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PREVALENCE AND HEALTH PROMOTION ACTIONS RELATED TO HYPOSALIVATION AND MOUTH DISCOMFORT IN A NURSING HOMES FOR ELDERLY

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ABSTRACT

Objective to verify the prevalence of hyposalivation in an institutionalized elder population and its relationship with oral discomfort. A cross-sectional study was conducted with older people living in a Nursing Home in Fortaleza-Brazil. Data collection occurred through the application of sociodemographic questionnaire; sialometry examination, test for evaluating the salivary flow speed; and by a subjective quantification of dry mouth intensity (Visual Analog Scale). Results: sixty-five older people aged between 61 and 91 years (mean 74.5±8.0) were evaluated, 30 (46.2%) were women and 35 (53.8%) men. The majority had low monthly income (55;84.6%) and low schooling (44;67.7%). The mean salivary flow was 0.4 ±0.2, with very low flow (0.1-0.3 ml/min) being more prevalent; females presented lower salivary flow (p=0.033) than males; there was an association between salivary flow and dry mouth sensation (p<0.001) and halitosis (p<0.001). The correlation between sialometry and VAS showed that the lower the salivary flow, the greater the perception of dry mouth sensation. Health promotion actions and treatment (proper hydration; tooth brushing; saliva stimulants) can be performed in order to minimize dry mouth/hyposalivation impact on elders' quality of life. Conclusion: Low salivary flow was prevalent in the study subjects. It interferes in oral discomfort and causes dry mouth sensation.

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INTRODUCTION

Hyposalivation is a very common problem in older people. Occurring due to the hypo function of the salivary glands, it is characterized by an objective changing in the amount and quality of salivary flow. Some times hypo salivation is mistaken as xerostomia, which is a subjective dry mouth sensation reported

by the patient (Villa *et al.*, 2014). The production and maintenance of saliva is important for oral health, since it performs numerous functions in the stomatognathic system. The salivary flow is responsible for maintaining and balancing the oral cavity through a series of manners: lubrication and protection; buffer action and mechanical cleaning; maintenance of the tooth integrity; antibacterial activity; taste and digestion (Tambeli,

2014). The etiological factors related to the salivary glands hypofunction are diverse, and among them, it can be mentioned: physiological changes from the salivary glands inherent to aging, medications side effects, smoking, alcohol consumption, gender, anxiety and/or stress, hormonal changes, as well as systemic diseases, infections and radiotherapy treatment (Bastos *et al.*, 2017; Giafferis, 2017). In the occurrence of hyposalivation, some symptoms can be observed that have the potential for oral health complications, such as: dry mouth sensation (xerostomia), pain, gingivitis, halitosis, dental caries, difficulty in chewing, swallowing and speech (Murray, 2014; Saintrain, Gonçalves, 2013). It may also increase susceptibility to some opportunistic infections, such as candidiasis, besides impairing dental prosthesis retention, favoring the appearance of traumatic ulcerations (Turner; Jahangiri; Ship, 2008). The hyposalivation diagnosis can be made through anamnesis, intraoral clinical examination and, when necessary, complementary tests. Sialometry examination is used to evaluate saliva amount, by obtaining stimulated salivary flow or at rest (Santos; Andrade *et al.*, 2016). The management of patients with hyposalivation should include measures in order to prevent and limit damage. This management will depend on several factors, which go from diagnosis until the use of appropriated medication (Silva *et al.*, 2016). Studies on this theme highlight the importance of hyposalivation diagnosis, since saliva maintenance in the oral cavity is indispensable. Its various effects on oral and systemic health claim general health and dental care to work in the same path, with the objective of providing patients with better quality of life (Ikebe *et al.*, 2007a; Hahnel *et al.*, 2014; Enoki *et al.*, 2014). By aiming at society's commitment to the older people's care, dentistry stands out in this study, which aimed to verify the prevalence of hyposalivation in an elder population living in nursing home and its relationship with the oral discomfort, as well as discuss health promotion activities related to hyposalivation.

METHOD

This is a cross-sectional study conducted from November 2017 to January 2018 in a Nursing Home for Elders (NHE) in Fortaleza. This NHE is reference for the State of Ceará. From the 220 elder residents in the institution, 65 were part of this research. They were recruited through the institution's audio system, when all residents were invited to participate in the study. The inclusion criteria were older people with physical and mental conditions in order to agree and perform the test. The data collection began with the application of a questionnaire, prepared by the researchers, which had questions regarding demographic characteristics (gender, age, schooling, monthly income) and oral discomfort (dry mouth, difficulty chewing and swallowing, food tasting, burning mouth sensation, voice changing and halitosis). Additionally, sialometry examination was performed. A test for evaluating the salivary flow speed (in ml/min) without salivary stimulation, following a methodology described in the literature by KRASSE (1988) was performed. Patients' saliva was expelled in a graduated cup for a period of 5 minutes and its amount divided by this time, counted on a digital clock. The results' interpretation considered the following scale: 1) normal - salivary flow between 0.7 - 1.2 ml/min; 2) Low-salivary flow between 0.4 - 0.6 and 3); very low - salivary flow between 0.1 - 0.3 ml/min. The study participants, who presented salivary flow below the normal parameters were classified as hypo salivation. The sialometry was performed in a closed and quiet environment, one hour after the first meal of the day, and, within this period, the examined elders did not drink any kind of liquid, smoked or brushed their teeth. The dry mouth subjective quantification occurred by the adaptation of a Visual Analog Scale (VAS). This tool has a ten-centimeter marked rule shape, where, at one end of the line (zero)

we have marked "no dry mouth", and, on the other end (10 centimeters), "very dry mouth". To identify their answer, elders made a mark corresponded to their perception of dry mouth. Data collection was conducted by a single researcher, in a room intended for examinations in the institution, allowing study standardization. After data tabulation, statistical analysis was performed through the Software Statistical Package for Social Science (SPSS) version 23. The Shapiro-Wilk Test was used to test variables normality. The dispersion test was performed in order to evaluate the findings from the VAS scale and the sialometry. In regards to the research ethical aspects, each participant signed (or verbally agreed to) an informed consent form, which contained the research objectives, methodology and participant's rights regarding the study. The project was approved by the Research Ethics Committee with Opinion No. 2.195.456.

RESULTS

Sixty-five older people aged between 61 and 91 years old participated in the study. The mean age was 74.5±8.0; where 30 (46.2%) were women and 35 (53.8%) men. From these population, eight (12.3%) had no income and 57 (87.7%) were retired; 55 (84.6%) had an average monthly income of a minimum wage; the majority had low schooling, where 19 (29.2%) were illiterate and 25 (38.5%) had less than eight years of formal school.

Table 1. Sociodemographic characteristics of institutionalized older people (n=65). Fortaleza-CE, 2018

Variables	Frequency (N)	Percentage (%)
Age Group		
60 to 69	21	32.3
70 to 79	24	36.9
80 or +	20	30.8
Marital Status		
Single	30	46.2
Married	7	10.8
Divorced	14	21.5
Widower	14	21.5
Gender		
Male	35	53.8
Female	30	46.2
Retired		
Yes	57	87.7
No	8	12.3
Income		
1 Minimum wage	55	84.6
2 to 5 Minimum wage	2	3.1
No income	8	12.3
Schooling		
None	19	29.2
Incomplete elementary school	25	38.5
Complete elementary school	7	10.8
Incomplete high school	5	7.7
Complete high school	5	7.7
Higher Education	4	6.2

Source: Data from the research itself.

Table 2 shows the salivary tests results, presenting the frequency from the non-stimulated salivary flow (ml/min). Low salivary flow was observed in 38 (58.5%) elders.

Table 2. Non-stimulated salivary flow classification and frequency in institutionalized older people. Fortaleza, Brazil, 2018

Salivary flow (ml/min)	N	%
Normal (0.7 - 1.2 ml/min)	16	24.6
Low (0.4 - 0.6 ml/min)	22	33.9
Very low (0.1-0.3 ml/min)	27	41.5
Average from the salivary flow	0.4 ± 0.2	

Source: Data from the research itself.

Table 3. Non-stimulated salivary flow frequency in relation to the age and gender. Fortaleza, Brazil, 2018.

Variables	Very low salivary flow		Low salivary flow		Normal salivary flow		Value p
	N	%	n	%	n	%	
Age group							0.170 ²
60 a 69	10	47.6	7	33.3	4	19.0	
70 a 79	8	33.3	6	25.0	10	41.7	
80 or older	9	45.0	9	45.0	2	10.0	
Gender							0.033¹
Male	11	31.4	11	31.4	13	37.1	
Female	16	53.3	11	36.7	3	10.0	

Source: Data from the research itself. ¹ Qui-quadrado test; ² Fisher's Exact Test.

Table 4: Non-stimulated salivary flow frequency in relation to self-reported oral discomfort. Fortaleza, Brazil, 2018.

Variables	Very low salivary flow		Low salivary flow		Normal salivary flow		Value p
	N	%	N	%	n	%	
Dry mouth sensation							<0.001¹
Yes	22	64.7	8	23.5	4	11.8	
No	5	16.1	14	45.2	12	38.7	
Difficulty on chewing and swallowing the food							0.326 ¹
Yes	10	45.5	9	40.9	3	13.6	
No	17	39.5	13	30.2	13	30.2	
Problems with the food tasting							0.417 ²
Yes	9	47.4	4	21.1	6	31.6	
No	18	39.1	18	39.1	10	21.7	
Mouth burning sensation							0.515 ²
Yes	3	60.0	2	40.0	0	0.0	
No	24	40.0	20	33.3	16	26.7	
Voice changing							0.594 ²
Yes	4	57.1	1	14.3	2	28.6	
No	23	39.7	21	36.2	14	24.1	
Halitosis							<0.001²
Yes	12	85.7	0	0.0	2	14.3	
No	15	29.4	22	43.1	14	27.5	
Perceive swelling in the mouth that make difficult the denture use							1.000 ²
Yes	1	50.0	1	50.0	0	0.0	
No	26	41.3	21	33.3	16	25.4	

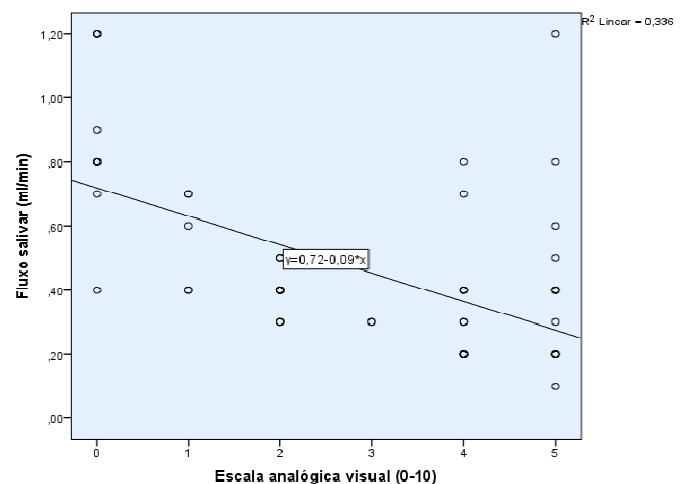
Source: Data from the research itself. ¹ Qui-quadrado test; ² Fisher's exact test.

Na Tabela 3 visualiza-se a relação do fluxo salivar com as variáveis: faixa etária e sexo. Não se verificou significância estatística entre fluxo salivar e faixa etária, entretanto exibe maior quadro de hipossalivação para o sexo feminino ($p=0.033$). Table 3 shows the relationship between salivary flow and the following variables: age group and gender. There was no relationship between salivary flow and age group, however, a significant relation was seen between salivary flow and gender ($p=0.033$). Among the elders with hypo salivation that reported oral symptoms, dry mouth sensation and halitosis presented a relationship with salivary flow classification ($p < 0.05$) – Table 4. Graph 1 shows the dispersion between salivary flow and oral dryness (self-reported via VAS) in elders living in the 'Lar Torres de Melo' nursing home.

DISCUSSION

Hyposalivation leads to impaired oral health, including a microbial shift that causes caries, periodontitis, loss of teeth, impaired masticatory function, and a higher risk of aspiration pneumonia among elderly patients (Manabe et al., 2015). Thus, hyposalivation is a risk factor not only for oral infections, such as dental caries and periodontal diseases, but also linked to taste disorders, speech and swallowing problems, poor chewing ability, malnutrition (Samnieng, Shinada, 2012) and systemic problems, stressing the importance to study this issue in elders, a vulnerable population for this disturbance. Researchers emphasize that during the aging process, there is an accumulation of physical and biological events that modify the organism.

The salivary glands, when experiencing linear loss in the amount of acinous cells responsible for saliva production, can decrease the volume of salivary secretion (Freitas Júnior *et al*, 2008), which results in hyposalivation.



Source: Search data itself.

Graph 1. Dispersion analysis between sialometry and visual analog scale

The results from the present study detected that more than three-fourth of the participants presented hyposalivation, demonstrating a high prevalence of this condition in the surveyed population. Patients with hypo salivation present various oral

conditions, so there is diversity in symptomatology. Oral discomfort symptoms, such as dry mouth sensation, halitosis, difficulty chewing and swallowing food, and food tasting problems were the most commonly reported during the present study. For those with very low salivary flow, dry mouth sensation and halitosis ($p < 0.001$) stood out. According to Berti-Couto *et al.*, (2012), subjective complaints of halitosis are frequent and interfere with elders' life. It is important to emphasize the complaints of halitosis and odor from the oral cavity in elders with hyposalivation. These symptoms represent a health issue, which is also socially detectable, because it interferes with interpersonal relationships (Teixeira, 2016; Paglia, 2018).

The psychosocial aspects of xerostomia, such as halitosis, can range from a mild effect on self-rated oral health to frustration, embarrassment, unhappiness, or substantial disruptions in quality of life (Anil *et al.*, 2016). In regards to the distribution of the salivary flow quantification in relation to the gender, lower salivary flow in females was observed when compared to male in this study. Other studies justify this relationship due to hormonal changes (Gupta; Epstein; Sroussi, 2006; Kamińska-Pikiewicz; Bachanek; Chałas, 2015). Corroborating with these findings, a study conducted in Chile with 566 participants (386 women and 180 men), aged 18 to 83 years old, also showed a higher female predilection in regards to the hyposalivation (Niklander *et al.*, 2017). In our research, the relationship between dry mouth sensation and hyposalivation was verified through the visual analog scale (VAS), whose analysis showed that the lower salivary flow, the greater the perception of dry mouth sensation. The fact that the dry mouth sensation is statistically significant when it is related to the very low salivary flow ($p < 0.05$) gets support from authors by highlighting that this symptom is an important predictor for the unconscious weight loss in older people; and the effect is a nutritional deficiency that triggers the deterioration from the salivary gland function, which is reflected in the oral health, by creating a vicious cycle (Luca *et al.*, 2014). However, previous studies suggested that not all people who had hyposalivation reported xerostomia, and people who reported xerostomia could have a normal or high salivary flow (Ohara *et al.*, 2016; Islas-Granillo *et al.*, 2017). As dry mouth sensation can occur in patients with decreased salivary production or not, Frydrych (2016) points out that salivary flow should always be verified in patients complaining of dry mouth, so that the objective reduction of saliva can be diagnosed. Interesting to know that studies have shown that oral dryness is more significantly associated with the resting salivary flow rate than with the stimulated salivary flow rate (Flink *et al.* 2008; Iwasaki *et al.*, 2016; Islas-Granillo *et al.*, 2017).

As oral discomfort can be observed by those affected with hyposalivation, dentists should be aware of the signs and symptoms of salivary disorders, being able to diagnose and treat them, as such symptoms may negatively influence patients' health and quality of life (Saleh *et al.*, 2014). Similarly, it is important to stress that individuality in the symptomatology from the oral discomfort should be considered, since each organism expresses different symptoms, hindering diagnosis and curative actions. The efficacy of different therapeutic strategies for the control of symptoms and signs derived from hyposalivation, regardless of their origin, are still not strong enough to recommend a particular treatment, either pharmacological or not. Most treatments tested and used in patients with xerostomia temporarily improve symptoms and, to some extent, salivary flow, but without medium or long-term control in all cases, making the use of such therapeutic strategies difficult and unpredictable (Gil-Montoya *et al.*, 2016). Nevertheless, it is important to know what the options in the literature regarding health promotion, prevention and treatment of dry mouth and hyposalivation in order to aid

patients on their needs. Health promotion activities can be performed to minimize dry mouth sensation and or hyposalivation. Easy remedies are proper hydration; increase in humidity at night-time; avoidance of irritating dentifrices and crunchy/hard foods; and use of sugar-free chewing gums/candy (Visvanathan, Nix, 2010; Villa *et al.*, 2015). Studies have shown that daily tooth brushing also has a beneficial impact on salivary flow. In the Netherlands, Ligtenberget *et al.* (2006) found that tooth brushing induced transient changes in salivary flow. After brushing with water, the subjects' salivary secretion rate increased significantly for 60 minutes, suggesting that tooth brushing mechanically and transiently stimulates saliva secretion. An increase in the frequency of chewing or a change in diet to more rigid foods results in increased salivary flow rates. Although not explicitly studied, it has been observed that when missing teeth were replaced with prostheses, the salivary flow was higher. It has been suggested that both chewing and bite force are involved in salivary gland secretion (Ikebe *et al.*, 2007b). Matzuda *et al.* (2009), consider the loss of teeth to be responsible for the decrease in bite force and subsequent decrease in salivary flow rate. These authors found that the replacement of complete dentures for elderly patients improved maximal occlusal force and increased both the stimulated and unstimulated salivary flow rates. On the same path, Islas-Granillo *et al.* (2017) reinforce the need to rehabilitate individuals with missing teeth and hyposalivation to improve oral health and quality-of-life.

In the past, chewing gums have been shown to increase saliva secretion and decrease oral mucosal friction (Olsson *et al.*, 1991). In addition to chewing gum, saliva stimulants and substitutes (*e.g.*, gel, mouthwash, and toothpaste) provide over-the-counter alternatives for salivary gland hypofunction management, as they provide symptomatic relief. However, they need to be carefully adapted to each patient's (Villa *et al.*, 2015). According to a systematic review carried out by Gil-Montoya *et al.* (2016), the use of malic acid with fluoride and xylitol, both spray and tablets, have been successful in terms of symptoms and sialometry. Studies analyzed where a mouthwash was used, the symptoms improved even after using water or a placebo. According to this review, lubricants and salivary substitutes are only a useful palliative treatment when they are administered continuously. Innovative methods, such as intraoral electrostimulation or topical application of anticholinesterase on the oral mucosa, have also been discussed in the literature (Barbe, 2018). There is some scientific evidence that oral electrostimulation and acupuncture have shown to be effective treatments to improve certain symptoms affecting patients with xerostomia (Strietzel *et al.*, 2011; Smcock *et al.*, 2013; Gil-Montoya *et al.*, 2016). The most commonly prescribed pharmaceutical treatment options for dry mouth are pilocarpine (a parasympathomimetic agent with potent muscarinic, cholinergic salivation-stimulating properties) and cevimeline (a quinuclidine analogue with therapeutic and side effects similar to those of pilocarpine). They are systemic US Food and Drug Administration-approved sialogogues for treatment of dry mouth. These pharmaceutical treatment options are described in the context of older patients, where the highly prevalent cholinergic side effects, which include nausea, emesis, bronchoconstriction, among others, need to be thoroughly supervised by the healthcare professionals involved (Barbe, 2018).

As it can be seen, a variety of treatments are available to diminish dry mouth and or hyposalivation symptomatology. Multidisciplinary, preventive care-oriented approaches that consider all influencing factors and treatment of the oral symptoms are desired when treating patients with dry mouth and or hyposalivation. Improvement in patient care requires that clinicians be aware of approaches to management, desirable

qualities of methods and products, and that they seek the development of products that support the functions of saliva and promote comfort and health (Epstein & Beier-Jensen, 2015). Some limitations of our study deserve to be highlighted, such as the low study adherence by the institutionalized elders, which may be due to their health status, mostly bedridden and or without condition to cooperate with the study. Nevertheless, the findings allowed to bring up this problem, which, despite of being a prevalent and important issue in this population, as interferes in people's well-being and quality of life, is commonly overseen by the health personnel caring for institutionalized elders.

CONCLUSION

A high prevalence of hyposalivation was observed in the studied population, especially in females. Low salivary flow interferes in oral discomfort and causes dry mouth sensation and halitosis, which can be minimized through health promotion actions and individual tailored treatment. It is important to discuss and bring up this problem, which, despite of being a prevalent and important issue in this population, as interferes in people's well-being and quality of life, is commonly overseen by the health personnel caring for institutionalized elders.

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