



SPEECH THERAPY INTERVENTION IN ORAL MOTOR SKILLS IN PATIENTS WITH OBESITY

INTERVENÇÃO FONOAUDIOLÓGICA NA MOTRICIDADE OROFACIAL EM PACIENTES COM OBESIDADE

Jenane Topanotti^{1*}, Roberto Stirbulov², Andrea Cavalcante dos Santos³

¹Doctor of Health Sciences and PhD candidate at FCMSCSP-SP; ²MD and Coordinator of the Lato Senso Graduate Program at FCMSCSP-SP; ³PhD in Public Health from UNIFOR-CE and Member of the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO).

***Corresponding author:**
Jenane Topanotti – **Email:**
fonojenane@gmail.com

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ABSTRACT: The objective of this study was to investigate the effect of speech-language therapy intervention in patients with obesity during the pre- and postoperative periods of bariatric surgery, assessing its impact on stomatognathic structures and functions. This was a randomized controlled clinical trial with quantitative analysis. Patients were randomly allocated to the Intervention Group or the Control Group. Assessments included appearance/posture, mobility (lips, tongue, mandible, and cheeks), and functions (breathing, swallowing, and mastication), as well as the frequency of vomiting episodes in the postoperative period. The Intervention Group participated in speech-language therapy training through the Orofacial Myofunctional Intervention Program for Individuals with Obesity. The protocol was initiated 60 days before the surgical procedure and completed 40 days after surgery, totaling 14 face-to-face sessions. Therapy in the Intervention Group demonstrated effectiveness in increasing scores related to appearance, lips, tongue, cheeks, swallowing, and mastication, in addition to reducing the percentage of postoperative vomiting episodes. It is concluded that the effect of speech-language therapy intervention in patients with obesity during the pre- and postoperative periods of bariatric surgery was significant, improving the mobility and tonicity of orofacial structures as well as the stomatognathic functions of swallowing and mastication. Speech-language therapy plays a fundamental role in optimizing oral conditions in patients with obesity, contributing to feeding efficiency and oral muscle function.

KEYWORDS: Bariatric surgery. Swallowing. Speech therapy. Chewing. Myofunctional therapy.

RESUMO: O objetivo foi verificar o efeito da intervenção fonoaudiológica em pacientes com obesidade nos períodos pré e pós-operatório de cirurgia bariátrica, avaliando o impacto nas estruturas e funções estomatognáticas. Trata-se de um ensaio clínico controlado, randomizado, com análise quantitativa. Os pacientes foram alocados aleatoriamente em Grupo Intervenção e Grupo Controle. As avaliações incluíram aparência/postura, mobilidade (lábios, língua, mandíbula e bochechas) e funções (respiração, deglutição e mastigação), além do índice de episódios de vômitos no período pós-cirúrgico. O Grupo Intervenção participou do treinamento fonoaudiológico do Programa de Intervenção Miofuncional Orofacial em Indivíduos com Obesidade. O protocolo foi iniciado 60 dias antes do procedimento e concluído 40 dias após o procedimento, totalizando 14 sessões presenciais. A terapia no Grupo Intervenção demonstrou eficácia em aumentar os escores relativos à aparência, lábios, língua, bochechas, deglutição e mastigação, além de reduzir o percentual de episódios de vômitos no pós-cirúrgico. Conclui-se que o efeito da intervenção fonoaudiológica em pacientes com obesidade nos períodos pré e pós-operatório de cirurgia bariátrica foi significativo, melhorando a mobilidade e tonicidade das estruturas orofaciais e as funções estomatognáticas de deglutição e mastigação. A terapia fonoaudiológica desempenha um papel fundamental na otimização das condições orais em pacientes obesos, contribuindo para eficiência alimentar e função muscular oral.

PALAVRAS-CHAVE: Cirurgia bariátrica. Deglutição. Fonoaudiologia. Mastigação. Terapia miofuncional.

INTRODUCTION

Over the last few decades, the world population has experienced intense changes in its living conditions, health, and nutrition. Among the main developments, the rise of obesity stands out, considered a chronic disease that affects people of all ages and social groups around the world to varying degrees. Approximately 650 million people worldwide are affected by obesity, which is considered one of the most common chronic diseases in the world¹.

In Brazil², the percentage of adults over 18 years of age with obesity, showed significant values and a marked upward trend, from 15.1% in 2010 to 22,4% in 2021. Obesogenic environments (environments that encourage unhealthy food choices and sedentary habits) promote or facilitate unhealthy food choices and sedentary behaviors, as they make it difficult to adopt and maintain healthy eating habits and regular physical activity³.

The treatments offered to address the consequences of the disease represent a huge expense for the national public health sector. Economic data, based on studies conducted since chronic obesity became an issue in recent years, show that it places a heavy burden on patients, both in terms of the financial impact on the healthcare system (direct costs) and the loss of productivity in society or quality of life (indirect costs)^{3,4}.

The clinical approach to obesity is routinely the first line of treatment prescribed by the medical team, involving a combination of calorie restriction, lifestyle changes, regular physical activity, and pharmacotherapy, resulting in considerable weight loss, but often not sustained by patients. This weight loss, in the long term, is an attribute of bariatric surgery, since severe obesity remains refractory to dietary and drug therapy in some cases.

For any treatment choice for obesity, whether clinical, behavioral, or surgical, interdisciplinary patient follow-up is essential. In the case of surgical treatment, this follow-up should extend to the postoperative period, as weight loss maintenance depends directly on changes in behavior and eating habits.⁵

Speech therapy plays a fundamental role in the adaptation process of individuals who have undergone gastroplasty. With this surgical procedure, the person's gastrointestinal tract is modified, altering the volume ingested and the speed of gastric emptying, requiring a new learning process regarding the form and mode of ingestion^{3,5}.

Speech therapy monitoring is required for the rehabilitation of complications related to chewing and swallowing in the oral phase of feeding, with the aim of improving the patient's food intake. Clinical speech therapy also helps to safely and effectively restore food consistency and texture, preventing complications such as vomiting, choking, and food stasis, thus contributing to bariatric success and improving quality of life⁶.

Speech therapy intervention occurs in the pre- and post-operative periods, during which the functions of the stomatognathic system and its structures are assessed. According to studies under evaluation, a significant portion of patients with obesity have alterations in perioral functions, which are usually caused by overeating or swallowing larger fragments, causing obstruction of the gastric stoma after surgery, which can lead to post-surgical complications^{7,8}.

Global studies on speech therapy intervention in obesity have not yet been reported. There is a lack of studies on this topic, especially in developed countries such as the United States of America (USA), the United Kingdom, and Australia, where obesity is a growing problem and the socioeconomic and cultural reality is different.

In order to understand this topic, this study aimed to evaluate the effect of speech therapy intervention in obese patients before and after bariatric surgery, describing the impact on stomatognathic structures and functions.

METHODOLOGY

To ensure scientific rigor and credibility of the results obtained, this study adopted a randomized controlled clinical trial design combined with quantitative analysis. This methodological approach allows for the mitigation of potential biases and the production of objective and reliable results, which are fundamental elements for evaluating the effectiveness of the intervention under investigation.

This study was approved by the Research Ethics Committee ZIP no. 33871220.3.0000.5219, under Substantiated Opinion n°. 4.169.295. Registered in *Clinical Trials Identifier*, NCT05516693. Registration with *Clinical Trials Identifier* offers advantages such as promoting transparency in clinical research and accountability in the disclosure of study protocols and results. Furthermore, such registration contributes significantly to the prevention of bias and the optimization of research quality.

For the sample calculation, in a population of 80 patients, the tests were performed considering $\alpha=0.05$ and test power $(1-\beta) = 0.80$, amounting to an average of 67 participants.

Patients with obesity, of both sexes, aged over 18 years and candidates for bariatric surgery, participating in an outpatient programme of the Brazilian Unified Health System (SUS), were included. Patients with significant dental changes (without the use of dental prostheses and/or with missing teeth) observed during the selection process or in medical records; diagnosed temporomandibular joint (TMJ) disorders; and any type of active cancer were excluded. Medical, dental, and psychological data were accessed from the patient's medical records. All participants signed an informed consent form (ICF).

Patients were selected for the purpose of convenience during scheduled appointments with the medical team. Following the initial assessment, carried out by a SUS team working at the rehabilitation center, and after verification of compliance with the inclusion criteria, patients were randomly assigned, according to the flowchart (Figure 1), to an intervention group (IG) and a control group (CG).

The randomization numbers were generated from a randomic table in the Speech Therapy laboratory by the health research department. Within this location, a sequence of sealed, opaque, and serially numbered envelopes was created, thereby ensuring confidentiality. Each envelope contained a card (sticker) indicating which group the patient should participate in. After randomization of the patients, the IG underwent oral myofunctional therapy (MOB training) according to individual clinical indications for at least 100 days, as described below.

The CG and IG groups underwent an initial assessment. Subsequently, the IG underwent the MOB speech therapy training programme (Orofacial Myofunctional Intervention Programme for Obese Individuals), developed by the researchers in this study. Given the unprecedented nature of this research, there are no protocols available for pre- and post-operative speech therapy rehabilitation programmes for bariatric surgery. This specific protocol was developed as part of a doctoral thesis by one of the authors of this study and is currently undergoing validation.

For each patient, oral exercises were defined individually according to the particularities found in the initial assessment. Myofunctional characteristics were assessed by the speech therapist researcher using the Orofacial Myofunctional Assessment with Scores (AMIOFE) protocol⁹.

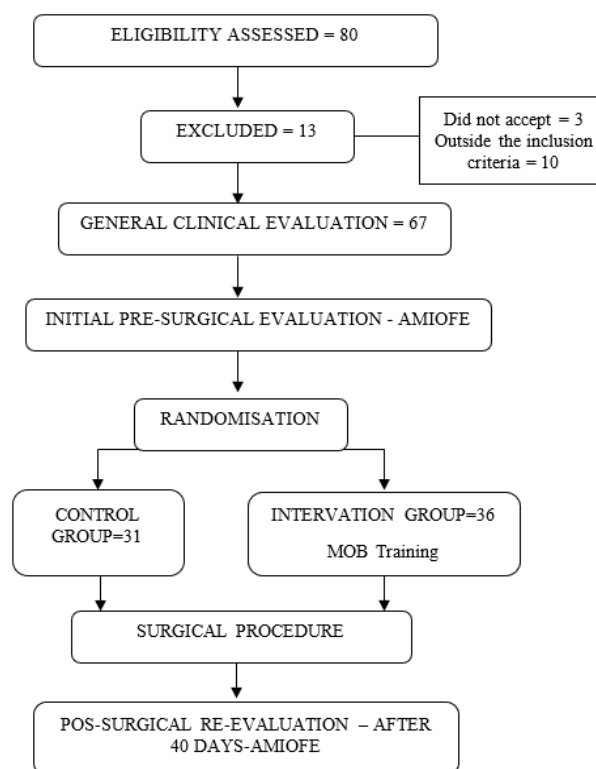


Figure 1. Study flowchart.

AMIOFE – Orofacial Myofunctional Assessment Protocol with Scores; MOB – Orofacial Myofunctional Intervention Programme for Obese Individuals. Source: the authors.

The standardized protocol was chosen for collection due to its good diagnostic reproducibility, consistency of results, and because it had already been used in other studies^{10,11,12}, establishing itself as a good method for analyzing the stomatognathic system (SS). The components and functions of the SS were assessed in terms of appearance/posture, mobility (lips, tongue, jaw, cheeks) and functions (breathing, swallowing – liquid and solid, chewing). Scores range from 0 to 4, according to each category evaluated, where 3 and 4 are considered adequate (normal), with a maximum score of 18 for the item ‘appearance and postural condition/position’; for the item ‘mobility,’ the score is 12; and for the item ‘functions,’ the total score that can be achieved is 28 points, for a total of 58 points.

After the bariatric surgery, all participants were re-evaluated by the researcher. It is worth noting that the evaluator was different from the therapist. A speech therapist, previously trained by the lead researcher, conducted the evaluations in a randomized and blinded manner for all patients, while the therapy sessions were conducted by the lead researcher.

To begin the data collection process, all participants received general guidance on the procedures performed to assist in the new post-surgical adaptations. The guidance was provided in the form of a one-hour lecture by team professionals, including a doctor, nurse, physiotherapist, speech therapist, nutritionist, and psychologist.

The IG and CG received an explanatory booklet (prepared by the researchers) during the pre-surgical speech therapy procedures. The general clinical evaluation protocol included observation of body posture, assessment of mobility, tonicity and orofacial sensitivity, as well as breathing, chewing and swallowing functions. Parameters such as age, gender, associated comorbidities, tonsil scale, Mallampati index, Body Mass Index (BMI) and abdominal circumference were also described in the study, with this information being taken from the patients online medical records. The presence of regurgitation and vomiting in the postoperative period was investigated in both groups.

The application of the MOB Intervention Protocol included individualized study stages determined by the patients' clinical history, covering metabolic and respiratory problems, sleep and treatments performed, aspects related to nutrition and the general health of obese patients.

The first stage of developing the MOB Intervention Programme involved reviewing the literature, and based on the studies found, the aspects to be addressed in therapy were defined, namely: lip, tongue and jaw posture; strength and mobility of the lips, tongue and cheeks; guidance and adequacy of breathing, chewing and swallowing functions. These aspects were distributed in a programme consisting of a weekly 40-minute individual speech therapy session, with exercises to be performed at home twice a day. The programme lasted for a minimum of 100 days, with 60 days pre-surgery and approximately 40 days post-surgery.

Although there is no standardized approach in speech therapy regarding parameters such as frequency of series and number of days per week for performing myofunctional exercises, research^{12,13,14} uses the methodology of performing daily exercises, with the number of repetitions in each exercise varying between 15 and 25 cycles, depending on the type of exercise and its purpose.

It is important to note that each patient is unique and has specific needs, and exercises cannot be generalized for all patients, as they are related to the structural and functional conditions of each individual. For this reason, the sequential sample of the MOB programme and the list of exercises used for this clinical trial are described in alphabetical order (Table 1).

Table 1. MOB Orofacial Myofunctional Intervention Programme for Obese Individuals.

	MOB - Orofacial Myofunctional Intervention Programme for Obese Individuals
	INSTRUCTIONS
	Therapy program started 60 days before the surgical procedure and 40 days after the procedure, with a minimum duration of 100 days (14 in-person sessions). Perform the exercises twice a day.
	INITIAL CONTACT (INDIVIDUAL)
	- Clinical History Report and Orofacial Myofunctional Assessment by AMIOFE. - Explanation of how speech therapy will contribute to the pre- and post-surgical process. - Organization and explanation of the therapeutic program. - Make clear the importance of chewing for the success of the surgical procedure.
	1th. SESSION
	- Raising awareness of the importance of exercising, with suggestions for helpful strategies, such as using the alarm on your cell phone as a reminder at home twice a day. - Building awareness of changes in tonicity, mobility, and orofacial functions presented by the patient - Chewing and swallowing training (with solid food, as usual. Recorded for awareness purposes). - Explanation of mobility and tonicity exercises (according to each case).
	2nd. to 8th. SESSION
	- Training the usual position of the tongue and lips at rest and during chewing and swallowing liquids and solids. - Mobility exercises (exercises listed in the appendix; their use is case-specific). - Toning exercises (exercises listed in the appendix; their use is case-specific). - Insight into the patient's chewing pattern and creating awareness about the new pattern. - Breathing training, simultaneous bilateral chewing (with solid food), and swallowing training.
	9th. SESSION
	FIRST POST-SURGICAL SESSION—checking the patient's general condition.
	- Performing isometric exercises (slowly). - Use of liquid suction using a (thin) straw. - Simultaneous bilateral chewing training (without food). - New guidelines for performing exercises at home and, if necessary, adjustments and/or changes to the exercises performed.
	10th. to 14th. SESSION
	- Perceived change in chewing habits. - Training of the sucking, breathing, chewing, and swallowing functions. - Mobility exercises (exercises listed in the appendix; their use is case-specific). - Toning exercises (exercises listed in the appendix; their use is case-specific).

	MOB – Orofacial Myofunctional Intervention Programme for Obese Individuals
• Simultaneous/alternating bilateral chewing training.	
• Guidance for monitoring orofacial functions.	
MYOFUNCTIONAL RE-EVALUATION	
✓ Application of assessment protocols and relevant notes.	
✓ The patient's self-perception of their new clinical condition.	
✓ General guidelines and definition of conduct.	
PERFORMED EXERCISES (perform twice a day, and the number of exercises/sets depends on each individual's needs)	
• Stretch the tongue (without touching the teeth or lips).	
• Holding the tongue in its resting position, open and close the mouth while keeping the tongue in place.	
• Pouring a small sip of water into the mouth, keep the tongue down and slightly curved at the tip, in a cupped shape. Hold the tongue in its resting position and keeping the water between the tongue and the palate. Slowly open the mouth. The water should remain sealed in this position, with the sides pressed against the gums and not against the teeth. Hold the water in this position for 10 seconds and then release the water.	
• Alternately clench the teeth, smile, and pucker the lips.	
• Push the tongue against the cheek, bilaterally.	
• Pronounce /o/ - /u/.	
• Tongue clicking.	
• Blowing kiss with a snap (and puckered lips).	
• Perform lateral kiss (with the tip pointing to the right and left).	
• Gargling.	
• Alternately puff out the cheeks.	
• Inflate cheeks and exhale.	
• Tongue on the 4 lip points (top, bottom and sides).	
• Chew gum (sugar-free) alternately (right and left) on the back teeth.	
• Simultaneous bilateral chewing: bite the food with the front teeth, start chewing on the preferred chewing side, distribute the food on the occlusal surface of the back teeth bilaterally, and grind at the same time, at a speed of one cycle per second.	
• Pronounce the sounds /k/ and /g/.	
• Inhale through the nose and exhale slowly through the mouth (3 times).	
• Tongue rotation in the vestibule.	
• Puff out cheeks and release.	
• Drink water through a straw (small sips).	
• Suck tongue on palate and open and close mouth.	
• Suck the lips closed, tense and release.	
• Tongue vibration.	
• Lips vibration.	
Observation: pay attention to breathing and body posture during exercises.	

Source: the authors.

The data obtained were allocated, tabulated, and processed electronically using Microsoft *Office Excel* and *RStudio* (05.2025). The quantitative data were presented based on relative frequencies, and then a bivariate analysis was performed using Fisher's test to compare proportions between CG and IG.

To evaluate the two-group medians in Tables 1-3, we chose the *Mann-Whitney* test because some variables did not follow a normal distribution in the *Shapiro-Wilk* test and because the groups were unpaired. In the paired evaluation between postoperative and preoperative (Tables 4 and 5) the *Wilcoxon* test was used because some variables did not follow a normal distribution in the *Shapiro-Wilk* test. Lastly, a significance level of 5% ($\alpha=0.05$)^{15,16} was used. Patient adherence to MOB treatment was assessed by attendance and punctuality, measured in the reception system implemented in the Rehabilitation Center Program, of which SUS patients are a part.

Once the research was done, the results were shared with the participants. This measure, adopted by the authors, is justified by considering that humanizing research involving humans is imperative, thus recognizing the intrinsic value and substantial contribution of participants to the advancement of scientific knowledge resulting from this investigation. The results were communicated

through an informative lecture in the post-surgical period, thus promoting not only transparency but also expressing respect and gratitude to the individuals who consented to participate in this research.

RESULTS

Most of the participants (53.7%) reported being aged 41 years or older (41.04 ± 12.03 years), and approximately 87% identified themselves as female. Regarding comorbidities, 67.2% had systemic arterial hypertension and 23.9% had diabetes mellitus. Regarding the tonsil scale, 19.4% were classified as grade 1; 49.3% as grade 2; 29.9% as grade 3; and 1.5% as grade 4. In the Mallampati index, most of the participants had a grade of 4 (62.7%). Regarding preoperative BMI, 14.9% of patients had grade II obesity (BMI between 35-40) and 85.1% had morbid obesity - grade III (BMI greater than 40). In terms of pre-surgical abdominal circumference, 25.4% measured between 106-120 cm, 47.8% between 121-135 cm, 25.4% between 136-150 cm, and 1.5% between 151-165 cm.

In order to assess the uniformity between the group that received speech therapy plus surgical treatment (IG) and the group that received surgical treatment and general guidance (CG), a bivariate analysis of characteristics between the two groups was performed. No statistical difference was demonstrated for the variables age, BMI, and preoperative abdominal circumference, Mallampati index, tonsil scale, proportion of patients with systemic arterial hypertension, and proportion of patients with diabetes mellitus between the two groups (Table 1).

Table 1. Bivariate assessment of uniformity between the group that received speech therapy intervention and the control group.

Characteristics	Intervention (n= 36)	Control (n= 31)	p value
Age (median) years	46	40	0,27 *
Pre-surgical BMI (median)	47	44,7	0,77 *
Pre-surgical abdominal circumference (median) in cm	130,25	127	0,36 *
Mallampati Index (median)	4	4	0,19 *
Tonsil Scale (median)	2	2	0,19 *
Systemic Arterial Hypertension (%)	75%	58%	0,19 **
Diabetes Mellitus (%)	28%	19%	0,57 **

* Mann-Whitney test. ** Fisher test. Source: research data (2023).

Table 2 shows the comparison of IG scores in the postoperative period with those in the preoperative period. There was a statistical difference in the scores for posture/appearance, lips, tongue, cheeks, swallowing, and chewing ($p < 0.001$).

Table 2. Total score of the sections in the AMIOFE of patients undergoing bariatric surgery comparing the group that received speech therapy intervention in the postoperative period with the preoperative period.

Items	Intervention Postoperative	Intervention Preoperative	p value*
	Mean $\pm$ SD	Mean $\pm$ SD	
Posture/appearance	17,08 $\pm$ 1,27	16,61 $\pm$ 1,61	<0,001
Lips	12,00 $\pm$ 0	11,69 $\pm$ 0,86	0,03
Tongue	17,94 $\pm$ 0,23	17,53 $\pm$ 1,13	<0,01
Jaw	12,14 $\pm$ 2,18	12,11 $\pm$ 2,2	1
Cheeks	10,78 $\pm$ 1,68	9,81 $\pm$ 1,83	<0,001
Breathing	2,44 $\pm$ 0,56	2,44 $\pm$ 0,56	**
Swallowing	14,97 $\pm$ 0,17	14,25 $\pm$ 1,27	<0,001
Chewing	8,92 $\pm$ 0,28	7,58 $\pm$ 0,81	<0,001

SD: standard deviation. * Wilcoxon test. ** Couldn't be calculated. Source: research data (2023).

Table 3 shows the CG scores in the postoperative period compared to the preoperative period. There was no statistical difference in the posture/appearance, tongue, swallowing, and chewing groups ($p=1$). The difference in the lips, jaw, and breathing sections could not be calculated, as none of the patients showed a change in score when comparing the preoperative and postoperative periods.

Table 3. Total AMIOFE score of sections in patients undergoing bariatric surgery comparing postoperative CG with preoperative CG.

Items	Intervention Postoperative Mean $\pm$ SD	Intervention Preoperative Mean $\pm$ SD	p value*
Posture/appearance	16,19 $\pm$ 1,58	16,16 $\pm$ 1,57	1
Lips	11,16 $\pm$ 1,24	11,16 $\pm$ 1,24	**
Tongue	16,97 $\pm$ 1,52	16,94 $\pm$ 1,59	1
Jaw	11,13 $\pm$ 1,67	11,13 $\pm$ 1,67	**
Cheeks	8,97 $\pm$ 1,4	8,97 $\pm$ 1,4	**
Breathing	2,16 $\pm$ 2,16	2,16 $\pm$ 2,16	**
Swallowing	14,32 $\pm$ 1,28	14,29 $\pm$ 1,32	1
Chewing	7,9 $\pm$ 0,54	7,87 $\pm$ 0,67	1

SD: standard deviation. * Wilcoxon test. ** Couldn't be calculated. Source: research data (2023).

Table 4 shows the scores in the Orofacial Myofunctional Assessment Protocol with scores in the postoperative period for patients in the IG and CG. The score obtained was higher in the group that received speech therapy intervention, according to the evaluation of the scores related to posture/appearance, lips, tongue, jaw, cheeks, breathing, swallowing, and chewing, showing a statistically significant difference ($p < 0.001$).

Table 4. Total score of sections on the AMIOFE in the postoperative period of patients undergoing bariatric surgery, comparing the group that received speech therapy intervention with CG.

Items	Speech Therapy Intervention (n= 36) Mean $\pm$ SD	Control (n= 31) Mean $\pm$ SD	p value *
Posture/appearance	17,08 $\pm$ 1,27	16,19 $\pm$ 1,58	<0,01
Lips	12,00 $\pm$ 0	11,16 $\pm$ 1,24	<0,001
Tongue	17,94 $\pm$ 0,23	16,97 $\pm$ 1,52	<0,001
Jaws	12,14 $\pm$ 2,18	11,13 $\pm$ 1,67	0,04
Cheeks	10,78 $\pm$ 1,68	8,97 $\pm$ 1,4	<0,001
Breathing	2,44 $\pm$ 0,56	2,16 $\pm$ 0,45	0,02
Swallowing	14,97 $\pm$ 0,17	14,32 $\pm$ 1,28	<0,001
Chewing	8,92 $\pm$ 0,28	7,9 $\pm$ 0,54	<0,001

SD: standard deviation. * Mann-Whitney test. Source: research data (2023).

The variation is shown in the score (postoperative score – preoperative score) of the IG and CG in Table 5. It was observed that the group that received speech therapy intervention had a greater increase in the score in the posture/appearance, lips, tongue, cheeks, swallowing, and chewing sections compared to the CG, as well as a decrease in regurgitation and vomiting in the postoperative period. There was no statistically significant difference in the variation in scores between the groups in the jaw and breathing sections.

Table 5. Total variation in the comparison of postoperative with preoperative sections in AMIOFE of patients undergoing bariatric surgery compared to IG.

Items	MOB Intervention (n= 36)	Without intervention (n= 31)	p value *
	Mean $\pm$ SD	Mean $\pm$ SD	
Posture/appearance	0,47 $\pm$ 0,65	0,03 $\pm$ 0,18	<0,001
Lips	0,31 $\pm$ 0,86	0 $\pm$ 0	0,02
Tongue	0,42 $\pm$ 1	0,03 $\pm$ 0,18	0,01
Jaw	0,03 $\pm$ 0,17	0 $\pm$ 0	0,37
Cheeks	0,97 $\pm$ 1,32	0 $\pm$ 0	<0,001
Breathing	0 $\pm$ 0	0 $\pm$ 0	**
Swallowing	0,72 $\pm$ 1,16	0,03 $\pm$ 0,18	<0,001
Chewing	1,33 $\pm$ 0,86	0,03 $\pm$ 0,18	<0,001

SD: standard deviation. * Mann-Whitney test. ** Couldn't be calculated. Source: research data (2023).

The CG (bariatric surgery only) did not improve in the AMIOFE Protocol scores. However, the group that received MOB speech therapy intervention in addition to bariatric surgery showed improvement in posture/appearance, lips, tongue, cheeks, swallowing, and chewing scores. This group had higher postoperative scores and greater score gains compared to the CG.

DISCUSSION

The sample studied obtained a similar profile of participants in relation to the literature researched^{17,18,19}, reporting that bariatric surgery was performed more frequently in females. A National Health Survey²⁰ showed that female obesity rose from 14.5% to 30.2% and remained higher than male obesity, which rose from 9.6% to 22.8%. Comorbidities were found in participants, with 67.2% presenting systemic arterial hypertension and 23.9% diabetes mellitus. These data corroborate large-scale studies, including estimates that an excess of only 20% of ideal weight can increase the incidence of arterial hypertension in individuals by up to eight times²¹. Regarding diabetes mellitus, it is known to be a serious public health problem that affects more than 425 million people worldwide, with estimates for 2045 suggesting that 629 million people will develop diabetes²². In addition, high blood pressure can damage the heart, brain, kidneys, and arteries, causing serious diseases such as acute myocardial infarction, heart failure, stroke, kidney failure, and aortic aneurysm. When combined with obesity, these risks only increase^{21,22}.

An additional sample characteristic reveals the scale of tonsils, whereby tonsils can be visualized and their size described using a classification system ranging from 0 to 4, based on the lateral extension from the anterior pillar to the midline of each tonsil. Most obtained grade II, i.e., occupation of 25% to 50% of the oropharyngeal lumen. As the population of this study was composed of obese individuals, tonsil hypertrophy can cause changes and compensations in chewing and swallowing. In addition, important changes result from upper airway obstruction, such as coughing, pulmonary hypertension, cor pulmonale, daytime sleepiness, sleep apnea, snoring, headache, and irritability¹⁷. The Mallampati index was evaluated, and most participants had a grade of 4, i.e., only the hard palate was visible.

These are significant findings for clinical speech therapy demand. Studies^{17,18,19,22} show that obese individuals may have impairments in the stomatognathic system, probably due to the accumulation of adipose tissue in the oral and pharyngeal cavity region, and due to facial adiposity, they have reduced lip and tongue tone, thus altering chewing and swallowing patterns.

Among the changes and/or adaptations in the stomatognathic system, obese patients evaluated pre-surgery presented tongue posture on the oral floor or interposed anteriorly in the dental arches, facial asymmetry, hyperfunction of the mentalis muscle, flaccidity of the lips, tongue, and cheeks, and

changes in chewing and swallowing. The chewing profile showed absence/decrease in food cutting, fast chewing rhythm, vertical jaw movements, large food bolus size, and insufficient chewing in the preoperative period. In the post-surgical reassessment, improvement was observed in tongue posture, increased tone in the lips, tongue, and cheeks, more efficient chewing, alternating bilaterally and at an appropriate rhythm, and greater awareness of the size of the food bolus, facilitating swallowing.

The analysis of the appearance/posture of orofacial structures based on the mobility of the lips, tongue, jaw, and cheeks and the functions of breathing, swallowing, and chewing was worse in obese adults compared to control subjects in studies^{23,24,25,26}. The orofacial myofunctional condition evaluated in the literature reports that there is an association between reduced cheek tone and the presence of multiple swallows during swallowing in obese individuals.

Chewing speed is reported in studies which indicate a relationship between bite, number of mastication, and obesity^{22,23,24,25,27}, and bite force also appears to be weaker in this population²⁶. Obese individuals have fewer chewing cycles, with a negative correlation between BMI and the number of chewing cycles and the duration of chewing. Obesity has also been associated with oral health problems, which affect the formation of the bolus and may promote rapid swallowing^{28,29,30,31,32}.

In a study conducted³² on individuals who underwent bariatric surgery with speech therapy intervention based on guidance and training in chewing and swallowing, the results showed improvement in aspects such as solid food consumption, chewing, and symptoms of food intolerance. The authors clarified that although the pharyngeal phase of swallowing is involuntary, working on chewing and the oral phase of swallowing can improve the pharyngeal phase. Thus, speech therapy focused on masticatory function was effective in improving food acceptance and food intolerance.

In the postoperative period, a significant reduction in the vomiting rate was observed, reaching 6% in the CG and 2% in the IG. The data was collected from medical records and confirmed through questioning during follow-up sessions.

The occurrence of nausea and vomiting, especially in the first few weeks after surgery, may be associated with poor adherence to the recommended diet for this period, ingestion of volumes greater than the stomach's capacity, and inadequate chewing and/or swallowing. The existence of clinical symptoms such as food intolerance, nausea/vomiting, diarrhea, gas, constipation, *dumping* and alopecia has also been reported in the literature^{33, 34,35,36}.

After conducting this study and observing obese patients who underwent speech therapy, it can be concluded that the presence of a professional leads to greater comfort when eating and the possibility of significant gains in the post-surgical rehabilitation process.

The Federal Council of Speech Therapy (CFFa) published³⁸ CFFa Resolution nº 717, on December 15, 2023, which provides for the regulation of speech therapists working in multidisciplinary teams for the clinical treatment of obesity and bariatric surgery. The 2nd article of the aforementioned Resolution states that speech therapists have the autonomy to manage specific procedures, techniques, and therapeutic resources that fall within their competence, based on scientific evidence, in the clinical treatment of obesity and bariatric surgery. It also states that speech therapists are competent to rehabilitate complications related to chewing and swallowing in the oral phase of feeding, with the aim of improving the patient's food intake.

The costs of the SUS could be mitigated by introducing a public policy in which speech therapists were included in the team on a regular basis, as appropriate preventive and continuous speech therapy for these patients would reduce the adverse effects caused by complications and could even reduce hospital admissions.

Focused on health promotion, this study addressed key aspects such as health education, prevention of problems in at-risk groups, and therapeutic interventions, with the aim of improving the quality of life of the population studied. These elements are crucial to meeting the SUS's prerogatives related to health promotion.

The benefits of this study are related to the quality of life of patients undergoing surgery. The limitations of the Intervention Program presented should be considered, given the types of surgeries performed and the individual characteristics of each patient, which determine individualized approaches, with the MOB Programme being a proposal for the fundamentals of myofunctional treatment for this population. The individualized use of the protocol complies with the Singular Therapeutic Project (STP) recommended by the SUS, which presents a set of coordinated therapeutic conduct proposals for an individual, resulting from collective discussion by an interdisciplinary team with matricial support³⁹.

Understanding the patient's unique characteristics is important for treatment, as it allows specific aspects to be incorporated into the treatment plan, justifying the individualized nature of MOB exercises. By understanding the complexity of the individual affected by a disease, the professional can recognize the need for specific, individualized interventions. The possibilities revealed by this type of approach must be carefully worked on by the team.

However, a limitation of this study is that data collection was performed using a convenience sample, which may compromise its representativeness in relation to the target population. Therefore, replicating this study with a broader or more diverse data collection methodology may provide even more comprehensive and generalizable results.

CONCLUSION

The outcomes associated with myofunctional speech therapy in obese patients who were candidates for bariatric surgery were positive. There was a significant improvement in the appearance and postural condition of the orofacial structures (lips, tongue, cheeks), as well as optimized performance in the mobility of these structures. Positive results also include functional improvement in chewing and swallowing. Although breathing did not show significant change, the other outcomes highlight the effectiveness of speech therapy in promoting positive and clinically relevant changes in these patients.

However, there is a gap in the literature on speech therapy in patients undergoing gastroplasty. Although there are references to potential complications related to the oral phase of feeding after gastroplasty, there is a shortage of studies that specifically address speech-language pathology intervention in this group. This indicates a pressing need for more research and studies to develop protocols and strategies for speech-language pathology intervention in this population. The lack of studies in this area may limit the ability of speech-language pathologists to provide evidence-based care, which may negatively affect the quality of rehabilitation and treatment success. Therefore, further studies are needed to confirm these findings and explore the benefits of speech-language therapy in this specific population.

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