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Denture rehabilitation effect on elders' nutritional status and quality of life

Efeito da reabilitação protética no estado nutricional e na qualidade de vida de idosos

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This study evaluated the effect of rehabilitation with complete denture on elders' nutritional status and quality of life. Forty-nine edentulous patients were recruited. The dentures were made using the simplified method, as adopted by the Brazilian public health system. Three months later, subjects returned for revaluation. Eight of the 49 patients returned, under the assessments of the following parameters: body fat percentage; lean mass; Body Mass Index (BMI); nutritional status (MNA); and analysis of masticatory efficiency through colorimetric analysis of chewing gum; self-perception of quality of life in relation to health (SF-12); impact of oral health on the quality of life of edentulous people (OHIP-EDENT). Data were evaluated using the paired t test, considering $p<0,05$. There was a statistically significant reduction in the percentage of fat (p=0.031, MD= 2.475), increase in MNA score (p=0.010, MD= -2.375), greater impact on quality of life in relation to oral health (p=0.010, MD= -33.750) and improvement of masticatory efficiency (p=0.014, MD= 0.261). Rehabilitation with complete dentures can improve nutritional parameters and the masticatory efficiency. Nevertheless, some impact of oral health on quality of life can also be observed.
Key-words: aging, oral health, quality of life.

Este estudo avaliou o efeito da reabilitação com prótese total no estado nutricional e na qualidade de vida de idosos. Quarenta e nove pacientes edêntulos foram recrutados. As próteses foram confeccionadas pelo método simplificado, adotado pelo sistema público de saúde brasileiro. Três meses depois, os sujeitos retornaram para reavaliação. Dos 49 pacientes, oito retornaram, sob avaliação dos seguintes parâmetros: percentual de gordura corporal; massa magra; Índice de Massa Corporal (IMC); estado nutricional (MAN); e análise da eficiência mastigatória através da análise colorimétrica de gomas de mascar; autopercepção da qualidade de vida em relação à saúde (SF-12); impacto da saúde oral na qualidade de vida dos edêntulos (OHIP-EDENT). Os dados foram avaliados pelo teste t pareado, considerando $p<0,05$. Houve redução estatisticamente significativa no percentual de gordura (p=0,031, MD= 2,475), aumento no escore MNA (p=0,010, MD= -2,375), maior impacto na qualidade de vida em relação à saúde bucal (p=0,010, MD= -33,750) e melhora da eficiência mastigatória (p=0,014, MD= 0,261). A reabilitação com próteses totais pode melhorar os parâmetros nutricionais e a eficiência mastigatória. No entanto, também pode ser observado algum impacto da saúde bucal na qualidade de vida.
Palavras-chave: envelhecimento, saúde bucal, qualidade de vida.

1. INTRODUCTION

Edentulism is the process of tooth loss that directly affects chewing, swallowing and speech, as well as psychological, aesthetic and social factors [1]. Tooth loss is an early indicator of accelerated aging [2] and the higher life expectancy increased the elderly population over time, leading to the need to provide dental services and manage edentulous elderly [3, 4].

Literature data reveal a directly proportional relationship between the number of teeth in the mouth and the nutritional status of the elderly, indicating that a greater number of teeth with maintained occlusal contacts corresponds to a better nutritional state [5, 6]. Thus, dental losses directly impact nutritional status; however, it is currently understood that dental prosthetic rehabilitation positively influences this scenario, improving nutritional parameters and the pleasure of eating [6].

However, when rehabilitation of the edentulous space is not carried out, chewing is compromised, which leads to swallowing difficulties, which can impair the nutritional status [7]. Edentulous individuals are unable to properly fragment food during chewing, impairing digestion and swallowing. Impaired mastication leads individuals to choose foods that are easier to consume, often increasing the intake of carbohydrates and fats, resulting in nutritional deficits and an increase in the frailty syndrome [3].

Oral health involves the ability to speak, smile, taste, touch, swallow and convey emotions [8]. Thus, oral health is fundamental to physical and mental well-being [6]. Presently, it is understood that the aging process affects several aspects of the individual's life. However, there are few studies which approach the impact of oral health on the various dimensions of the elderly quality of life [9].

Furthermore, it is known that the use of prostheses is prevalent in the elderly [10]. Therefore, functional rehabilitation is essential to promote general health and the quality of life [11]. In order to replace lost teeth, conventional complete dental prostheses are widely used, improving facial appearance, speech and chewing [12, 13]. Dentures are the treatment of choice for many patients, mainly because of their affordable cost [13].

In Brazil, conventional complete dental prostheses have been provided by the Unified Health System (SUS, Sistema Único de Saúde) since 2005. However, health financing by the public sector has spending limitations. Thus, it is necessary to carry out studies that guide the rational decisions of managers from the perspective of the Unified Health System (SUS) [14]. And it's worth noting that cost reduction becomes important for dental practice beyond SUS as well [14].

The literature reports several methods for making complete dental prostheses. The conventional protocol involves numerous clinical and laboratory steps, which are normally taught in dental schools [15]. However, there are simplified techniques that can influence teaching and dental practice, in addition to providing conventional complete dentures with a faster and more efficient treatment, with a better cost-benefit ratio, without reducing technical quality or patient satisfaction [15, 16].

The objective of the present study was to evaluate the effect of rehabilitation of conventional complete dental prostheses obtained by the simplified method, on clinical parameters of health and quality of life of patients assisted at a center of dental specialties.

2. MATERIAL AND METHODS

A paired longitudinal clinical study was carried out, developed in a public dental service, which is specialized in the provision of dental prostheses. The study began after approval by the Research Ethics Committee (CAAE: 57820522.7.0000.5188), in accordance with the guidelines of the Declaration of Helsinki and its amendments. This study was registered on The Brazilian Registry of Clinical Trials (ReBEC) platform. The study was developed in accordance with the CONSORT recommendations - Consolidated Standards of Reporting Trials [17].

People who sought the service were spontaneously invited to participate in the research, and after reading and signing the Free Informed Consent Form, they performed the subsequent stages.

The research participants had as inclusion criteria: intention to receive complete dental prostheses in the public dental service where the research was being developed and needing them in both arches. Individuals with cognitive deficits or with limiting conditions that made it impossible to carry out oral examinations and collect responses to the questionnaires, as well as patients who had a score of less than 18 points on the Mini-Mental State Examination (MMSE) [18], were excluded from the study. Patients underwent a detailed anamnesis where the following sociodemographic information was collected: age, sex, education, systemic condition. The clinical examination revealed edentulism.

Forty-nine patients were recruited. Sample size was estimated on the basis of a previous study, based on the difference in means between groups, before and after rehabilitation considering a power β=.8 and a=.05 [19, 20]. The following parameters were evaluated: fat percentage, body mass index (BMI) and lean mass using a bioimpedance scale; hand strength by means of digital dynamometer19; assessment of self-perception of quality of life in relation to health through the

Short-Form Health Survey (SF-12) [21]; evaluation of the impact of oral health on the quality of life of edentulous people, using the Health Impact Profile for assessing edentulous subjects (OHIP-EDENT) [22]; the assessment of nutritional status was measured using the Mini-Nutritional Assessment (MNA) questionnaire [18]; and analysis of masticatory efficiency through colorimetric analysis of chewing gum [23], where, after 20 chewing cycles, the collection of gum is carried out specifically for this type of methodology. The gum was collected and flattened with two glass plates, forming disks of the same thickness, and scanned. With the viewgun software, the scan analysis was performed, arriving at a numerical value of Hue Variation (VOH), from 0 to 1, which allowed the analysis of the individual's masticatory efficiency. The higher the numerical value, the worse the masticatory efficiency [23].

The manufacture of the prostheses was carried out in a standardized way, considering the simplified technique [16]. According to this technique, the initial impression was made with alginate - which was used to obtain the study model. In this model, a test base was made in acrylic and guide planes were created in wax. The maxillomandibular relationship was achieved with a hinged articulator configuration. Phonetic, metric, aesthetic and swallowing tests were performed to adjust the wax planes in the mouth. After the assembly of the teeth and the final approval of the volunteer, the prostheses were acrylated and then installed in the fourth session, in which adjustments were made for the comfort of the volunteer.

Three months after the installation and adaptation of the prostheses, the patients were invited to return for reassessment. To date, eight of them have returned. Among the pending patients, thirty-two did not want to return and six were unable to be contacted (Figure 1).

Data were tabulated and analyzed using Jamovi Desktop software. (The jamovi project, v. 2.3.21, Sidney, Australia). Data distribution was analyzed using the Shapiro-Wilk test. The adopted null hypothesis was that the parameters would not differ between the moments “before” and “after” the rehabilitation. Data were evaluated using the paired t student test, considering $p<0.05$ and power of 0.8.

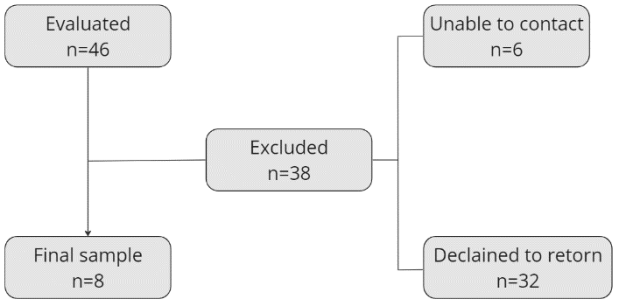

Figure 1. Sample flowchart.

3. RESULTS

The descriptive data of the study and statistical comparisons between the initial moment and the three months after rehabilitation are presented in Table 1. We observed statistically significant reduction in the percentage of body fat ($p=0.031$ – MD= 2.475), increase in the MNA score ($p=0.010$; MD= -2.375), greater negative impact on quality of life related to oral health ($p= 0.010$; MD= -33.750) and improved masticatory efficiency ($p=0.014$; MD= 0.261). No differences were observed for the following variables: lean body mass; BMI and self-perception of quality of life in relation to health (Table 1).

Table 1. Descriptive data of the variables analyzed and comparison of study variables pre- and post-oral rehabilitation using paired student's t-test.

	Mean	Median	Standard deviation	Mean difference	p-value	Standard error	95% confidence interval
%Body fat	27.675	29.150	10.1413	2.475	0.031	0.9223	0.2941 – 4.656
%Body fat after three months	25.200	25.350	10.4426				
BMI †	25.887	27.550	4.0424	0.463	0.243	0.3630	-0.3958 – 1.321
BMI † after three months	25.425	26.100	3.4837				
Lean mass	44.438	40.800	8.7823	4.375	0.262	3.5855	-4.1034 – 12.853
Lean mass after three months	40.063	39.600	15.1516				
MNA ‡	10.625	11.000	1.9226	-2.375	0.010	0.6797	-3.9823 – -0.768
MNA ‡ after three months	13.000	13.000	1.0690				
SF12 §	85.625	83.000	10.8620	10.875	0.060	4.8456	-0.5830 – 22.333
SF12 § after three months	74.750	82.000	14.8781				
OHIP-EDENT*	9.250	8.000	8.6148	-33.750	0.010	9.5651	-56.3679 – -11.132
OHIP-EDENT* after three months	43.000	49.000	29.1204				
Chewing Efficiency	0.521	0.507	0.1619	0.261	0.014	0.0807	0.0701 – 0.452
Chewing Efficiency after three months	0.260	0.214	0.0818				

*† Body Mass Index; ‡ Mini-Nutritional Assessment; § SF-12, Short-Form Health Survey; * Oral Health Impact Profile for assessing edentulous subjects.*

4. DISCUSSION

The results obtained from conducting this study demonstrate that rehabilitation with complete dentures improved nutritional parameters and chewing efficiency. Furthermore, an increase in the negative impact of oral health on quality of life was observed. These findings indicate that rehabilitation with complete dental prostheses through the simplified method contributed to the overall improvement of the individual's health, especially in terms of nutritional aspects [24].

The findings obtained in this study corroborate with the study by Huraib et al. (2022) [24], making it possible to identify the improvement in the nutritional status and chewing efficiency of individuals after rehabilitation. However, lean body mass, BMI, and self-perceived health-related quality of life could not provide parameters in the present study due to non-statistically significant data.

Cousson et al. (2012) [25] emphasize the importance of routine use of the MNA in edentulous individuals, as complete dental prostheses wearers present a higher risk of malnutrition compared to fully dentate patients. It is important for future studies to assess comorbidities related to edentulism, such as Parkinson's, Alzheimer's, diabetes, and the impact of prosthetic rehabilitation on nutritional status [22] and in health parameters, reaffirming the importance of the data obtained in our study.

There is a need to investigate factors that may negatively impact quality of life after rehabilitation. This result may be associated with adaptation to new prostheses [15]. Even with all the benefits of rehabilitation, attempting to adapt to the denture poses functional challenges in speech, saliva control, and causes limitations in mandibular and labial movements, due to the new dental positioning and the new vertical dimension of occlusion, especially in users of lower dentures, because of anatomical factors that limit denture retention after bone resorption in that region [26, 27].

Thus, the adaptation period to the dentures can result in patient dissatisfaction [12] mainly in patients who have never used inferior prostheses, due to the difficulty in retaining [27]. Users of complete dentures tend to have difficulties in chewing, loss of self-esteem and social contact [26]. Therefore, it is possible to relate the period of adaptation to the prosthesis to the damage observed in the impact of oral health on the patient's quality of life after the oral rehabilitation illustrated in the present study. Thus, longitudinal studies that follow the long-term impacts of rehabilitation related to oral health are necessary.

Although oral rehabilitation contributes to a significant improvement in functional, aesthetic and emotional aspects, the initial process of using complete dentures is a challenge, especially in people who have not had previous experiences with this type of rehabilitation. Thus, the adaptation period can have a negative impact on the patient's oral health and quality of life. At this stage, the user may experience some discomfort, which may increase sensitivity to the new denture.

Thus, it is of utmost importance that longitudinal studies exist to verify if improvements occurred in quality-of-life parameters for edentulous patients using complete dentures after a longer period. Undoubtedly, the long-term follow-up of complete denture wearers posed a challenge in the present study. A high number of individuals declined to return for dental service reassessment, mainly due to not having complaints regarding the new dentures. In the conditions of this study, the simplified method proved to be feasible and effective, even though a lower-than-expected number of patients returned for reassessments.

The study has limitations concerning the low number of returns, typical of a prospective clinical study, especially with the elderly population. Additionally, the study included individuals both with and without prior experience with conventional complete dentures. In a way, this latter aspect has a subjective impact on the perception of health-related quality of life. The use of the simplified technique may lead to difficulties in adapting the denture to the patient's ridge, as the conventional method should be adopted in situations where adjustment might occur depending on the maxillomandibular relationship based on each patient's conditions.

5. CONCLUSION

Rehabilitation with complete dentures fabricated using the simplified method resulted in improvements in nutritional parameters and chewing efficiency. However, a deterioration was observed in the oral health-related quality of life index, possibly due to difficulties in adapting to the new prostheses. Therefore, longitudinal studies with longer durations, exploring the relationship between the prosthetic fabrication method and oral health-related quality of life, are recommended to further deepen understanding of this topic.

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