v. 2, n. 4, 2022

International Journal of Health Science

INVESTIGATION OF INTRAORAL SENSITIVITY IN OBESE INDIVIDUALS WITH ESTHESIOMETER

Ivan Luís da Silva Carneiro

Katiene S.J. Silva

Suellen Fraga do N. Alencar

Carla Marcela Faedda

Ana Paula Magalhães Medeiros

Abstract: Goal: To evaluate the sensitivity of the intraoral cavity in obese individuals. **Methodology**: 19 individuals participated in this study, divided into 3 groups: Obese Group (OG) with BMI ≥30.0 kg/m², composed of 5 women and 2 men, mean age 34 years, with mean BMI of 35.97 kg/m² m². The Overweight Group (GS) consisted of 3 women, mean age 22 years, with BMI between > 25.0 kg/m² and ≤ 30.0 kg/m2. The Control Group (CG) composed of non-obese individuals with 7 women and 2 men, mean age 28 years, mean BMI of 21,3 kg/m². The exclusion criteria for the groups were: individuals who had neurological impairments or associated comorbidities, who had undergone speech therapy for orofacial motricity, facial and/or craniofacial surgery and who had craniofacial malformations and who had undergone speech therapy in the orofacial motricity specialty. All were evaluated regarding: anthropometry of the face, static and dynamic occlusion analysis, orofacial myofunctional assessment (AMIOFE), and assessment of oral sensitivity using the esthesiometer. **Result:** All subjects evaluated had orofacial myofunctional disorder, and felt the green, blue and violet monofilaments**. Conclusion:** In the 3 groups evaluated, the majority presented sensitivity in the green monofilament considered normal, however, the GC and GO, presented individuals in the blue monofilament, which means decreased sensitivity, and violet, decreased protective sensitivity, remaining sufficient to prevent injuries and difficulty in temperature discrimination. And in GS, there were no individuals in the violet monofilament.

Keywords: Speech Therapy, Stomatognathic System, Obese Intraoral Sensitivity, Stesiometer.

INTRODUCTION

Obesity affects millions of people around the world, and has become a serious public health problem. According to data from the National Health Survey (PNS), carried out by the Brazilian Institute of Geography and Statistics (IBGE) (2019), in Brazil, six out of ten Brazilians are overweight, that is, 96% million people are overweight. weight in the country, that is, the BMI result indicates that they are in the overweight range (IMC) ≥ 25,0 kg/m²) or if obesity (IMC ≥30,0 kg/m²).

Far from being just a matter of aesthetics, studies show that excess weight is associated with the emergence of several complications related to reduced quality of life, functional disability, decreased life expectancy and increased mortality. In addition to being a risk factor for the appearance of comorbidities such as metabolic changes: high rates of sugar concentrations (type II diabetes mellitus), cardiovascular diseases, systemic arterial hypertension, dyslipidemia, cholecystitis, cerebrovascular accident (CVA), osteoarthrosis, (joints suffer from the overload caused by weight, which causes chronic and progressive joint and back pain.), obstructive sleep apnea, which has symptoms of excessive daytime sleepiness, tiredness, reduced memory, mood changes (irritability, discouragement, depression), coronary insufficiency and neoplastic[1, 2, 3.]

Regarding the speech-language pathology aspects and the functions of the stomatognathic system, the literature reports that in obese there is a prevalence of orofacial myofunctional disorders. [4, 5]. Chewing in obese individuals can be unilateral and rapid, causing masticatory inefficiency, causing multiple swallowing, this change in mastication generates a failure to stimulate digestive system receptors, which lead to an imprecise response to the brain, and a failure to display satiety. causes the individual to eat more food [6, 7.]

The sensitivity of the oral cavity and

oropharynx is mediated by a rich variety of receptors that preferentially respond to different aspects of sensory function - touch, pressure, vibration, position, pain, temperature and taste. The main points of sensitivity branch into superficial objective sensitivity, which involves tactile, painful and thermal sensitivity, and deep objective sensitivity that encompasses vibratory, paresthesia, nerve trunks, visceral, segmental, active and passive movement and resistance, weight and strength[8, 9.]

Superficial (exteroceptive) sensitivity provides information about external stimuli from skin receptors. Threshold tests determine the minimum stimulus value that can be perceived by the subject, associated with the four classic skin functions: pain, heat, cold, soft touch-deep pressure[10].

Among them, tactile sensory feedback plays a critical role in safe and effective swallowing. Oral sensory function is necessary for the identification of food objects, selection of chewing action and decision making to trigger a swallowing sequence. In addition to swallowing, tactile integrity allows for precise lip apposition, tongue movements, and palatal excursions to produce differentiated vocal expressions. Oral sensorimotor function may, however, be impaired by primary diseases or secondary effects of treatment. An example is sensory degradation of the oral cavity after chemotherapy, radiotherapy or surgery for head and neck malignancies.[11]

Oral cavity sensory dysfunction may arise in association with snoring and obstructive sleep apnea disorders [12]. It is concluded that an affordable and reliable clinical tool to quantify the oral cavity and oropharyngeal tactile sensory function can be widely useful to promote the care of patients with diseases that affect the upper aerodigestive tract.[9]

Sensitivity is the conscious interpretation of sensory stimuli from the environment and its loss or alteration can bring important functional impairments. In this sense, its measurement is extremely important. [10]

Considering the above information, speech therapy is the specialty that treats myofunctional disorders of any etiology, contributing to the balance of the stomatognathic system, with the assessment, detection and rehabilitation of oral sensorimotor alterations found in these individuals. Therefore, the present study aims to measure intra- and extra-oral skin sensitivity using the esthesiometer.

MATERIALS AND METHODS

This research was approved by the Research Ethics Committee under protocol number 4,002,898, number of CNA (National Activity): 30183220.9.0000.5512. The evaluations were carried out after signing the Free and Informed Consent Term (ICF), and carried out at the UNIPLAN Speech Therapy School Clinic in Brasília-DF and 19 individuals participated in this study, divided into 3 groups: Obese Group (OG) with BMI ≥30.0 kg/m², composed of 5 women and 2 men, mean age 34 years, with mean BMI of 35.97 kg/m² m^2. The Overweight Group (GS) with 3 women, mean age 22 years, with BMI between ≥ 25,0 kg/m^2 and ≤ 30,0 kg/m^2. The Control Group (CG) consisted of non-obese individuals with 7 women and 2 men, mean age 28 years, mean BMI of 21.3 kg/m^2.

The exclusion criteria for the groups were: individuals who had neurological impairments or associated comorbidities, who had undergone speech therapy for orofacial motricity, facial and/or craniofacial surgery and who had craniofacial malformations and who had undergone speech therapy in the orofacial motricity specialty.

All were submitted to the assessment of Body Mass Index (BMI) = weight in kg/ (height in meters X height in meters), orofacial

International Journal of Health Science ISSN 2764-0159 DOI 10.22533/at.ed.159242230015

myofunctional assessment with the AMIOFE protocol[13] (adapted), anthropometric assessment of the face and dynamic and static analysis of the occlusion with an analog caliper, and assessment of intraoral sensitivity using the monofilaments of the esthesiometer in the following intra and extraoral regions: apex of the tongue, right and left dorsum of the tongue, edges of the tongue, hard palate, soft palate, palatoglossal arch, palatopharyngeal arch, uvula, upper lip, lower lip and the right and left cheek regions (cheeks). The esthesiometer has monofilaments of different standardized diameters, with equal lengths and differentiated by colors. Each color, with different grammage, represents a sensitivity threshold. This set of filaments is available from Semmes-Weinstein under the Sorri® brand.

Before the beginning of the measurement, the researcher reproduced the procedure on the back of the volunteer's hand to familiarize himself with the stimulus. Subsequently, the participant was asked to remain seated and with the head in the usual position, with eyes closed, extinguishing the visual cue.

To measure skin sensitivity, the filaments were positioned perpendicularly on the face and pressed into the skin of the individuals until forming a curvature. The participant was asked to respond with the word "yes" to the sensation of touch, albeit subtle.

The evaluation started with the filament with the lowest weight (0.05 gf - green color) and continued in an increasing manner until the filament with the highest weight (300.0 gf - pink color), as recommended by the esthesiometer manual. The first and second filaments, colored green (0.05 gf) and blue (0.2 gf), were tested three times, and the stimulus was considered conclusive if the response was positive for at least one of the trials. The other filaments were tested only once, also following the instructions for using the instrument itself. Responses were recorded in a collection protocol.

RESULTS

Regarding the orofacial myofunctional aspects performed with the AMIOFE protocol described in Table 1, the average of the myofunctional performance scores obtained in the evaluation in each group was observed orofacial myofunctional disorder in the 3 groups evaluated. In the GC group, it was severe, GS was mild, and GO was moderate.

It is also observed that there is a regularity and similarity in the means of anthropometric measurements of the face, described in Table 2.

In the evaluation with the esthesiometer, GC and GO had subjects who felt in the green, blue and violet monofilaments. And in the GS, the subjects felt the green and blue monofilaments. In (Table 3) the description of the GC esthesiometer. In Table 4 of GS, and in Table 5, GO.

DISCUSSION

Obesity is defined as an abnormal or excessive accumulation of fat, representing a health risk. It is a multifactorial phenomenon that involves genetic, behavioral, psychological, social, metabolic and endocrine components.

Considering the role of the speech therapist in the care of obese patients, it is necessary to know the demands of this population in order to improve speech therapy intervention.[14] The speech therapy intervention consists of evaluation and follow-up, and a complete myofunctional evaluation, and the evaluation of sensitivity being extremely important for the performance of the functions of the stomatognathic system. To perform such functions ideally or close to the standard considered normal, it is necessary to present anatomical structures without functional impairment. Such structures as lips, cheeks,

hard and soft palate, tongue, lingual frenulum and teeth are evaluated by the speech therapist, and he/she will verify the possibilities of this individual to perform a satisfactory chewing and swallowing.[14]

Based on this hypothesis, the present study sought to trace the existence of myofunctional alterations and their relationship with intraoral sensitivity alterations in this population.

From the analysis of the data obtained with the application of the AMIOFE protocol, it was noticed that the postural characteristics of the lips, vertical posture of the jaw, appearance of the face, cheeks, palate and the movements of the lips, jaw, cheeks and tongue showed to be with alterations in the 3 groups evaluated. As shown in Table 1, being in the GC group a severe degree, GS mild degree, GO moderate degree, which would not be expected, since according to Figueiredo (2010)[15] describes that obese individuals present greater orofacial myofunctional alterations in relation to the non-obese population.

Regarding swallowing, chewing and breathing, there was no difference between the CG, SG, and GO, and the three groups presented mild myofunctional alterations, according to the scores (Table 1).

In the evaluation of oral sensitivity with the esthesiometer in the GS, the results showed a predominance of adequate sensitivity for the structures tested. In the GO and GC samples, there is a reduction in sensitivity in some structures, especially in areas related to taste perception, namely the apex of the tongue, right and left dorsum of the tongue, right and left edge of the tongue and hard palate (table 3 and 5 respectively).

The research Skrandies e Zschieschang (2015)[16] shows that body weight influences olfactory and gustatory perception, and that an increase in BMI is associated with a decrease in olfactory and gustatory sensitivity. These findings may have implications for the understanding of pathophysiological mechanisms in patients, reporting that the increase in BMI may be related to the decrease in taste and odor sensitivity.

There may be a relationship between myofunctional disorders and obesity, however there is no relationship in the literature between intraoral sensitivity in individuals and increased BMI. Only the investigation in patients with TMD, where it was observed that the more severe the temporomandibular disorder, the greater the change in skin sensitivity along the face, as well as, the greater the age, the greater the number of analogous points with difference in sensitivity.[17]

However, in the present study, it was not possible to observe this relationship, since there are limitations regarding the sample and the cross-sectional design, other variables may have had an influence on the results, such as: method of diagnosing obese and overweight by BMI, as it is a simpler method, but not very indicated, being necessary to evaluate more deeply, skinfolds, bioimpedance. This highlights the need for further studies with a significant sample, as well as monitoring individuals over time.

CONCLUSION

In the 3 groups evaluated, the majority presented sensitivity in the green monofilament considered normal, however, the GC and GO, presented individuals in the blue monofilament, which means decreased sensitivity, and violet, decreased protective sensitivity, remaining sufficient to prevent injuries and difficulty in temperature discrimination. And in GS, there were no individuals in the violet monofilament.

REFERENCES

1. Francischi RPP, Pereira LO, Freitas CS, Klopfer M, Santos RC, Vieira P, Lancha AHJ. Obesidade: atualização sobre sua etiologia, morbidade e tratamento. Revista Nutrição, 2000;13 (1):17-8.

2. Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. Ônus de doenças associado ao sobrepeso e à obesidade. JAMABrasil, 2000;4(3):2853–2866.

3. Yanovski JÁ, Yanovski SZ. Recentes Avanços na Pesquisa Básica em Obesidade. JAMABrasil, 2000; 4(2):2822-2824.

4. Tavares TB, Nunes SM, Santos MO. Obesidade e Qualidade de Vida: revisão da literatura. Rev. Med. Minas Gerais. 2010;20(3):359-366.

5. Mores R, Delgado SE, Martins NF, Anderle P, Longaray C, Pasqualeto VM, Berbert MB. Caracterização dos distúrbios de sono, ronco e alterações do sistema estomatognático de obesos candidatos à cirurgia bariátrica. Revista Brasileira de Obesidade, Nutrição e Emagrecimento, 2017;11(62):64-74.

6. Norris L. Psychiatria issues in bariatric surgery. Psychiatrclin north Am. 2007;30(4): 717- 738.

7. Souza NC, Guedes ZCF, Mastigação e Deglutição de Crianças e Adolescentes Obesos. Rev. CEFAC, 2016; 18(6):1340-1347.

8. Calhoun KH, Gibson B, Hartley L, Minton J, Hokanson JA. Age-related changes in oral sensation. Laryngoscope. 1992;102(2):109-116.

9. Bearelly S, Cheung SW. Sensory Topography of Oral Structures. JAMA Otolaryngol Head Neck Surg. 2017 Jan 1;143(1):73-80. doi: 10.1001/jamaoto.2016.2772. PMID: 27684535

10. Dapper MB. Reprodutibilidade de três testes para avaliação da sensibilidade da mão em indivíduos assintomáticos [Dissertação]. Porto Alegre (RS): Pontifícia Universidade Católica do Rio Grande do Sul; 2007.

11. Zur KB, Genden EM, Urken ML. Sensory topography of the oral cavity and the impact of free flap reconstruction: a preliminary study. Head Neck. 2004;26(10):884-889.

12. Kim SW, Park HW, Won SJ, et al. Palatal sensory threshold reflects nocturnal hypoxemia and airway occlusion in snorers and obstructive sleep apnea patients. J Clin Sleep Med. 2013;9(11):1179-1186.

13. Felício CM, Folha GA, Ferreira CLP, Medeiros APM. Expanded protocol of orofacial myofunctional evaluation with scores: validity and reliability. Int J Pediatr Otorhinolaryngol. 2010;72(3):367-375

14. Silva ASG, Tanigute CC, Tessitore A A. Necessidade da Avaliação Fonoaudiológica no Protocolo de Pacientes Candidatos à Cirurgia Bariátrica. Rev. CEFAC. 2014;16(5): 1655-1668.

15. Figueiredo AB. Avaliação Fonoaudiológica Clínica e Eletromiográfica da Motricidade Orofacial do Obeso, Faculdade de medicina de São Paulo, 2010.

16. Skrandies W, Zschieschang R. Olfactory and Gustatory Functions and Its Relation to Body Weight. Physiol Behav 2015;142:1-4.

17. Silva GSF, Paulino CEB, Kosminsky M, Studart-Pereira LM. Rev. CEFAC. 2020;22(4):e1020 | DOI: 10.1590/1982-0216/20202241020

	Expected	GC (N=9)	GS (N=3)	GO (N=7)
Appearance and Posture		AVERAGE	AVERAGE	AVERAGE
Postural condition of the lips		3	2,6	3
Vertical jaw posture		3	3	3
Appearance of cheeks		2,11	2	2
Face Appearance		2	2	2
Tongue Position		3	3	3
Appearance of the Hard Palate		2,66	2,66	2,8
Mobility				
Lip Movement		8,7	10,6	9,5
Tongue Movement		13,6	17	14
Jaw Movement		11,2	13	13
cheek movement		10,6	12	11,4
Breathing		2,5	2,6	2,7
Deglutition		11,5	9,6	10,2
Chewing		4,6	9,6	4,7
TOTAL		78,47	89,66	81,3

Table 1. Results of the orofacial myofunctional assessment with scores with the AMIOFE protocol of the 3 groups evaluated, containing evaluated regions, mean scores.

	GC (N=9)	GS (N=3)	GO (N=7)
	AVERAGE cm	AVERAGE cm	AVERAGE cm
Upper Third	59,9	61,5	59,8
Middle third	59,5	58,9	61,2
Lower third	56,6	63	65,6
Overbite	4,4	4,5	4,1
Interincisal Distance	4,3	3,9	3,2
Right laterality	9	11,6	9,8
Left Laterality	10,7	10,9	14,6
Protrusion	4,5	4,6	5

Table 2. Anthropometric evaluation of the face and dynamic and static analysis of occlusion with an analog caliper, of the 3 groups evaluated, containing the average of the measurements.

GC (N=9)	Green	Blue	violet
Apex of the tongue	8	1	–
Right dorsum of the tongue	5	4	–
Left tongue dorsum	6	3	–
Right Edge of the Tongue	4	4	1
Left edge of tongue	6	3	–
Hard palate	9	–	–
Soft palate	9	–	–
Palatoglossal arch	9	–	–
Pharyngeal palate arch	9	–	–
Uvula	9	–	–
Posterior wall of pharynx	9	–	–
Upper lip	9	–	–
Lower lip	9	–	–
Right cheek mucosa	9	–	–
Right cheek mucosa	9	–	–

Table 3- Measurement of skin sensitivity by region of the face and oral cavity of the GC with the monofilaments of the esthesiometer.

GS (N=3)	Green	Blue	violet
Apex of the tongue	3		
Right dorsum of the tongue	3		
Left tongue dorsum	3		
Right Edge of the Tongue	3		
Left edge of tongue	2	1	
Hard palate	3		
Soft palate	3		
Palatoglossal arch	3		
Pharyngeal palate arch	3		
Uvula	3		
Posterior wall of pharynx	3		
Upper lip	3		
Lower lip	3		
Right cheek mucosa	3		
left cheek mucosa	3		

Table 4- Measurement of skin sensitivity by region of the face and oral cavity of the GS with the monofilaments of the esthesiometer.

GO (N=7)	green	Blue	violet
Apex of the tongue	5	1	1
Right dorsum of the tongue	2	5	–
Left tongue dorsum	5	1	1
Right Edge of the Tongue	6	1	–
Left edge of tongue	3	3	1
Hard palate	5	2	–
Soft palate	7	–	–
Salatoglossal arch	7	–	–
Pharyngeal palate arch	7	–	–
Uvula	7	–	–
Posterior wall of pharynx	7	–	–
Upper lip	7	–	–
Lower lip	7	–	–
Right cheek mucosa	7	–	–
left cheek mucosa	5	1	1

Table 5- Measurement of skin sensitivity by region of the face and oral cavity of the GO with the monofilaments of the esthesiometer.