Influence of Age and Time Since Edentulism on Masticatory Function and Quality of Life in Implant-Retained Mandibular Overdenture Wearers: 1-year Results from a Paired Clinical Study

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**Purpose:** To investigate the influence of age and time since edentulism on masticatory function and quality of life related to oral health (OHRQoL) in totally edentulous patients after implant-retained mandibular overdenture (IMO) loading. **Materials and Methods:** The sample consisted of 33 patients categorized in two age groups (≤ 65 and > 65 years, respectively), and two time since edentulism groups (< 25 and ≥ 25 years). The masticatory function was evaluated through the masticatory performance and swallowing threshold tests before IMO loading, and 1, 3, 6, and 12 months after IMO loading. The OHRQoL was evaluated by applying the Oral Health Impact Profile (OHIP-EDENT) and Geriatric Oral Health Assessment Index (GOHAI) questionnaires, before loading and after 3, 6, and 12 months. Data were subjected to the Mann-Whitney test and Wilcoxon signed-rank test for paired samples. **Results:** The masticatory performance and swallowing threshold outcomes showed a gradual improvement up to 12 months, irrespective of the patient categorization. The GOHAI questionnaire scores showed that the OHRQoL was influenced by age in complete denture wearers with a difference between groups in the psychosocial and global domains. The time since edentulism was not affected by the GOHAI scores of complete denture wearers (P < .05). The OHIP-EDENT questionnaire only indicated significant differences as a function of age or time since edentulism between complete denture wearers. Age was associated with significant differences in the physical pain domain outcome, while time since edentulism did not affect only the psychologic discomfort, psychologic inability, and handicap domains. **Conclusion:** Neither the age nor the time since edentulism influenced the masticatory function of IMO-wearing patients. However, IMO significantly improved the masticatory function in totally edentulous patients, and this is more evident for younger patients (≤ 65 years) with a shorter time since mandibular edentulism (< 25 years). The OHRQoL is only influenced by age and time since edentulism in complete denture wearers; IMO treatment eliminates these differences. Int J Oral Maxillofac Implants 2019;34:1466–1474. doi: 10.11607/jomi.7525

**Keywords:** edentulism, masticatory function, overdentures, quality of life, totally edentulous patients

The majority of health problems faced by the growing elderly population are chronic.1,2 One of the major problems is total edentulism, which has deleterious consequences to the oral and general health of individuals.3 Total edentulism is the end result of a multifactorial process involving biologic factors, such as caries, periodontal disease, trauma, and buccal cancer, and nonbiologic factors related to the teeth treatment, health access, patients’ behavior, financial issues, and treatment availability.4 Although the prevalence of total edentulism is decreasing in high-income countries, an inverse trend is noted in low- or medium-income countries, where it is closely related to caries and periodontal diseases.5 For instance, Brazil
is considered a medium-income country, and 11% of its population is totally edentulous.6

The most important problems besides teeth loss are the alterations to the hard and soft tissues in the oral cavity.4 Continuous and progressive residual ridge resorption significantly reduces the alveolar bone volume and the basal support area for the prosthesis and negatively influences the rehabilitation options when maxillary bone atrophy is present.7,8 Common clinical findings in these patients include superficial muscular insertions, thin or flat residual ridges, and superficialization of the alveolar nerve that results in pain during usage of the prosthesis.9,10 Total edentulism also results in loss of muscle tone and mass, which probably affects the masticatory function and the nutritional choices of older patients.

In addition, it is expected that the oral motor function decreases with age, which may cause a decrease in masticatory performance.11,12 Besides oral health, total edentulism also negatively affects oral health–related quality of life (OHRQoL) aspects, including social interaction, day-to-day activities, self-esteem, and psychologic health.13 Conventional complete dentures are also associated with poor retention and stability, which can result in unsatisfactory masticatory function, low occlusal force, discomfort during function, and dissatisfaction with the rehabilitation.14–17 All these problems faced by complete denture wearers can be aggravated by prolonged time since edentulism or advanced age.

In 2002, the McGill Consensus defined that implant-retained overdentures (IMO) should be the minimum treatment for totally edentulous patients.18 After IMO treatment, patients’ masticatory function, occlusal force, and satisfaction improves, while discomfort during function decreases.19 However, mandibular bone atrophy may hinder treatment with conventional implants, and the degree of bone atrophy is directly proportional to the time since edentulism.20–22 Insufficient bone volume in patients with severe bone atrophy may necessitate reconstructive surgery or the use of narrow-diameter implants. The latter have become an attractive treatment option for these patients, as they involve simpler and less-invasive surgical techniques and enable rehabilitation of elderly patients for whom more complex and time-consuming surgical procedures are contraindicated.23

Treatment with implants in elderly patients has become a routine practice and will be even more widespread in the near future, as IMOs have a significant positive impact on the masticatory function and OHRQoL.22,24,25 However, there is no consensus in the current literature regarding the change in masticatory function or maximum occlusal force as a function of age.26 Bilhan et al27 did not find a significant difference in maximum occlusal force in IMO wearers above and below 65 years of age. Presently, it is unclear to which degree the patient’s age and time since edentulism impact the masticatory function and OHRQoL improvements that can be obtained. Thus, this study investigated the null hypothesis that age and time since edentulism do not influence the masticatory function and OHRQoL of totally edentulous individuals during the transition from a complete denture to an IMO, until 1 year of rehabilitation with the IMO.

MATERIALS AND METHODS

Study Design

This longitudinal clinical study was performed according to the Helsinki Declaration, following the STROBE guidelines. The study was approved by the Research Ethics Committee of the UFPel School of Dentistry (Protocol - 69/2013) and included fully edentulous patients rehabilitated at the Complete Dentures Clinic of the Dentistry School at the Federal University of Pelotas. The following inclusion criteria were applied: good systemic and oral health, complete denture wearers for at least 3 months, present difficulties in adapting to their mandibular prosthesis, and being diagnosed with mandibular atrophy according to Kapur28 criteria.

All participants who agreed to participate in this study signed an informed consent form, and subsequently performed the masticatory performance and swallowing threshold tests. The OHRQoL was then measured by applying the OHIP-EDENT and GOHAI questionnaires. Immediately after these evaluations, two narrow-diameter implants (2.9 × 10 mm, Facility NeoPoros Neodent) were placed between the mental foramen by an experienced surgeon, and healing caps were connected. After a 3-month osseointegration period, the healing caps were replaced by Equator attachments, and the mandibular prosthesis was submitted to occlusal loading. The masticatory tests and questionnaires were repeated after 1, 3, 6, and 12 months.

Patient Categorization

All volunteers were categorized according to their age and time since edentulism. The participants were categorized according to the median values of the data into two groups: (1) patients ≤ 65 years of age and patients > 65 years of age; and (2) patients with time since edentulism of < 25 years and ≥ 25 years.

Confection of the Artificial Food (Optocal)

Optocal artificial food is a mixture of Optosil Plus (Bayer Dental; 58.3 wt%), conventional toothpaste (7.5 wt%), solid Vaseline (11.5 wt%), common dental plaster powder (10.2 wt%), and alginate powder (12.5 wt%).
Metallic molds are used to create standardized cubes with 5.6-mm sides. All cubes were stored for 16 hours in a stove at 65°C and subsequently disinfected in glutaraldehyde. To perform the tests, a portion of 3.7 g was weighted on an analytical balance and stored in the refrigerator.29–31

**Masticatory Function**

The masticatory function was evaluated using two distinct tests, the masticatory performance and the swallowing threshold. To perform these tests, all volunteers were instructed to chew a 3.7 g Optocal portion.8,31 In the masticatory performance test, the patients needed to chew the artificial food for 40 cycles, recorded by the evaluator. During the swallowing threshold test, the volunteers were instructed to chew until they felt the desire to swallow. All the material was subsequently expelled on a paper filter. The chewed material was then washed and dried at room temperature for 7 days. After drying, the material was passed through a sieve tower with progressively decreasing mesh size. The weight retained in each sieve was then determined and inserted in a Rosin-Rammel equation to calculate the ×50 and B parameters. The ×50 calculation determines the median particle size corresponding to the theoretical sieve aperture through which 50% of the particle weight would pass, while the B parameters describe the homogeneity of the crushed particle distribution, with lower values corresponding to more homogenous distributions. In addition, the masticatory efficiency was calculated as the weight percentage retained in the 5.6-mm and 2.8-mm sieves (ME 5.6 and ME 2.8).8,30 The masticatory tests were performed before and after the transition from the complete denture to IMO.

**Oral Health–Related Quality of Life**

**OHIP-EDENT.** This questionnaire evaluates the physical, functional, social, and psychologic aspects of the treatment. Each question has three possible answers: never, sometimes, and always, which were scored as 0, 1, and 2, respectively.32,33

**GOHAI.** This questionnaire evaluates the patients’ self-reported OHRQoL in three different domains: physical, psychologic, and pain/discomfort. Each question has three possible answers: always/frequently, sometimes/rarely, and never, which were scored as 1, 2, and 3, respectively.34,35

**Statistical Analysis**

The data distribution was analyzed using descriptive statistics. Nonparametric tests were used to perform the comparisons: the Mann-Whitney test was used to compare the differences between the groups, while the Wilcoxon signed-rank test for paired samples was used to test for differences between the evaluated periods. The effect size was calculated, and the final scores were classified as: small (ES ≃ 0.2), medium (ES ≃ 0.5), and large (ES ≃ 0.8).36 All data were analyzed with the SPSS 22 software; the significance level was set at 5%.

**RESULTS**

The sample population consisted of 33 patients divided into groups according to the median age and time since edentulism: (1) age ≤ 65 years, 16 patients, and > 65 years, 17 patients; (2) time since edentulism < 25 years, 17 patients, and ≥ 25 years, 16 patients.

Figures 1 and 2 show the percentage improvement of masticatory function test outcomes. No statistically significant differences (P > .05) in the masticatory performance outcomes were found between the age (Fig 1) and time since edentulism (Fig 2) groups. However, after IMO placement, a significant improvement was observed for all masticatory performance outcomes in all groups in the first month of IMO loading. Figure 1 shows that the highest percentage of improvement was observed in the ≤ 65 years of age group, for all masticatory function outcomes (X50, B, ME 5.6, ME 2.8) measured by both tests, masticatory performance and swallowing threshold. The time and number of cycles in the swallowing threshold test was only significantly different after 6 months of IMO loading, when patients > 65 years of age needed 35% more cycles and time. None of the applied masticatory function tests showed any statistically significant difference between the time since edentulism groups (P > .05; Fig 2).

Figure 3 presents the global OHRQoL scores of the GOHAI and OHIP-EDENT questionnaires for the groups at different time points. At the baseline, all patients were complete denture wearers, and statistically significant differences between the groups were observed in both questionnaires. In the GOHAI questionnaire, there was a significant difference between the age groups in the psychosocial domain (≤ 65 years = 10.81 [± 1.33]; > 65 years = 12.12 [± 1.18]; P = .006) and the global score (≤ 65 years = 25.44 [± 3.39]; > 65 years = 28.29 [± 2.14]; P = .004). The OHIP-EDENT questionnaire only showed a significant difference between the age groups for the physical pain domain at baseline (≤ 65 years = 4.63 [± 2.19]; > 65 years = 2.94 [± 2.01]; P = .049). After the IMO placement, no significant differences were observed between the age groups, except for the pain and discomfort domain in the GOHAI questionnaire at 12 months (≤ 65 years = 7.19 [± 0.66]; > 65 years = 6.76 [± 0.42]; P = .039).

No significant differences were observed between the time since edentulism groups in the GOHAI
Fig 1  Percentage of masticatory function improvement for (a) the masticatory performance test and (b) the swallowing threshold test according to the age group, calculated as the percentage of improvement between the baseline and the mean at the evaluated time interval (1, 3, 6, and 12 months; Mann-Whitney test, $P < .05$).

Fig 2  Percentage of masticatory function improvement for (a) the masticatory performance test and (b) the swallowing threshold according to time since edentulism, calculated as the percentage of improvement between the baseline and the mean at the evaluated time interval (1, 3, 6, and 12 months; Mann-Whitney test, $P < .05$).

Fig 3  Mean and standard deviation of the global (a) GOHAI according to age; (b) OHIP-EDENT according to age; (c) GOHAI according to time since edentulism; (d) OHIP-EDENT according to time since edentulism, scores for each group obtained at the different evaluation times (Mann-Whitney test, $P < .05$). Asterisks indicate significant differences between the groups. ES = effect size observed for the global scores at the respective evaluation times in comparison to the baseline.
questionnaire at the baseline. Conversely, the OHIP-EDENT questionnaire showed significant differences between the time since edentulism groups in five domains during the baseline evaluation: global (< 25 years = 14.47 ± 8.47; ≥ 25 years = 7.69 ± 5.31; P = .018), functional limitation (< 25 years = 3.88 ± 1.73; ≥ 25 years = 2.75 ± 1.91; P = .028), physical pain (< 25 years = 4.53 ± 2.53; ≥ 25 years = 2.50 ± 1.90; P = .008), physical disability (< 25 years = 4.53 ± 2.53; ≥ 25 years = 2.50 ± 1.90; P = .008), and social disability (< 25 years = 4.53 ± 2.53; ≥ 25 years = 2.50 ± 1.90; P = .008). After the IMO placement, no significant difference was observed between the time since edentulism groups, except in the global GOHAI domain at 3 months post-loading (< 25 years = 28.94 ± 0.97; ≥ 25 years = 29.63 ± 1.59; P = .014).

Table 1 and 2 list the effect size (ES) values for the GOHAI and OHIP-EDENT questionnaire domains at all evaluation periods (0, 3, 6, and 12 months) according to age and time since edentulism, respectively. In the GOHAI questionnaire, patients with ≤ 65 years of age (Table 1) reported the highest short-term clinical effects in the physical (ES 0–3: 1.1) and psychosocial (ES 0–3: 1.5) domains. The latter two domains maintained high ES after 1 year of treatment (ES 0–12: 1.3 and 1.2, respectively). For the > 65 years of age group, large short-term ES values were observed in the pain and discomfort domain (ES 0–3: 0.8), and these high ES values compared with the baseline peaked at 12 months (ES 0–12: 1.1), when they were joined by high ES values in the physical domain (ES 0–12: 0.9). The OHIP-EDENT questionnaire indicated that large short-term clinical effects in the ≤ 65 years of age group for the functional limitation, physical pain, and physical disability domains (ES 0–3: 1.0, 1.4, and 1.3, respectively) were observed in the short period. The latter domains also showed the highest ES after 1 year of treatment (ES 0–12: 1.1, 1.8, and 1.5, respectively). In the > 65 years of age group, only the functional limitation (ES 0–3: 1.0) and physical pain (ES 0–3: 1.1) domains had large ES at 3 months, and these same domains remained with large ES in a long period of time (ES 0–12: 1.3 and 1.2, respectively); the long-term ES in the physical disability domain became apparent after 1 year (ES 0–12: 0.8).

In the GOHAI questionnaire (Table 2), the group with a short time since edentulism only had large short-term ES in the psychosocial domain (ES 0–3: 0.9), and large ES persisted in this domain long-term (ES 0–12: 1.1). In the group with a longer time since edentulism, the physical and psychosocial domains showed large short-term ES (ES 0–3: 0.9), and these domains maintained high ES at 12 months (ES 0–12: 0.9 and 0.8, respectively). The pain and discomfort domain also presented large long-term ES between baseline and 12 months (ES 0–12: 0.8). In the OHIP-EDENT questionnaire, the group with a shorter time since edentulism showed the highest short-term clinical effects in the
functional limitation, physical pain, physical incapacity, and psychosocial incapacity domains (ES 0–3: 1.3, 1.3, 1.0, and 0.8, respectively). These four domains also presented higher ES after 1 year of treatment (ES 0–12: 1.6, 1.5, 1.0, and 0.8, respectively), when an improvement in the social disability domain becomes apparent (ES 0–12: 0.8). After 3 months of IMO loading, the group with a long time since edentulism showed the highest ES in the functional limitation, physical pain, and psychologic incapacity (ES 0–3: 0.8) domains. The high ES in these three domains persisted after 1 year (ES 0–12: 1.0, 1.0, and 0.9, respectively), when an improvement in the physical disability domain becomes apparent (ES 0–12: 0.9).

DISCUSSION

This is the first paired clinical study that investigated how age and the time since edentulism can functionally (masticatory function) and subjectively (OHRQoL) affect totally edentulous patients during the first year of transition from a complete denture to an IMO. The masticatory function aspect of the null hypothesis was accepted, as the results indicate that these two factors generally did not significantly influence the objectively assessed masticatory function, when the complete denture and IMO treatment results were compared over a period of 1 year. However, the subjective perception regarding complete denture treatment was influenced by these two factors. Patients with a shorter time since edentulism (< 25 years) and ages ≤ 65 years reported a worse OHRQoL as complete denture wearers. After IMO loading, these patients reported greater clinical effects, as they presented the highest ES values across most domains when the baseline conditions were compared with the postloading periods.

The aging process varies widely between individuals and coincides with a progressive degeneration of normal structures and a decline of the function of body peripheral tissues, including skin, mucosa, muscles, joints, glands, and viscera, as sensory receptors, and the sensory motor functions of the jaws may also be affected.37 Thus, the physiologic changes of the oral cavity during aging can modify masticatory function. This in turn has implications for the diet of elderly people, who have a tendency to reduce food intake and an increasing preference for soft and easy-to-swallow foods.38 According to Peyron et al,39 three factors greatly impact the masticatory function of elderly people: the number of natural antagonist teeth, the quantity and/or the quality of the saliva, and the compromised motor system. Consequently, the masticatory function of totally edentulous complete denture wearers is poor compared with healthy dentate individuals.30

In this clinical study, a compromised masticatory function of patients with advanced age and prolonged edentulism was expected, believing that a decrease in

<table>
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<th>Domain</th>
<th>ES 0–3</th>
<th>ES 0–6</th>
<th>ES 0–12</th>
<th>ES 3–6</th>
<th>ES 3–12</th>
<th>ES 6–12</th>
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<tr>
<td>Physical</td>
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<tr>
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<td>0.9</td>
<td>1.1</td>
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<td>0.8</td>
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<tr>
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<td>0.3</td>
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<td>0.4</td>
<td>0.6</td>
<td>0.3</td>
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<tr>
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<td>1.4</td>
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<td>1.1</td>
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Table 2: Effect Size (ES) for Each Domain of the GOHAI and OHIP-EDENT Questionnaires According to Time Since Edentulism Groups
muscle tone for older patients, leading to a decreased occlusal force, could have implications for the masticatory function tests. However, the results showed no significant differences for both masticatory performance and swallowing threshold outcomes between the two age and time since edentulism groups. One exception is that the number of cycles and the time required to complete the swallowing threshold test at 6 months of function was significantly associated with the time since edentulism (≥ 35%, \( P = .017 \) and \( .044 \), respectively). Recently, Enkling et al.\textsuperscript{26} found that patients older than 65 years of age rehabilitated with IMOs presented a lower maximum occlusal force. However, when the authors evaluated masticatory efficiency through the homogenization of a two-color chewing gum, no improvement was observed. The lack of improvement was attributed to the acquisition of an inefficient masticatory behavior during complete denture use, which was not altered after IMO treatment. This deleterious effect is thought to be related to tactile limitations and the mobility of conventional mandibular prostheses acquired during > 10 years of usage.\textsuperscript{26} Another important inference related to these types of tests is that occlusal force results in clinical studies with edentulous patients do not always match those results found in masticatory function tests. In the occlusal force test, the patient applies their maximum occlusal force capacity for a given time, usually in the first molar region. By contrast, most of the masticatory performance and swallowing threshold tests involve chewed artificial (Optocal) food particles, following the methodology of Fontijn-Tekamp et al.\textsuperscript{30} In those tests, the patient does not necessarily need to use their maximum occlusal force and may have different distributions of muscular forces during the execution of the masticatory cycles.\textsuperscript{26,30} However, it is important to highlight that the swallowing threshold test was more sensitive than masticatory performance in the present study, since after 6 months of IMO loading, older patients needed more time and a greater number of cycles to grind the test food (≥ 35%). The latter can be justified by the fact that older patients have less muscle tone and muscular endurance.\textsuperscript{40} In spite of the compromised masticatory kinetics in patients > 65 years of age, these patients did not present worse food homogenization in the swallowing threshold test.

A recent literature review that investigated changes in masticatory mechanisms as a function of age showed that complete denture wearers present adaptations in their mastication to compensate for their deficient masticatory apparatus, even with foods that are easy to chew.\textsuperscript{39} These authors identified that the effects of aging on mastication and swallowing of complete denture wearers include an increase in the number and duration of the masticatory cycles, reduction of muscle strength, decreased tactile sensitivity and reflex responsiveness, and changes in the sequence and coordination of oropharyngeal muscle contractions. Such changes may affect dietary behavior, nutritional status, and also increase the risk of mortality.\textsuperscript{39} In this context, the swallowing threshold results showed that the adaptation to the IMO can be observed after 6 months, but only in older patients, and this effect disappears after 1 year of IMO loading as new habits are created.

Treatment with IMO significantly improved the masticatory performance and swallowing threshold over time irrespective of age or time since edentulism. In particular, the masticatory behaviors obtained by the patients during the swallowing threshold test in the present study were similar to those described by Van der Bilt et al.\textsuperscript{41} After the placement of IMOs, patients showed not only superior quality in mastication, but it is also believed that they developed greater muscle strength.\textsuperscript{41} In addition, Enkling et al.\textsuperscript{26} observed that the occlusal force of edentulous patients rehabilitated with IMOs increases by 33.23% after 3 months of loading. Consequently, an improvement in masticatory function is expected after IMO loading when compared with a complete denture,\textsuperscript{26,42} consistent with the results in the present study. A prospective study by Van der Bilt et al.\textsuperscript{43} found that the maximum occlusal force and masticatory performance increased significantly after IMO treatment and remained unchanged over the 10-year follow-up period. Other studies have shown that the muscle activity of the muscles involved in mastication is altered according to prosthetic rehabilitation performed in edentulous patients.\textsuperscript{15,41} Van der Bilt et al.\textsuperscript{41} observed that temporal muscle activity was significantly lower than masseter activity when subjects bit with complete dentures. Conversely, the muscular activity of the temporal and masseter did not differ when the patients were rehabilitated with IMOs.\textsuperscript{41} These authors suggest that part of the muscle activity performed during mastication by complete denture wearers is used to manipulate the prosthesis in order to keep it in a comfortable place, instead of focusing on grinding food.\textsuperscript{41} The latter is consistent with Caloss et al,\textsuperscript{16} who stated that the instability of the prosthesis inhibits the masticatory muscles, especially during unilateral bite and mastication. The neuromuscular adaptation after treatment with IMOs can be compared with electromyography results of healthy dentate individuals.\textsuperscript{44} Studies show that the maximum occlusal force increases significantly after 3 months of IMO rehabilitation, which reflects in improved masticatory function compared with complete denture treatment.\textsuperscript{15,45} Therefore, it could be suggested that the occlusal force of the individuals in this paired study increased over time, contributing to the
improved masticatory function observed in all groups after 1 year of IMO loading.

The success of rehabilitation depends on the re-establishment of the patient’s oral function, satisfaction, and OHRQoL. Assessing the impact of the IMO treatment on the OHRQoL is essential to provide a more complete view of the rehabilitation along with the objective masticatory function tests. The positive impact of IMOs on the quality of life of patients rehabilitated in the present study was confirmed by both questionnaires (Figs 3 and 4) and in agreement with the results of previous studies. These findings also showed that the perception of the clinical treatment effect was greater in the 65 years of age group, which perceived higher ES values in most domains, and it was better perceived by patients with a shorter time since edentulism, as these patients perceived large ES across more domains at the end of the follow-up period.

The between-groups results show that age and time since edentulism influenced the OHRQoL, as there were statistically significant differences in both GOHAI and OHIP-EDENT scores while patients were complete denture wearers, and the groups with ages > 65 years and a longer time since edentulism (≥ 25 years) reported better OHRQoL. These findings may be justified because patients with ages > 65 years and time since edentulism ≥ 25 years have a greater prosthetic experience, and thus, have less expectations regarding the rehabilitation type and oral discomfort, and also are more habituated with the treatment and, consequently, report better scores in the OHRQoL. Patients with ages ≤ 65 years and time since edentulism < 25 years may have higher expectations regarding the placement of a new complete denture, as the adaptation to its use is difficult, mainly in conditions with poor motoric control, greater fragility of the oral tissues, and reduced neuromusculature, which could account for the greater frustration in this group of patients. The ES of patients aged ≤ 65 years and time since edentulism < 25 years evaluated after 12 months were higher than those of patients with age > 65 years and time since edentulism ≥ 25 years for most domains of the questionnaires. This suggests a greater clinical effect of IMO treatment for these patients. However, between-groups comparisons after IMO placement were only significantly different for the pain and discomfort domains of the GOHAI questionnaire at 12 months.

Both the OHIP-EDENT and GOHAI scores indicate that the majority of the positive impact of rehabilitation with IMOs occurred at 3 months of loading, followed by additional improvements at 6 months. In addition, the present ES results show that IMO treatment had the greatest clinical impact on the physical and functional domains. The studies of Schuster et al and Marcello-Machado et al also describe similar results regarding the short-term perception of positive treatment effects on the patients’ quality of life. This finding may be justified due to the application of the questionnaires shortly after surgery, as the positive impact of IMOs on functionality and psychologic comfort may be easier to perceive 3 months after rehabilitation compared with longer periods. After a longer time of IMO treatment, the patients’ memory regarding their mastication as complete denture wearers fades as they become accustomed to the IMO.

The limitations of the present study include the lack of maximum occlusal force and salivary flow monitoring. In particular, the latter is directly related to the masticatory function and the homogenization capacity of the bolus. Finally, the present study evaluated mandibular ridge atrophy only via the clinical parameters established by Kapur et al. More studies with longer follow-up times and additional mastication-related parameters are necessary to evaluate the long-term evolution of masticatory function and OHRQoL after rehabilitation with IMOs.

CONCLUSIONS

Age and time since edentulism did not affect the masticatory performance outcomes of totally edentulous complete denture or IMO users. However, after 6 months of IMO loading, the more sensitive swallowing threshold test showed that older patients needed ~35% more time and more cycles, and this likely reflects a more intense IMO adaptation period in this group. In addition, IMO significantly improved the masticatory function of edentulous patients.

The OHRQoL of complete denture wearers was affected by age and time since edentulism. Younger patients with a shorter time since edentulism had higher expectations with the new treatment, and have greater resilience to this treatment. The physical and functional domains exhibited the highest clinical effect after IMO treatment, and the greatest improvements were observed for younger patients and with less time since edentulism.

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