; 95% IC 1.01-1.40), with neurological diseases (PR = 1.22; 95% IC 1.01-1.49) and with perception of swallowing alterations (PR = 1.34; 95% IC 1.09-1.64) presented a higher risk for swallowing functionality alterations (FOIS ≤ 6). The final model of risk analysis for oropharyngeal dysphagia is presented in Table 4.

DISCUSSION

The study observed a higher prevalence of dysphagia among hospitalized elderly patients aged 70 years or older with

Table 4. Crude and adjusted analysis of the risk factors for functionality alterations of swallowing according to the Poisson regression (PR = prevalence ratio)

	FOIS ≤ 6 (n = 132)			
	Crude PR (CI)	**p value**	**Adjusted PR (CI)**	**p value**
Age				
≥70 years old	2.32 (1.39-3.89)	0.01[a]	1.65 (1.01-2.73)	0.04[a]
Dental conditions				
Edentulous or badly-adapted prostheses	1.75 (1.41-2.17)	≤0.01[a]	1.40 (1.14-1.72)	≤0.01[a]
Degree of dependence				
Degree II ou III	1.86 (1.58-2.20)	≤0.01[a]	1.19 (1.01-1.40)	0.03[a]
Neurological diseases				
Yes	1.65 (1.35-2.02)	≤0.01[a]	1.22 (1.01-1.49)	0.03[a]
Gastrointestinal diseases				
Yes	1.49 (1.20-1.86)	≤0.01[a]	1.08 (0.88-1.31)	0.43
EAT-10				
Indication of dysphagia	1.85 (1.52-2.25)	≤0.01[a]	1.34 (1.09-1.64)	0.05[a]
MNA total score				
Malnourished or at risk of malnutrition	2.02 (1.41-2.89)	≤0.01[a]	1.4 (0.97-2.02)	0.06

[a]significant difference

Subtitle: FOIS: *Functional Oral Intake Scale*; FOIS ≤ 6: with swallowing restrictions; PR: prevalene ratio; CI: confidence interval; EAT-10: Eating Assessment Tool; MNA: Mini Nutritional Assessment

lower education level, 58% of whom presented oropharyngeal dysphagia. Previous studies have identified that individuals aged 75 years or older had a higher risk of dysphagia, observing that sociodemographic variables regarding low educational and economic level were related to a worse swallowing performance due to the social vulnerability of individuals[17]. In this context, health care is affected by the social situation in which these patients are inserted. The vulnerability of the health condition of elderly people increases and may be related to determinants such as occupation, income, education, family structure, availability of health care services, exposure to diseases, basic sanitation, social networks and support, social discrimination and access to preventive health actions[17].

It was also noticed that the older adults who were the most vulnerable had a higher difficulty to perceive the disorders and a lack of awareness about their global limitations, which would normally happen only when the comorbidities and the severity of the situation increased[18]. The detection of swallowing disorders is still late, and these are some of the points that can contribute to this reality.

In this study, a lower frequency of food consistency restrictions was reported by the individuals compared to the results obtained in the swallowing clinical evaluation. Previous studies had shown that the patients attributed swallowing problems to the aging process, being unable to identify alterations in its function[17,19]. This data becomes an important alert to the teams about the risk of intercurrences related to the prescription of a diet that is incompatible with the elderly capacity for food ingestion. The inadequacy of the prescribed diet can negatively affect the immune response, which may bring nutritional loss, due to the reduced access to nutrients and water consumption, besides increasing the risk of aspiration and pneumonia[20]. These factors may lead to more hospital length of stay, predisposal to diseases and survival decrease[21]. Diets with modified consistency strategies must be adapted according to the functional restrictions presented by each individual[10].

The present study also evidenced relevant data related to access difficulties to the diagnosis of the swallowing alteration, in which it was verified that only 2.2% of the individuals had already had some previous diagnosis. This fact may be associated with difficulties in recognizing abnormalities and with the difficult access to exams such as the swallowing videofluoroscopy, the main assessment for oropharyngeal dysphagia[22]. In this context, the use of subjective investigation instruments, such as EAT-10, can be a screening tool for dysphagia. In this sample, the instrument identified risk of dysphagia, favoring an early detection of the alterations[23,24].

The changes on the orofacial structures caused by the aging process have a significant correlation with the food performance. The mobility restriction of the stomatognathic organs can be part of a global muscle mass and strength reduction highly prevalent among older adults[23]. Besides the motor alterations, the high quantity of individuals who were edentulous or with poorly adapted prosthesis worsens the functional performance, limiting the variability of food consistencies. In a previous study[23], it was also identified that the natural denture or well-adapted dentures are indispensable to keep adequate orofacial abilities. It is known that older adults, even without swallowing-related complaints, present higher prevalence of food restrictions in the presence of an unfunctional oral health condition[23]. These orofacial alterations demonstrate a significant association with the presence of oropharyngeal dysphagia[24], leading to the indication of solid consistency restriction in 57.6% of the individuals in this study.

Considering the swallowing performance from the V-VST data, it was observed a superior prevalence of individuals with alterations. A previous study suggested that the reduction of the orofacial muscular strength could compromise the swallowing efficiency and safety, which can be associated with the lack of coordination with the breathing process[22]. The literature also emphasizes a necessity of taking longer breathing breaks during feeding and a reduced apnea break while swallowing, which increases the risk of oropharyngeal dysphagia[25]. Despite observing swallowing alteration in 64.2% of the assessed subjects, not all of them received an indication of consistency restriction due to adequate functional compensation, guaranteeing a safe ingestion

without restrictions. The absence of food consistency restrictions in the presence of alterations can be seen as an indicator of safe ingestion even with a necessity of compensation, for example, controlling rhythm and volume ingestion.

Dependent older adults have increased vulnerability to stressors (that is, frailty) and decreased functional capabilities[23]. Comorbidities like neurological diseases, heart failure and diabetes contribute to a decline of the functional independence and may increase the risk of oropharyngeal dysphagia[26], being observed in the patients who were assessed in this study through the Charlson Comorbidity Index. These findings were also observed in earlier studies, in which older adults with higher functional restrictions and higher number of comorbidities associated with it presented clinical signs of oropharyngeal dysphagia in 69.6%[27] and up to 86%[28] of individuals. The risk of changes in swallowing must be carefully considered in neurological disorders. The swallowing and the cognition processes are based on the integrity of the multiple neuroanatomic systems and, therefore, vulnerable to different forms of neurofunctional damage[27]. A previous study also pointed out that dysphagia is a frequent comorbidity among individuals with dementia, Parkinson disease and stroke due to the difficulties that these conditions cause on the motor and sensory execution of the swallowing process[29], corroborating the data on this study.

In the nutritional assessment, the presence of oropharyngeal dysphagia as associated with a lower MNA score, in which older adults with dysphagia were malnourished or at risk of malnutrition, similar to previous findings[27,29]. From the adjusted risk analysis for dysphagia, this study observes that a worse nutritional condition does not contribute to the increase of the risk, having only an association with it, although it indicates a worsening condition. Thus, when considering nutritional aspects and swallowing changes as associated conditions, it must be taken into account an overall context of health alterations which have an impact on both aspects, such as worsening functionality and systemic diseases, and it is also possible to consider a geriatric syndrome as the reason for a global weakness[26].

Another relevant data in the current study was the prevalence of oropharyngeal dysphagia associated with femur fracture, pointed out as a major public health problem regarding senior citizens. Patients affected by femur fracture are fragile and prone to extensive local and systemic complications pre and post-operatively. A previous study indicated that 25% of the older adults with femur fracture died within a year, and the main predictors of mortality included ages over 80 and higher Charlson Comorbidity Index[30]. Despite being a condition associated with oropharyngeal dysphagia, it did not qualify as a relevant covariate in the final model of risks, since it does not explain the outcome, being attributed to broader health conditions, such as higher dependence degree or neurological disorders.

Despite the important findings in this study, it is necessary to highlight the limitations that may have influenced its results. This is a cross-sectional study and the relationship between the variables should be carefully analyzed in order not to incur reverse causality. In fact, further studies are needed to analyze causal relationships. Another limitation refers to the positioning of the individuals in bed during the moment of assessment. Some patients were positioned according to their limitations because of pain or specific fractured area, a fact that may have contributed to a worse swallowing performance. Despite these factors, it should be considered that this was the position that the subjects would possibly keep during the hospitalization while being fed, which makes the identification of adaptations and alterations of these conditions important. Still, an objective exam such as videofluoroscopy could provide a broader assessment, detecting a higher number of individuals with alterations.

CONCLUSION

There was a prevalence of oropharyngeal dysphagia in six out of ten individuals, with frailty, advanced age, multiple diseases and deficient oral conditions associated with oropharyngeal dysphagia. Therefore, during the hospital admission because of orthopedic trauma fractures, these aspects must be assessed to reduce the risk of aspiration, consequently being relevant to a safe strategy plan for older adults.

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