

Changes in Food Consistency Improve Quality of Life Related to Swallowing in Post-stroke Patients at Risk of Dysphagia

Daiana Cristina Dessuy Vieira^{1,*}, Carine Cristina Callegaro², Adriane Schmidt Pasqualoto³,
Ligia Beatriz Bento Franz⁴

¹Northeast Regional University of the State of Rio Grande do Sul, Department of Life Sciences, Nutrition. Ijuí, Rio Grande do Sul, Brazil

²Federal University of Santa Maria (UFSM), Department of Physical Therapy and Rehabilitation, Physiology and Rehabilitation Laboratory, Santa Maria, Rio Grande do Sul, Brazil

³Federal University of Santa Maria (UFSM), Specialization in physical-motor rehabilitation, Postgraduate Program in Human Communication Issues, Santa Maria, Rio Grande do Sul, Brazil

⁴Regional State University of Northwestern Rio Grande do Sul, Department of Life Sciences, Nutrition Course, *Sensu Stricto* Graduate Program in Comprehensive Health Care in the Regional State University of Northwestern Rio Grande do Sul Extension / Cruz Alta University, Rua do Comércio, 3000, 98700-000, Bairro Universitário, Ijuí, Rio Grande do Sul, Brazil

*Corresponding author: daiana.dessuy@unijui.edu.br

Abstract This study aimed to evaluate the effects of change in food consistency on the nutritional status and quality of life of patients at risk of dysphagia. Twenty-five post-stroke patients receiving outpatient care in a physical rehabilitation clinic participated in the study. Subjects were grouped into those with and those without risk for dysphagia. The *Eating Assessment Tool* (EAT-10) was applied as a tool to assess the risk of dysphagia. The participants' nutritional status was evaluated through a Mini nutritional assessment (MNA) and anthropometric measures. Quality of life as it relates to swallowing disorders was determined by using the *Quality of Life in Swallowing Disorders* questionnaire. For patients at risk of dysphagia, there were changes in the consistency of food as well as conventional treatment. For patients without risk of dysphagia, only conventional treatment was offered. All patients were reevaluated in the first and second month after the modifications. Twelve patients (69 ± 7 years) were classified as being the at-risk group and 13 patients (66 ± 10 years) were classified as not being at risk of dysphagia. Patients at risk of dysphagia presented poorer quality of life related to swallowing in the following areas: perceiving swallowing as a burden, duration of feeding, fear, mental health, social health, fatigue, and sleep. After the intervention, symptoms improved only in patients at risk of dysphagia, while the perception of health improved in both groups. Nutritional status did not change in either group. Change in the consistency of food improves symptoms related to swallowing in patients at risk of dysphagia. The perception of general health improves in patients with and without risk of dysphagia who participate in a physical rehabilitation program.

Keywords: stroke, quality of life, dysphagia

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1. Introduction

The human population is growing, with an increasing number of individuals older than 60 years. In Brazil, this group increased in population by 33.6% from 2000 to 2009, increasing the incidence and prevalence of chronic noncommunicable diseases [1] and with a strikingly high prevalence of cardiovascular disease (CVD) such as coronary artery disease and stroke, the main causes of death for both sexes in Brazil [2].

In addition to increasing mortality and morbidity, strokes are a major cause of reduced functionality. In fact, about 90% of stroke survivors develop some handicap or

disability [3]. Of these, 85% need rehabilitation and ongoing care. This reduction in functionality causes losses in quality of life (QOL) [4].

Another factor that interferes with the QOL of stroke patients is dysphagia, a swallowing disorder that affects 18% to 81% of patients in the acute phase of the illness [5]. The most frequent complications of dysphagia are lung problems due to aspiration of saliva and/or food, malnutrition, dehydration, prolonged hospitalization, and death [6].

Prolonged periods of dysphagia can cause changes in lifestyle resulting in nutritional risks [5]. Thus, the detection of risk of dysphagia makes safe eating more possible, and one of the indications of clinical treatment is modifying the consistency of food [7].

The use of food with added texture and thickened liquids facilitates oral processing and rehabilitation of swallowing [8], which may prevent the development of malnutrition and impaired QOL. This study aimed to assess the effects of a change in the consistency of food on the nutritional status and QOL of patients at risk of dysphagia after stroke.

2. Methods

The study included 25 patients who had suffered an ischemic stroke and who enrolled into a multidisciplinary rehabilitation program in the period from May to November of 2015. The patients were separated into groups of those with and without risk of dysphagia, using the Eating Assessment Tool (EAT-10) for assessing the risk of dysphagia. The culturally adapted equivalent version of the EAT-10 in Brazilian Portuguese consists of ten simple questions regarding functionality, emotional impact, and physical symptoms. A score of three points or more classified patients as being at risk of dysphagia [9]. The study excluded patients with hemorrhagic stroke.

The evaluations were performed at the time of entry into the rehabilitation program. Reassessments were conducted in the first and second months after the intervention. The intervention involved changing the consistency of food for patients at risk of dysphagia, as well as conventional treatment for patients without risk of dysphagia.

All participants signed informed consent forms, and the study protocol was approved by the Ethics Committee of the Regional State University of Northwestern Rio Grande do Sul and by the National Health Council, with approval number 40264514.4.0000.5350.

2.1. Assessment of Nutritional Status

Body mass was measured using a Micheletti digital scale, MIC-Wheelchair model (500Kg-100g, SP-BR) by two methods. Some patients stood, positioning themselves in the center of the scale platform [10]. For wheelchair users, the weight check was performed with the patient sitting in a wheelchair, discounting the weight of the chair, which is a method used currently at the Rehabilitation Unit.

Height was measured using two methods: patients who were able to stand were positioned centrally on the scale platform in an upright position, with feet together and bare, using the anthropometric ruler on the scale [10]. For patients in wheelchairs, height was measured indirectly by the use of the knee-heel length equation [11].

Body mass index (BMI) was used as a variable for anthropometric assessment of body weight. Nutritional status was assessed through BMI for adults (up to 60 years), according to the criteria of the World Health Organization [12]. For patients older than 60 years, the classification of the Pan American Health Organization (PAHO) was used [13].

MNA is a questionnaire divided into two parts, the first part for screening and the second part for overall assessment. Screening questions relate to changes in food intake (due to loss of appetite, digestive problems, or

difficulty in chewing or swallowing), loss of body mass, or loss of mobility; occurrence of psychological stress or acute disease, neuropsychological problems, and BMI. The overall assessment includes questions relating to lifestyle, skin lesions or sores, medications, dietary assessment (number of meals, food and liquid intake, and ability to feed oneself), self-assessment (self-perception of health and nutritional status), and anthropometry which is complemented by measurements of leg and arm circumference [14].

The triceps skinfold test (TST) was used as an indicator of caloric reserves. A digital plicometer (Skyndex-SM-1000, Arkansas, USA) was used, with a precision of 1 mm and constant pressure of 10 g/mm² [10]. In cases of hemiplegic patients on the right side, the measurement was taken on the other arm.

Arm circumference (AC) was used as an indicator of caloric and protein reserves. Measurements were performed on the right arm for hemiplegic patients and calibrated on the other side. The AC measurement was used to estimate mid-upper arm circumference (MUAC) to check muscle mass [15].

Calf circumference as an indicator of muscle mass was measured on the left calf with an inelastic tape measure, at the largest part of the calf [16].

Body composition analysis was performed using bioelectrical impedance analysis with a body composition analyzer (RJL Systems, Michigan, USA). Measurements were performed on the right hemisphere, with the subject lying in the supine position [17].

QOL was assessed using the *Quality of Life in Swallowing Disorders* questionnaire (SWAL-QOL), before and after 1 and 2 months of intervention in all patients. The questionnaire, modified for Brazil [18], is made up of 43 questions that assess eleven subject areas: swallowing as a burden, desire to eat, duration of eating, frequency of common symptoms of dysphagia, food selection, communication, fear of eating, mental health, social health, sleep, and fatigue. The patient responds to the frequency of each question (always, often, sometimes, a little, or never). The values of each question within each subject area were summed and the result divided by the number of questions in the area analyzed. The score was converted from 0 to 100: the lower the score, the worse the QOL related to swallowing. The result was expressed as a score value in each subject area. In interpreting the results, we considered scores of 0 to 49 to represent a severe impact, from 50 to 70 a moderate impact, and 71-100 a slight impact or no impact on QOL associated with swallowing [18,19]. In addition, the SWAL-QOL characterizes the consistency of food/liquids that patients can swallow and self-classifies health as poor, fair, good, very good, or excellent.

2.2. Intervention

2.2.1. Change in the Consistency of Food

The consistency of food was only changed for patients at risk of post-stroke dysphagia. A medical history relating to food was taken to determine modifications in protein-energy intake, with diet data calculated using the DIETPRO program. Food consistency was modified to

texture (A), classified as soft and hard texture (B), considered to be ground up and moist in accordance with the National Dysphagia Diet [20]. The diets were prepared considering the nutritional status of patients. The calculation of average caloric values and macronutrients of diets prescribed to patients comprise: 2003.6 Kcal/day, an average protein intake of 78.4 g/day, 313.5 Kcal/day and 15.6%; an average lipid intake of 60.99 g/day, 548.9 Kcal/day and 27.3%; and an average carbohydrate intake of 283.6 g/day, 1134.3 Kcal and 56.8%.

2.2.2. Conventional Treatment

Conventional treatment through physical rehabilitation was instituted in both the group at risk of dysphagia and the group without risk of dysphagia. Conventional treatment included an initial screening done by a doctor or physical therapist, discussions with the interdisciplinary team, and referral for assistance from other professionals such as nutritionists, nurses, occupational therapists, psychologists, and social workers.

2.3. Statistical Analysis

Data were expressed as means and standard deviations. Student's *t*-test for independent samples was used to compare the groups. Generalized estimating equations were used, followed by Tukey's post-hoc test for multiple comparisons of the differences between pre-intervention data and data from the first and second months post-intervention. $P < 0.05$ was considered significant. All analyses were performed using the *Statistical Package for the Social Sciences- SPSS*, version 21.

3. Results

A total of twenty-five patients participated in the study and were grouped by EAT-10. Of the sample, 12 patients presented a risk for dysphagia and the mean age of this group was 69 ± 7 years. The group without risk of dysphagia consisted of 13 patients with a mean age of 66 ± 10 years ($p = 0.61$). The time between the stroke and

admission to the rehabilitation service was 4.5 ± 2.7 months for the group at risk for dysphagia and 4.3 ± 3.2 months for the group without risk of dysphagia ($p = 0.81$). The other characteristics of the study volunteers are described in Table 1.

Table 1. Characteristics of the sample group

| | At risk of dysphagia n=12 (100%) | Not at risk of dysphagia n=13 (100%) |
|-------------------------------------|-------------------------------------|---|
| Sex | | |
| Male | 7 (58.3) | 7 (53.8) |
| Female | 5 (41.7) | 6 (46.2) |
| Level of education | | |
| 1 st grade not completed | 10 (83.4) | 12 (92.3) |
| 2 nd grade completed | 1 (8.3) | 1 (7.7) |
| 3 rd grade completed | 1 (8.3) | - |
| Marital status | | |
| single | - | 2 (15.4) |
| married | 10 (83.3) | 10 (76.9) |
| widowed | 1 (8.3) | 1 (7.7) |
| separated | 1 (8.3) | - |

Anthropometric and body composition measurements of patients at risk and without risk of dysphagia were similar in the pre-intervention period and remained unchanged after the change in food consistency (Table 2).

Regarding nutritional status, it was observed as a result of MNA that: of the group of patients at risk for dysphagia, 8 were at risk of malnutrition (66.7%) and 4 were malnourished (33.3%). In the group without risk of dysphagia, 10 were at risk of malnutrition (76.9%) and 3 were malnourished (23.1%).

The subject areas of QOL related to swallowing are presented in Table 3. The group at risk of dysphagia presented with poorer QOL related to swallowing than the group without risk of dysphagia in the following areas: swallowing perceived as a burden, duration of eating, fear, mental health, social health, fatigue, and sleep. After the intervention, the group at risk of dysphagia showed improvement in symptoms measured by the QOL questionnaire related to swallowing. The other areas of QOL related to swallowing were not affected by the change in the consistency of food.

Table 2. Anthropometric measures of body composition

| VARIABLES | AT RISK OF DYSPHAGIA | | | NOT AT RISK OF DYSPHAGIA | | |
|---------------------------|----------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------------------------|
| | Pre-intervention | 1 month post-intervention | 2 months post-intervention | Pre-intervention | 1 month post-intervention | 2 months post-intervention |
| BW (Kg) | 71.9 (± 16.8) | 72.2 (± 17.1) | 73.3 (± 17.2) | 67.6 (± 13.2) | 66.7 (± 14.2) | 67.1 (± 14.6) |
| AC (cm) | 31.2 (± 4.2) | 31.0 (± 4.4) | 31.1 (± 3.5) | 29.3 (± 3.5) | 29.1 (± 3.6) | 28.9 (± 3.6) |
| TST (cm) | 15.6 (± 6.4) | 15.6 (± 6.1) | 15.7 (± 6.3) | 13.2 (± 5.8) | 12.7 (± 5.6) | 12.4 (± 5.8) |
| CC (cm) | 35.6 (± 4.6) | 35.6 (± 4.5) | 36.0 (± 4.6) | 34.2 (± 3.8) | 34.0 (± 4.3) | 33.9 (± 4.0) |
| MUAC (mm) | 26.3 (± 3.5) | 26.1 (± 3.8) | 26.2 (± 3.3) | 22.4 (± 7.1) | 22.4 (± 7.3) | 22.5 (± 7.5) |
| BMI (Kg/cm ²) | 27.4 (± 6.0) | 27.5 (± 6.1) | 27.9 (± 6.2) | 24.9 (± 4.1) | 24.4 (± 4.7) | 24.6 (± 4.7) |
| Water (%) | 53.6 (± 7.4) | 53.8 (± 7.9) | 53.7 (± 7.5) | 54.8 (± 7.2) | 54.9 (± 7.3) | 56.3 (± 7.8) |
| LM (%) | 73.1 (± 10.1) | 73.7 (± 10.6) | 73.5 (± 10.3) | 74.8 (± 9.9) | 75.0 (± 10.3) | 77.0 (± 10.8) |
| BFP (%) | 26.9 (± 10.1) | 26.2 (± 10.6) | 26.5 (± 10.3) | 25.1 (± 9.9) | 25.0 (± 10.3) | 23.0 (± 10.8) |
| BF (Kg) | 19.8 (± 9.1) | 19.4 (± 9.5) | 19.7 (± 9.1) | 17.5 (± 8.3) | 17.0 (± 8.3) | 16.1 (± 8.7) |
| LM (Kg) | 52.2 (± 12.8) | 52.7 (± 13.5) | 53.5 (± 13.4) | 50.1 (± 10.1) | 49.6 (± 11.5) | 51.1 (± 10.7) |

Data presented as means and standard deviation.

Group *intervention

GEE: Body weight (BW): Group= 0.39. Intervention= 0.104. Group* intervention= 0.24; **Arm circumference (AC):** Group= 0.19. intervention= 0.65. Group* intervention= 0.86; **Triceps Skinfold Test (TST):** Group= 0.24. Intervention= 0.67. Group* intervention= 0.65; **Calf circumference (CF):** Group= 0.32. Intervention= 0.85. Group* intervention= 0.54; **Mid-upper arm circumference (MUAC):** Group= 0.11. Intervention= 0.94. Group* intervention= 0.90; **Body mass index (BMI):** Group= 0.17. Intervention= 0.079. Group* intervention= 0.26; **water %:** Group= 0.59. Intervention= 0.46. Group* intervention= 0.48; **Lean mass (LM) %:** Group = 0.59. Intervention= 0.40. Group* intervention= 0.36; **Body fat percentage (BFP) %:** Group= 0.59. Intervention= 0.40. Group* intervention= 0.36; **Body fat (BF) Kg:** Group= 0.43. Intervention= 0.48. Group* intervention= 0.41; **Lean mass (LM) Kg:** Group= 0.59. Intervention= 0.53. Group* intervention= 0.72

Table 3. Quality of life related to swallowing (SWAL-QOL)

| VARIABLES | AT RISK OF DYSPHAGIA | | | NOT AT RISK OF DYSPHAGIA | | |
|--------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
| | Pre-intervention | 1 month post-intervention | 2 months post-intervention | Pre-intervention | 1 month post-intervention | 2 months post-intervention |
| | Min - Max | Min - Max | Min - Max | Min - Max | Min - Max | Min - Max |
| | Average (dp) | Average (dp) | Average (dp) | Average (dp) | Average (dp) | Average (dp) |
| Swallowing as a burden | .00 - 100 56.2 (±38.9) | .00 - 100 57.3 (±41.8) | .00 - 100 62.5 (±41.9) | 100 100* | 100 100* | 100 100* |
| Desire to eat | .00-100 56.9 (±40.0) | .00-100 54.2 (±39.2) | .00-100 55.5 (±38.5) | 00-100 73.7 (±34.5) | 00-100 71.1 (±36.3) | 00-100 76.3 (±31.9) |
| Duration of feeding | .00-100 29.2(±33.0)* | .00-100 39.6(±35.7)* | .00-100 36.4 (±41.1)* | 25.0-100 63.5 (±36.2) | 25.0-100 70.2 (±29.9) | 25.0-100 63.5 (±29.5) |
| Food selection | .00-100 41.7 (±29.8) | .00-100 51.0 (±33.0) | .00-100 43.7(±31.75) | .00-100 64.4 (±31.8) | .00-100 62.5 (±30.2) | .00-100 62.5 (±29.7) |
| Communication | .00-100 41.7 (±24.6) | .00-100 52.1 (±29.1) | 12.5-87.5 50.0 (±21.3) | .00-100 51.9 (±40.1) | .00-100 54.8 (±40.0) | .00-100 55.8 (±39.4) |
| Fear | 00-100 50.0(±32.9)* | .00-100 53.6(±37.3)* | .00-100 54.2(±36.28)* | 50.0-100 90.9 (±18.1) | 56.2-100 89.4 (±18.1) | 56.2-100 92.3 (±15.6) |
| Mental health | .00-100 64.6(±35.9)* | .00-100 67.1(±38.7)* | .00-100 64.2(±34.10)* | 85.0-100 97.3 (±5.6) | 85.0-100 98.5 (±4.3) | 80.0-100 98.1 (±5.6) |
| Social health | .00-100 61.7(±35.4)* | .00-100 62.9(±36.7)* | .00-100 60.8 (±37.6)* | 75.0-100 94.6 (±10.3) | 60.0-100 93.1 (±13.6) | 60.0-100 93.1 (±13.6) |
| Fatigue | 15.0-75.0 47.9(±19.9)* | 25.0-80.0 55.0(±16.9)* | 25.0-85.0 57.1(±18.14)* | 40.0-100 73.1 (±19.5) | 20.0-100 71.9 (±21.9) | 45.0-95.0 73.1 (±16.9) |
| Sleep | 15.0-75.0 47.9(±19.9)* | 25.0-80.0 55 (±16.9)* | 25.0-85.0 57.1(±18.14)* | 40.00-100 73.1 (±19.5) | 20.0-100 71.9 (±21.9) | 45.0-95.0 73.1 (±16.9) |
| Average Symptoms | 6.2-81.7 46.6(±27.5)* | 14.6-93.3 58.4(±26.5)*† | 13.3-93.3 58.1(±26.6)*† | 70.8-100 89.8 (±8.5) | 71.7-100 90.4 (±8.7) | 79.2-100 90.7 (±7.4) |
| Average Quality of Life | 11.8-75.4 49.5(±23.7)* | 12.8-92.6 55.1 (±27.9)* | 15.3-90.5 54.5 (±26.7)* | 56.7-91.8 79.3 (±9.5) | 64.4-90.0 79.4 (±9.1) | 51.8-92.2 79.8 (±11.3) |

GEE: Burden: Group= 0.01. Intervention= 0.21. Group* intervention= 0.21; **Desire to eat:** Group= 0.21. Intervention= 0.42. Group* intervention= 0.78; **Duration of feeding:** Group= 0.021. Intervention= 0.24. Group* intervention= 0.80; **Food selection:** Group= 0.14. Intervention= 0.31. Group* intervention= 0.12; **Communication:** Group= 0.63. Intervention= 0.13. Group* intervention= 0.56; **Fear:** Group= 0.001. Intervention= 0.64. Group* intervention= 0.67. **Mental Health:** Group= 0.003. Intervention= 0.60. Group* intervention= 0.84; **Social:** Group= 0.006. Intervention= 0.86. Group* intervention= 0.53; **Fatigue:** Group= 0.009. Intervention= 0.39. Group* intervention= 0.30; **Sleep:** Group= 0.009. Intervention= 0.39. Group* intervention= 0.30; **Average Symptoms:** Group= 0.00. Intervention= 0.04. Group* intervention= 0.01; **Average Quality of Life:** Group= 0.02. Intervention= 1.47. Group* intervention= 1.93.

* compared to the Group without risk of dysphagia

† compared with pre-intervention

Table 4. Patients' perception of their general health.

| VARIABLES | AT RISK OF DYSPHAGIA | | | NOT AT RISK OF DYSPHAGIA | | |
|-----------------------|--------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------------------------|
| | Pre-intervention | 1 month post-intervention | 2 months post-intervention | Pre-intervention | 1 month post-intervention | 2 months post-intervention |
| | Min-Max | Min-Max | Min-Max | Min-Max | Min-Max | Min-Max |
| | Average (dp) | Average (dp) | Average (dp) | Average (dp) | Average (dp) | Average (dp) |
| General Health | .00-50.0 25.0 (±15.1) | .00-50.0 35.4 (±16.7)† | .00-50.0 37.5 (±16.8)† | .00-50.0 30.8 (±14.9) | .00-100 46.1 (±26.7)† | 25.0-50.0 36.6(±12.9)† |

GEE: General health: Group = 0.339. Intervention = 0.004. Group* intervention = 0.33

† compared with control

Regarding the consistency or texture of the food consumed in the last week of the pre-intervention period, of the group at risk of dysphagia, 5 patients (41.7%) maintained a normal diet, 4 patients (33.3%) ate soft food for easy chewing, 2 patients (16.7%) were fed only by tube, and 1 patient (8.3%) was fed mostly via feeding tube with pasty foods. In the first and second month after the intervention to change food consistency, 9 patients (75%) in the group at risk of dysphagia consumed soft foods that were easy to chew. The other patients maintained the same pre-intervention behavior. For the group without risk of dysphagia, during the pre-intervention period, 12 patients (92.3%) consumed normal food and one patient's diet (7.7%) consisted of soft, easy to chew food (the patient did not have a dental prosthesis). After 1 and 2 months of intervention, the non-risk group maintained the same behavior.

Regarding the consistency of liquids consumed in the

last week of the pre-intervention period, for the group at risk of dysphagia, 8 patients (66.7%) drank liquids of normal consistency, 3 patients (25%) did not drink liquids by mouth, and of these, 1 patient (8.3%) drank thickened liquids. After the first and second months of intervention there was no change in the consistency of liquids and the patients maintained their behavior regarding liquid consumption, since the objective of the study was an intervention in the consistency of food and not liquids. All of the patients without risk of dysphagia (100%) reported consumption of liquids of normal consistency during the pre-intervention period as well as during the first and second month post-intervention.

Table 4 shows an improvement ($p=0.004$) in the perception of overall health both for the at-risk group and for the group without risk of dysphagia after one and two months of the intervention.

4. Discussion

The incidence of oropharyngeal dysphagia in stroke patients varies from 20% to 90% in the literature [21]. Dysphagia is a major health problem for stroke patients, as a swallowing disorder can ultimately cause death due to malnutrition, dehydration, tracheal aspiration, and repeated bouts of pneumonia [22].

The presence of dysphagia, alone or in combination with other functional disabilities, is associated with higher mortality rates and a worse prognosis for recovery and rehabilitation [23,24]. In addition to the factors of age and neurological disorders, dysphagia is associated with a lower capacity to maintain adequate food intake and leads to a greater risk of malnutrition during and after hospitalization [25,26].

The European Society for Swallowing Disorders recommends monitoring the nutritional status of patients with dysphagia due to high risk of malnutrition, in addition to modification of the texture of food. Despite the recommendations, only 1 in 4 patients with dysphagia and only 1 in 3 patients with dysphagia and malnutrition [27] receive nutritional support.

Thus, modification of the consistency of solid/liquid foods is considered one of the primary intervention strategies for dysphagia. The purpose of the modification is to improve safety and facilitate oral consumption. However, low acceptability, resulting in low compliance with modified food consumption, may contribute to the increased risk of inadequate nutrition [28]. One study showed that institutionalized seniors who suffer from dysphagia could increase their oral intake and thus increase their body weight if they are served foods with modified texture [29]. This finding is contradictory to that of the present study, in which patients at risk of dysphagia showed no change in body weight during the period of modification in the consistency of food, possibly due to the short period of intervention. Dysphagia is one of the primary contributors to malnutrition, which leads to more prolonged rehabilitation and decreased QOL. Despite causing complications, dysphagia is not always systematically explored and detected, and most patients are not even diagnosed and receive no treatment for this condition.

Therefore, routine evaluation for dysphagia and prophylactic and therapeutic measures should be instituted in multidisciplinary rehabilitation programs. Methods to screen for dysphagia should rapidly identify patients who are at risk of aspiration or malnutrition. This is a measure that can reduce the rates of clinical complications related to dysfunction [30]. Thus, early identification of dysphagia is necessary to reduce the effects of inadequate nutrition that may interfere with nutritional status.

The EAT-10 tool for clinical screening identifies patients at risk of dysphagia [31]. One study [32] found an incidence rate for dysphagia of 76.5% for patients who were clinically evaluated only; the rate increased to 91% when videofluoroscopic (VFS) assessment was added. However, not all patients can undergo VFS; it requires special equipment that is not available in most health service centers, including those in the present study.

According to nutritional status based on the MNA protocol, the sum of screening and overall scores in our study found that 66.7% of patients were at risk of both

dysphagia and malnutrition, and 33.3% were at risk of malnutrition. In the group without risk of dysphagia but at risk of malnutrition, the percentage reached 76.9%, and 23.1% for malnutrition. These results are in agreement with previous studies, which report the incidence of malnutrition in cases of stroke as varying from 7% to 32% [33].

In another study [34] that involved 49 patients with stroke, malnutrition was found in 49% of the patients, though the incidence decreased to 34% after dietary intervention. In the present study, the groups were within the appropriate standards for body mass, total lean mass, and total fat mass, showing a stable clinical and nutritional status before and after the change in food consistency. One possible explanation is that, regarding changes in nutritional status, the malnutrition process may be slower to develop than dysphagia. In addition, two patients were identified in the study who were in the severe stage of dysphagia (requiring the use of a feeding tube). Perhaps this relationship may be more evident in individuals who present with severe difficulty in the swallowing process, as noted in relation to the texture of food and fluid intake and non-oral nutrition. Even after the change in food consistency, there was no significant change in anthropometric variables. However, there was a significant improvement in perceived health status in general according to responses to the SWAL-QOL questionnaire.

Patients at risk of dysphagia, as described in our study, had a poorer QOL related to swallowing - SWAL-QOL - than patients without risk of dysphagia. In fact, a previous study found a direct relationship between the severity of dysphagia and poor QOL related to swallowing - SWAL-QOL [35]. Several authors suggest that modifying the consistency of food worsens the QOL related to swallowing-SWAL-QOL [36-37]. This finding is not in line with the present study, in which the change in food consistency improved the SWAL-QOL symptoms. Our data may differ from the literature due to the short period of intervention, which was only two months. On the other hand, studies in which modifications in food consistency lead to a poorer QOL related to swallowing may be due to introducing changes in the taste of food, which have a bigger impact the bigger the modification [38]. In any case, changes in the consistency of food for patients with dysphagia continue to be clinically recommended.

In post-stroke patients, modifications related to swallowing and QOL are still a challenge, as they depend on adequate management of care and interdisciplinary action [39]. Thus, there is a need for new studies to confirm the incidence of dysphagia, as well as the most frequent complications for dysphagia patients with stroke, and to assess the impact of malnutrition on QOL.

5. Conclusion

Patients at risk of dysphagia present QOL impairment associated with swallowing. The symptoms related to swallowing improved after changes in the consistency of food given to patients at risk of dysphagia. Despite the interventions in this study, nutritional status did not change, although perception by patients of their general

health showed improvement in both groups. This improvement in the perception of general health may be related to the work of the multidisciplinary rehabilitation team.

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Statement of Interest Declaration

The authors report no conflicts of interest.

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