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Expected and perceived burdens in patients receiving mandibular overdentures retained by one or two implants

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Abstract

Purpose: This study aimed to assess patients' expected burdens before treatment and their perceived burdens after the surgical and prosthodontic procedures of mandibular overdenture treatment and to evaluate factors influencing patients' perceptions.

Methods: Data were collected from 47 participants enrolled in a randomized clinical trial comparing mandibular overdentures retained by one or two implants. A 20-item questionnaire measured on a four-point Likert scale covering the surgical and prosthetic treatment procedures was used to assess the patients' perception of the procedural burdens before (expected burdens) and immediately after (experienced burdens) each procedure. Operators' perceptions of intercurrences associated with the procedures were also assessed as an independent variable.

Results: Low levels of perceived burdens were observed both before and after treatment. The mean overall scores of 1.65 ± 0.46 and 1.53 ± 0.33 for expected and experienced burdens, respectively, indicated that most items ranged between "not burdensome at all" and "somewhat burdensome." Significant differences between expected and experienced burdens were found for eight items ($P < 0.001$). Considering the treatment stages, expected burdens scored higher in the pre-surgical, surgical, and prosthetic stages and lower in the post-surgical phase than experienced burdens. Overall, the experienced burdens were significantly affected by the expected burdens ($P < 0.001$) and operator's perceived burdens ($P = 0.045$).

Conclusions: Treatments were associated with low levels of perceived burdens related to surgical and prosthodontic procedures and were highly correlated with the expected burdens before treatment. However, patients tend to overestimate the expected burdens before treatment, especially for surgical procedures.

Keywords: Patient-reported outcome measures, Dental implants, Dental prosthesis, Denture, overlay

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1. Introduction

Multiple factors may influence edentulous patients' intentions and behaviors toward oral rehabilitation, including their perceptions of costs, opportunity costs, perceived needs, and access to dental care[1]. However, another relevant aspect of adherence to treatment is how patients perceive the burdens associated with treatment. 'Treatment burdens' may be defined as both the workload and impact of treatment regimens on the function and well-being of patients[2]. These can produce significant negative impacts in implant treatments, which patients often associate with discomfort, pain, and temporary disability symptoms. These negative perceptions can also adversely impact patient–professional relationships[3,4]. As a result, some health interventions have been associated with poor adherence to treatment and unfavorable outcomes.

For edentulous patients, managing their impaired oral condition often requires physiological and functional adaptation, which influences their perceived oral treatment needs and treatment-seeking behavior[5]. However, their adherence to treatment regimens requires significant time investment affecting the patient, their family, or careers, including the need to navigate dental services, interact with multiple professionals, undergo diagnostic procedures, receive treatment, and change their diet and oral function during treatment, especially for implant-based rehabilitation. Non-adherence results when a patient does not initiate or continue care that a provider has recommended and is related to the value given to treatment, incorporating how the patient evaluates the treatment's effectiveness, side effects, costs of care, and their views regarding the burdens associated with the intervention.

Therefore, the edentulous condition and related treatments may be increased by the "workload," or burden, often driven by more complex treatments, such as those with implants, compared

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to conventional prosthodontic treatments. In such instances, edentulous patients who are candidates for implant treatments often lack the perceived ability to fulfil the requirements of maintaining these regimens, thus impacting their willingness to accept and undergo complex treatments. This is frequently reported in the literature as patient refusal to receive implants[6], preference for conventional prosthodontic alternatives[7], or withdrawal of participants enrolled in clinical trials when they are randomly assigned to the study arm that includes implant interventions or more complex treatment protocols.

In clinical practice, improving clinicians' understanding of the burdens associated with implant treatment can help inform decisions about treatment for patients and ultimately allow practitioners to better optimize the delivery of healthcare to improve patient adherence and well-being. Assessments of patients' perceived burdens in oral surgery and prosthodontic interventions have previously been reported based on questionnaires specially developed for the measurement of process-related quality of care to help clinicians reduce pain, burdens, unpleasantness, and anxiety during treatment[8–10]. However, these methods do not enable a direct assessment of the entire process of implant surgery and patient rehabilitation, including events related to the pre-surgical and healing phases and specific procedures of overdenture treatment and post-insertion use. The aims of this prospective study are: (1) to assess the perceived burdens associated with treatment in edentulous patients undergoing mandibular overdenture treatment, (2) to compare patients' expectations before and perceptions during the surgical and prosthodontic stages of treatment, and (3) to investigate the influence of additional factors on changes in patients' perception of burdens associated with treatment. This study hypothesizes that there is a difference in patients' expectations of the burdens associated with implant treatment before treatment and aims to rate their perceived burdens after the interventions are carried out.

2. Material and Methods

2.1. Study design and sample

Data were collected prospectively as part of a randomized clinical trial that compared the effectiveness of mandibular overdentures retained using one or two implants (NCT03691285). The study protocol was approved by the local research ethics committee (CAAE:65240617.5.0000.5083) and all clinical procedures were conducted at the School of Dentistry of the Federal University of Goias, Brazil, between November 2017 and December 2018. Details regarding the sampling methods, treatment protocols, and results of the assessment of patient-reported outcomes and masticatory function have been published elsewhere[11,12]. All treatments were provided at no cost to the participants.

Edentulous volunteers were enrolled in the study and provided with newly constructed conventional dentures. The eligibility criteria for enrollment included favorable conditions for implant insertion at the anterior mandibular region and satisfactory cognitive function, as assessed by the mini-mental state[13]. The parameter cut-offs were 25 and 20 points for literate and non-literate participants, respectively. As part of the enrollment procedure, all participants received detailed information regarding the proposed treatment.

As this study was conducted alongside a randomized clinical trial that initially tested the comparative effect of treatments on patient-reported outcome measures, the sample size was estimated based on the main study, as reported previously[11,12]. An a priori sample size calculation was performed considering a 0.80-power, two-sided 0.05 significance level, a difference of 15 points in the 0–100 patient satisfaction score (representing the minimal difference between groups believed to be clinically relevant in a before–after assessment following treatment), and a 20-point maximum common standard deviation for the entire sample. A 10% increase in the sample size was adopted to minimize the loss of study power due to participant withdrawal. Finally, a total sample size of 48 participants was estimated, with 24 participants in each treatment group[11].

2.2. Interventions

Participants were randomly allocated to receive one or two implants in the anterior mandible for retention of an overdenture. Participant randomization was performed using block randomization stratified by gender; the participants were assigned to sets of different sizes using unsorted numbers representing the two treatments and an allocation ratio of 1:1 for the groups with one or two overdenture implants. Implants comprising tissue-level Straumann Standard Plus SLActive® (Straumann AG Institute, Basel, Switzerland) were installed under terminal infiltrative anesthesia using articaine hydrochloride with 1:100,000 epinephrine. Surgical access was performed with a crestal incision allowing full-thickness flap elevation to expose the implant site, which extended between the intercanine region for the single-implant group and immediately beyond the mental foramen bilaterally for the two-implant group. Alveolar ridge regularization was performed when needed, and the drilling sequence for implant insertion was performed according to the protocol recommended by the manufacturer. A healing abutment of 1.5 mm in height was installed, and an early three-week implant healing protocol was implemented. Paracetamol (750 mg) was prescribed as postoperative care in case of pain. All of the surgical procedures were performed by the same experienced implant surgeon.

After three weeks, the retention titanium anchor abutment (3.4 mm) was installed and attached to the corresponding elliptical matrix, which was incorporated into the dentures intraorally with autopolymerized acrylic resin. All of the prosthetic procedures were performed by the same prosthodontist with extensive clinical expertise.

2.3. Assessment of patients' perceived burdens

The main outcomes of this study were patient-reported treatment burdens measured before and after treatment. The measurements were based on an item pool generated by listing all of the steps required to perform the overdenture treatment, including the surgical and prosthodontic stages.

Each of the clinical procedures carried out during all stages of treatment were listed for the purpose of registering patients' perceptions of their associated burdens. Four major treatment stages — pre-surgical, surgical, post-surgical, and prosthetic — were defined and divided according to the specific sequential clinical procedures in each stage, as detailed in **Table 1**.

The 20 items covering all treatment steps constituted the perceived burden questionnaire. Patients were asked to rate the burden of each of these items on a four-point Likert scale: (1) not burdensome at all, (2) somewhat burdensome, (3) very burdensome, and (4) extremely burdensome. A summative score was obtained for each

Table 1. List of clinical procedures of each treatment stage for implant surgical and prosthodontic treatment

Stage	Number of steps	Items
Pre-surgical	2	1. Acquisition of imaging exams
		2. Preoperative medication and preparation
Surgical	10	3. Mouth and face cleansing
		4. Local anesthesia
		5. Local incision and debridement
		6. Bone regularization
		7. Bone drilling of the implant site
		8. Implant screwing
		9. Suture
		10. Post-operative adaptation of the denture
		11. Duration of surgery
		12. Being with mouth opened for a long time
Post-surgical	4	13. Postoperative management and care
		14. Suture removal
		15. Functional limitation during the postoperative period
		16. Tissue healing
Prosthetic	4	17. Attach the retention system to the denture
		18. Ability to remove and insert the overdenture
		19. Adaptation to the overdenture
		20. Need of repairs and adjustments

treatment stage and an overall score was generated for the combined treatment burden.

The questionnaire was administered during two periods: (1) before treatment at the pre-surgical treatment planning appointment and (2) immediately after each of treatment step in which specific items related to the treatment stages were performed. The first questionnaire was considered to represent the patients' "expected" burdens, and the second questionnaire was defined as the patients' "experienced" burdens.

Data collection concerning "expected burdens" occurred during the first clinical appointment after enrollment. "Experienced burdens" were assessed at clinical sessions during the actual treatment, corresponding to the numbered items listed in **Table 1**: (I) appointment that preceded implant surgery (items 1–2); (II) appointment for implant surgery (items 3–12); (III) one-week postoperative appointment (items 13–16); (IV) attachment incorporation after three weeks (item 17); (V) one-month follow-up (items 18–19); and (VI) six-month follow-up (item 20).

2.4. Independent variables

Sociodemographic data were collected as along with the time of full edentulism and the use of existing dentures. The participants' age and gender were included as independent variables.

The number of implants (one *versus* two) was tested to assess the impact of the extent of the surgical and prosthodontic procedures on patients' perceived burden.

In addition, because any negative side effects during treatment may influence patients' perceived burden, the operator's perception of the burden associated with each procedure was considered as a potential variable of the patient's perceived burden. Therefore, after each dental visit, the operator ranked the procedure on a four-point ordinal response scale (ranging from "very positive" to "very negative") to describe the occurrence of any difficulty in performing the procedure or any unexpected event during the procedure. In addition, the duration of the surgical session was recorded.

2.5. Data analysis

Data were analyzed using descriptive statistics and bivariate tests to compare patients' expected and perceived burdens. In addition, the reliability of the composite item score of the burden scale and subscales was calculated using Cronbach's alpha to measure the internal consistency of the instruments. Because the primary data were measured on a Likert scale treated as an ordinal scale, nonparametric tests were used for the analyses. The Wilcoxon signed-rank test was used to test the significance of the difference between the distributions of the two non-independent samples involving matched pairs of ordinal score measurements.

Associations among patients' overall expected and experienced burdens and the operator's perception of burdens were tested using Spearman's correlation test.

The influence of independent variables (sex, age, number of implants, time of full edentulism, time using the existing prosthesis, surgery duration, patients' expected burdens, and operators' perception of burdens) on patients' response variable (perceived burdens) was analyzed using a general linear model (GLM) procedure to test the effects of independent variables on the means of various groupings of the dependent variable. All of the statistical analyses were performed using IBM-SPSS 24.0 software. The level of significance adopted was 5%.

3. Results

From the initial sample of 48 individuals, 24 were assigned to each of the single- and two-implant overdenture groups. One individual from the single-implant group withdrew from the study before implant surgery; thus, 47 patients completed the study, with 23 in the single-implant group, and 24 in the two-implant overdenture group. The participants' ages ranged from 44 to 81 years (mean = 65.4; SD = 8.5), and 36 participants (76.6%) were female. The mean time of complete edentulism was 21.5 (±17.0) years; the use of the existing dentures ranged up to 35 years (mean = 10.0; SD = 10.9), and 66.0% of participants used upper and lower dentures at the beginning of the study (16.7% had no dentures). None of the participants had previous experience with implant treatment. The educational level of the participants was relatively low—74.5% had less than eight years of formal education—and most of the participants were of lower socioeconomic status. There were no differences in socioeconomic variables between the groups receiving one or two implants ($P>0.05$).

Table 2 summarizes the descriptive data (mean, standard deviation, median, and interquartile range) of the participants' scores for the items on the expected and experienced burden scales according to the treatment stage. Both scales showed good internal consistency (Cronbach's $\alpha > 0.80$), assuming that unidimensionality exists in the sample of test items.

Table 2. Item scores of the expected and experienced burdens, according to treatment stage

Stage	Items	Means (SD)		Median (IQR)		*P*-value*
		Expected	Experienced	Expected	Experienced	
Pre-surgical	1. Imaging exams	1.04 (0.20)	1.02 (0.15)	1.0 (0.0)	1.0 (0.0)	0.317
	2. Preoperative measures	1.28 (0.62)	1.09 (0.28)	1.0 (0.0)	1.0 (0.0)	0.045 [a]
	Subscale values	1.16 (0.36)	1.06 (0.16)	1.0 (0.0)	1.0 (0.0)	0.046 [a]
Surgical	3. Mouth and face cleansing	1.30 (0.51)	1.09 (0.28)	1.0 (1.0)	1.0 (0.0)	0.004 [a]
	4. Local anesthesia	2.01 (0.83)	1.72 (0.58)	2.0 (0.0)	2.0 (1.0)	0.008 [a]
	5. Local incision and debridement	1.96 (0.86)	1.49 (0.72)	2.0 (2.0)	1.0 (1.0)	0.001 [a]
	6. Bone regularization	1.98 (0.90)	1.81 (0.76)	2.0 (1.0)	2.0 (1.0)	0.210
	7. Bone drilling of the implant site	1.83 (0.79)	1.81 (0.90)	2.0 (1.0)	2.0 (1.0)	0.884
	8. Implant screwing	1.85 (0.83)	1.49 (0.69)	2.0 (1.0)	1.0 (1.0)	0.015 [a]
	9. Suture	1.70 (0.66)	1.55 (0.83)	2.0 (1.0)	1.0 (1.0)	0.211
	10. Post-operative adaptation of the denture	1.57 (0.85)	1.41 (0.52)	1.0 (1.0)	1.0 (0.0)	0.240
	11. Duration of surgery	1.64 (0.82)	1.57 (0.71)	1.0 (1.0)	1.0 (1.0)	0.682
	12. Mouth opened for a long time	2.04 (0.75)	2.01 (0.84)	2.0 (0.0)	2.0 (2.0)	0.845
	Subscale values	1.80 (0.57)	1.60 (0.43)	1.9 (1.0)	1.6 (0.7)	0.008 [a]
Post-surgical	13. Postoperative management and care	1.60 (0.77)	1.66 (0.60)	1.0 (1.0)	2.0 (1.0)	0.567
	14. Suture removal	1.51 (0.69)	2.30 (0.66)	1.0 (1.0)	2.0 (1.0)	< 0.001 [b]
	15. Functional limitation	1.81 (0.90)	1.77 (0.87)	2.0 (2.0)	2.0 (1.0)	0.692
	16. Tissue healing	1.62 (0.77)	1.66 (0.70)	1.0 (1.0)	2.0 (1.0)	0.758
	Subscale values	1.63 (0.65)	1.85 (0.53)	1.5 (1.0)	1.8 (0.8)	0.011 [b]
Prosthetic	17. Attach the retention system	1.53 (0.62)	1.45 (0.54)	2.0 (1.0)	1.0 (1.0)	0.303
	18. Remove and insert the overdenture	1.79 (0.69)	1.51 (0.62)	2.0 (1.0)	1.0 (1.0)	0.003 [a]
	19. Adaptation to the overdenture	1.53 (0.62)	1.17 (0.43)	1.0 (1.0)	1.0 (0.0)	0.002 [a]
	20. Need of repairs and adjustments	1.21 (0.55)	1.10 (0.31)	1.0 (0.0)	1.0 (0.0)	0.132
	Subscale values	1.54 (0.48)	1.31 (0.30)	1.5 (0.5)	1.25 (0.5)	0.011 [a]
Overall	Scale values	1.65 (0.46)	1.53 (0.33)	1.6 (0.85)	1.5 (0.37)	0.058
	Cronbach's Alpha	0.92	0.85			–

* Wilcoxon Signed Ranks Test). [a] Expected > experienced burdens. [b] Expected < experienced burdens

Table 2 also presents the differences between the expected and experienced burdens among participants. Overall, the scores revealed low expected burdens before treatment and perceived burdens after the actual procedures. The mean overall scores, measured on a 1–4 possible score range were 1.65 ± 0.46 and 1.53 ± 0.33 for the expected and experienced burdens, respectively, indicating that most of the items were ranked between "not burdensome at all" and "somewhat burdensome." Considering all scores registered by the 48 participants across the 20 items, only 2.1% of the expected burdens were scored as 3 or 4, and 1.3% of the experienced burdens were scored as 3 or 4. Significant differences between the expected and experienced burdens were found for eight items ($P < 0.001$). In comparison with the expected scores, the procedures assessed by these items were scored as less burdensome after being performed, except for suture removal, for which the experienced burdens were significantly higher than the expected burdens. Considering the treatment stages, expected burdens presented higher scores in the pre-surgical, surgical, and prosthetic stages and lower scores in the post-surgical stage compared to experienced burdens.

There was a significant correlation between the experienced and perceived burdens ($r_s = 0.71$; $P < 0.001$), as shown in **Figure 1**. The values of the mean perceived burdens (expected and experienced) in the different treatment stages are shown in **Figure 2**. Higher mean scores were observed for the expected burdens in the surgical stage (1.80 ± 0.81) and experienced burdens in the post-surgical stage (1.85 ± 0.75).

The mean scores of the operator's perceptions of burdens associated with procedures ranged from 1.13 to 2.25 (mean = 1.53; SD = 0.25), and the duration of the implant surgery ranged from 40 to 138 min (mean = 81.5; SD = 20.4). Although the duration of surgery was longer for the two-implant group than the single-implant group (92.2 ± 21.4 *vs* 71.3 ± 13.0; $P < 0.001$), the operator's perceived burdens did not differ between groups ($P = 0.259$). There was a significant moderate correlation between participants' experienced burdens and the burdens perceived by the operator ($r_s = 0.33$; $P = 0.026$).

The GLM analysis showed that the overall experienced burden was significantly affected by the participants' expected burdens ($F = 44.9$; $P < 0.001$) and the operator's perceived burdens ($F = 4.26$; $P = 0.045$; adjusted $R^2 = 0.57$). No significant effects were observed for the other independent variables, including sex and age of participants.

4. Discussion

This study showed that edentulous patients undergoing mandibular overdenture treatment generally reported low perceived burdens associated with implant treatment for the provision of overdentures. In addition, the expected burdens prior to surgical and prosthodontic interventions were higher than the experienced

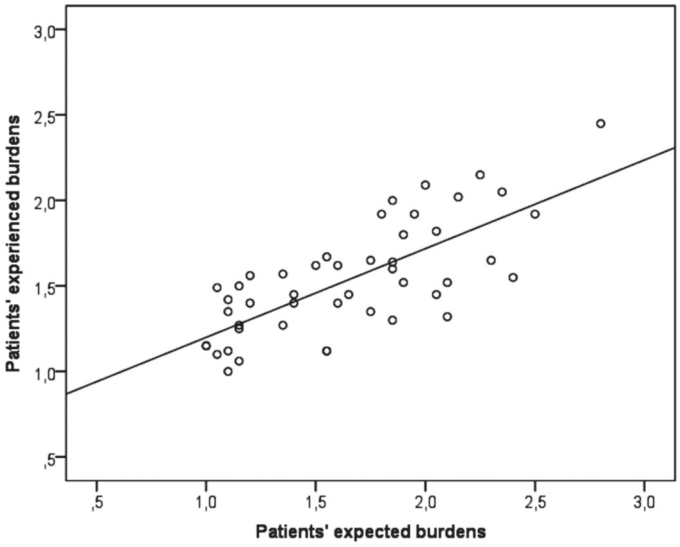

Fig. 1. Scatterplot of the association between perceived burdens experienced and expected by patients

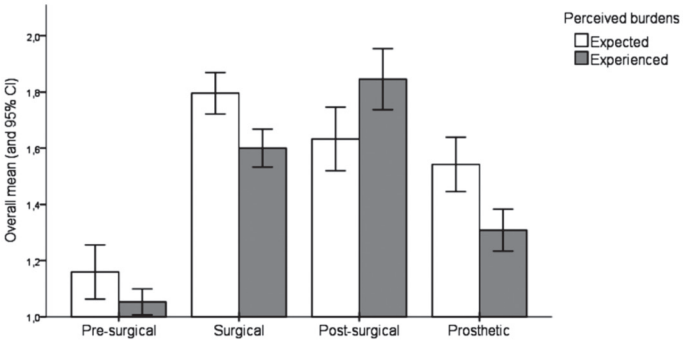

Fig. 2. Mean scores (and 95% confidence intervals) for the expected and experienced burdens for the four stages of overdenture treatment

burdens for most treatment procedures. The patients' overall experienced burdens were significantly affected by their pre-treatment expected burdens and by the operator's ratings of treatment burdens.

Previous studies have explored several aspects of patients' perceptions during prosthetic and surgical treatments, including the development of specific questionnaires with satisfactory reliability and validity for the assessment of perceived burdens associated with oral surgery (the burdens in oral surgery questionnaire (BiOS-Q)[8]), prosthodontic procedures (the burdens in prosthetic dentistry questionnaire (BiPD-Q)[9]), and dental impressions (the burdens in dental impression-making questionnaire (BiDIM-Q)[10]). These questionnaires aimed to provide reliable instruments with external validity to assess how burdensome surgical and prosthodontic procedures can be in clinical research settings.

BiPD-Q[9] and BiDIM-Q[10] are generic instruments that are not specific for implant-related prosthodontic procedures and are mainly focused on conventional prosthodontics, which limits their use for overdenture treatment patients. Moreover, BiOS-Q may be suitable for this study because it assesses the perception of burdens, pain, discomfort, or satisfaction with respect to actual surgical procedures that encompass osteotomy, apicectomy, implantation, and others[8]. However, our study used a tailored questionnaire to enable the identification of important context-dependent aspects of the implant treatment by capturing individual contexts that are meaningful for the patient throughout the course of the treatment and enabling the assessment of patients' perceived treatment burdens before and after rehabilitation with mandibular overdentures.

The use of a tailored questionnaire may limit comparability across studies owing to the need for thorough validation to allow for external application to other situations, groups, or events; however, this study was designed to address a specific research question with good internal validity. The hypothesis that patients overestimate the expected burdens of treatment before being treated has not been previously investigated and was confirmed by our study, which may explain an aspect of patient non-adherence or refusal to receive implants.

Moreover, previous studies that assessed patients' perceived burdens following surgical and prosthodontic treatments[8–10,14] used a 0–100 visual analog scale or a five-point ordinal scale. We opted to exclude the neutral point of the scale because previous research has suggested that when presented with a neutral response option, people are more likely to select that option than report their actual opinion. This is usually due to the following reasons: (1) individuals tend to avoid the cognitive effort required to select a satisfactory answer when providing attitude reports; (2) people pick neutral options as a result of ambivalence, and thus people's responses to opinion polls tend to gravitate toward neutral because they want to avoid the negative feelings associated with their conflicting viewpoints on an issue; or (3) social desirability influences the choice of a neutral option when people are reluctant to voice a socially undesirable opinion[15].

The findings of this study suggest that expected burdens may influence patients' perception of experienced burdens; however, considering the subscale values, the experienced burden scores were lower than the expected burden scores for all treatment stages, except for the post-surgical stage. This overestimation of expected burdens was evident for the surgical-related procedures "preoperative measures," "mouth and face cleansing," "local anesthesia," "local incision and debridement," and "implant screwing," as well as for items related to prosthodontic use, such as "remove and insert the overdenture" and "be adapted to the overdenture." On the other hand, the experienced burdens for "suture removal" were worse than expected. These comparative findings must be interpreted with caution because most of the items were scored as "not burdensome at all" to "somewhat burdensome", and the statistical differences may have low clinical relevance.

The findings of this study are consistent with others that assessed patients' perceived treatment burdens, with higher experienced burden scores for surgical (mainly the anesthesia procedure) and post-surgical stages than for pre-surgical and prosthetic stages[14,16,17]. Reissmann *et al.*[18] reported that the burdens experienced by patients during prosthetic procedures were slightly lower than those perceived during oral surgery procedures, such as implant placement, surgical tooth removal, or apicectomy[18]. This seems to be because surgical procedures are more invasive and result in temporary injuries to oral structures; therefore, they are often perceived by patients as painful and unpleasant[10,18,19].

Patients' tendency to overestimate the pain and unpleasantness of implant surgery and underestimate the post-surgical effects and morbidity of surgery has previously been reported[3]. However, these findings also showed an overestimation of the burdens associated with some prosthodontic procedures, which has not been reported in previous studies[3]. Despite these results, in a previous qualitative study, treatment with mandibular overdentures had better post-surgical perceptions, with patients reporting a generally painless healing period, prompt healing, and absence of major complications[4].

The quality of previous information may influence patients' expectations because in-depth information about implant procedures can increase anxiety levels regarding surgery, whereas poor quality information about post-surgical outcomes can leave patients unprepared for the severity of symptoms[3]. The decision to undergo dental implant treatment can be affected by the level of dental anxiety[20]. Therefore, the acceptance of dental implants by patients might be increased by providing more detailed and comprehensive counseling and information[21,22]. Assessment and subsequent management of patient expectations are important factors for obtaining greater patient satisfaction after the choice of treatment[23]. Furthermore, knowledge about burdens affects patients' decisions not only in accepting or refusing implant treatments but can also affect the decision to for example keep or remove an endodontically compromised tooth[18].

The quality of procedures as scored by the clinical operator also influenced the experienced burdens after treatment, irrespective of the number of implants inserted and the duration of surgery. This suggests that this burden is probably attributed more to events during treatment than to procedural complexity. Nevertheless, other studies have reported a positive correlation between the duration of procedures and the perception of discomfort[19] and experienced burdens of treatment[18].

Although the instrument used in this study has limitations due to the lack of confirmed external validity, we used a specially designed questionnaire to compare the expected and experienced burdens as well as the operator's perception of burdens. The experienced burden questionnaire was administered immediately after the end of each dental appointment to reduce patients' memory bias and ensure that they directly reported their perceptions[9]. In addition, no retest was performed, as this could impact the scoring[9,14]. As an additional measure to improve the consistency of the results, all surgical procedures were performed by the same operator as were all of the prosthodontic procedures in an effort to reduce the variability in clinical procedures, which may influence the patients' rating of perceived burdens[14].

Generalization of the results of this study should also be considered with caution because the experimental conditions of a randomized clinical trial may differ from those of a standard clinical setting. In addition, all treatments were provided at no financial cost to the participants, which may represent an additional burden for patients in daily clinical practice. Another limitation is that the sample size estimation was derived from the hypothesis of the primary study related to the comparative effectiveness of treatments with one or two implants. Therefore, as this study focused on a different outcome assessed alongside the clinical trial, no direct sample size calculation was performed, limiting the inferences from data analysis due to the risk of type II error in an underpowered study.

Finally, from a broader perspective, understanding psychological influences on intentions to attend dental appointments would help strengthen patient attendance motivation and foster appropriate dental service utilization, integrating behavioral, cognitive, and emotional aspects that influence patients' dental experiences[24]. Within this context, patients' perceived burdens are an important part of the picture and may influence their likelihood of accepting implant treatment. However, it may be considered within the context of people's emotional and practical responses to challenges in health and well-being and the responsiveness of the health system to their needs. Consideration of patients' perceived burdens is an important part of delivering patient-centered clinical care.

5. Conclusions

Treatment with mandibular implant-retained overdentures was associated with low levels of patients' perceived burdens related to the surgical and prosthodontic procedures and highly correlated with their expected burdens before treatment. However, patients tend to overestimate their expected burdens before treatment, especially for surgical procedures. The results of this study suggest that patients' expected burdens may be a relevant aspect of their attitudes towards implant treatment, potentially increasing the rates of refusal to receive implants due to fear of surgery. These aspects can be appropriately identified and managed during treatment planning to minimize their negative impact on patient adherence to treatment.

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Conflicts of interest statement

The authors declare no conflicts of interest concerning this study.

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