

# Oral Health-Related Quality of Life in Brazilian Patients Wearing Three Types of Lower Dentures: Psychosocial and Clinical Aspects

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## **Abstract**

*The purpose of this study was to evaluate the oral health-related Quality of Life (QoL) of patients with edentulous lower jaws rehabilitated with conventional or implant-supported dentures. In the quest for greater QoL, especially among the elderly, it is important to evaluate how the use of dentures impacts physical and emotional well-being. Brazilian health care policy makers should be informed of the advantages of rehabilitation with implant-supported dentures. A cohort of 78 edentulous seniors was divided into three groups of 26 according to denture type: Conventional (CD), Implant-Supported Overdenture (IOD) and Fixed-Implant Prosthesis (FIP). To evaluate QoL, clinical and sociodemographic information was collected and the OHIP-20 questionnaire was administered, using a 5-point frequency scale, including a “don’t know” option. Chewing and pronunciation were less impacted in FIP and IOD than in CD ( $p=0.013$  and  $p=0.027$ , respectively), while patients in the CD group reported more adaptation difficulties ( $p=0.006$ ) and more frequent avoidance of hard-to-chew foods ( $p=0.032$ ). The majority reported no interference of dentures with appearance and social life, regardless of denture type. Depending on the patient’s biological and financial circumstances, implant-supported dentures is the form of rehabilitation of edentulism providing the greatest improvement in QoL. The reported limitations and difficulties had no significant impact on satisfaction and QoL.*

## **Keywords**

*Quality of Life, complete lower denture, prostheses and implants, oral health*

## 1. Introduction

Over the past decades, populational aging has had profound implications for health care practices, especially in developing countries where social and economic inequalities remain strong. According to the IBGE, the Brazilian elderly population has been expanding for decades and is now proportionally the fastest growing segment, a trend which is likely to continue for decades. The number of seniors is expected to surpass that of children and adolescents by 2030 (Brasil, 2007).

The highest indices of total loss of teeth and adjacent bone tissue are observed in the elderly population (MacEntee, 2007). Thus, approximately 30% of the global population aged 65-74 years do not have natural teeth (WHO, 2012). Edentulism and poor oral health have a significant negative impact on the physical and psychological well-being of the elderly.

Although dental caries is the most prevalent oral health problem in Brazil (Brasil, 2010), the need among the elderly (65-74 years) for full dentures remained unabated between 2003 (24%) and 2010 (23%), with 3 million requiring full dentures in both arches and 4 million requiring full dentures in one of the arches (Dias, Maia, & Pereira, 2013).

From a more holistic perspective, oral health is an inalienable part of general health, essential to the well-being of persons and communities and a determining factor of Quality of Life (QoL). Self-perception of physical and emotional well-being is an important element in the planning, management and evaluation of therapy. In fact, rehabilitation with dentures should be regularly evaluated with regard to effectiveness and impact on self-perception of QoL (Redford et al., 1996). Self-evaluation of oral health is an effective way of assessing the overall oral health condition of the population (Yamane et al., 2016).

Many patients with complete lower dentures experience pain when chewing and poor stability and retention (Albrektsson, 1983), and chewing can be difficult to control with the masticatory muscles (Gahan & Walmsley, 2005). The use of implants is associated with lower rates of resorption of the lower anterior alveolar ridge, and masticatory efficiency is 20% higher than with complete Conventional Dentures (CD) (Rissin et al., 1978; Moura et al., 2016). Implant-Supported Overdenture (IOD) is the treatment of choice for completely edentulous patients due to its low cost compared to Fixed-Implant Prosthesis (FIP). As such, it should be made available by the public oral health care system to all edentulous patients who experience difficulties with CD (Feine et al., 2002; Awad, Rashid, & Feine, 2014).

The concept of QoL emerged in the wake of the economic growth following World War II. In Brazil, the expression has been in use since 1970. Our notions of QoL depend on local collective and individual values, customs and knowledge and are subject to change over time (Minayo, Hartz, & Buss, 2000). Oral health-related QoL is the subjective experience of how oral symptoms impact individual well-being (Yamane et al., 2016).

The use of validated questionnaires provides a scientific means of quantifying physical, emotional and psychological well-being and expressing it in terms of QoL (Pires, Ferraz, & Abreu, 2006). Clinical

indicators are important in surveying oral health and treatment needs, but have limitations and should be combined with psychosocial indicators to produce a more accurate and multidimensional picture of oral status (Locker & Miller, 1994). Studies probing individual perceptions of oral health are gaining attention due to their importance for self-care practices and direct effect on health-related QoL (Zucoloto et al., 2016).

Growing life expectancy, the popularization of dental implants and the quest for better QoL, especially among the elderly, have made it urgent to assess the level of satisfaction of patients rehabilitated with different types of dentures. Thus, the purpose of this study was to evaluate the oral health-related QoL of patients with edentulous lower jaws rehabilitated with CD, IOD or FIP.

## 2. Materials and Methods

The sample of this retrospective, cross-sectional study consisted of 78 patients with edentulous lower jaws divided into three groups according to type of denture: CD n=26, IOD n=26 and FIP n=26. Rehabilitation was performed more than 12 months previously at clinics of specialization courses in dental implants and prosthesis of the Brazilian Association of Odontology (ABO/Ceará). The study protocol was approved by the odontology research ethics committee of the São Leopoldo Mandic School of Dentistry (Campinas, São Paulo, Brazil) and filed under entry #1.006964. All participants gave their informed written consent.

Following the clinical examination, sociodemographic data and information on oral health and satisfaction were collected. The latter was based on a self-evaluation of oral health and subjective denture-related oral symptoms. To this end, the short-form oral health impact profile (OHIP-20) questionnaire (derived from the OHIP-49 questionnaire) was administered by a single examiner (Allen & Locker, 2002). The instrument features 7 domains (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, handicap) (Table 3). Each question was answered by checking one of five options (0=never, 1=seldom, 2=sometimes, 3=often, 4=always, 5=don't know).

### 2.1 Statistical Analysis

The collected data were managed with Microsoft Excel and analyzed with the software IBM SPSS v. 17.0 for Windows, at the 95% confidence interval.

Expressed as absolute frequencies and percentages, the results were submitted to Fisher's exact test or Pearson's chi-squared test. The sum of the scores on the OHIP-20 questionnaire was given as minimum, maximum and median. The scores and the plaque index (mean  $\pm$  standard deviation) were submitted to the Kruskal-Wallis test, followed by the Mann-Whitney post-test for non-parametric variables.

## 3. Results

### 3.1 Sample Description

In our sample of 78 patients the female sex was predominant (n=59, 75.6% vs. n=19, 24.4%),

especially among users of CD (n=24, 92.3%), compared to FIP (n=16, 61.5%) and IOD (n=19, 73.1%) ( $p=0.033$ ). Most patients were  $\leq 65$  years old (n=41, 52.6%). The sample was nearly half Caucasian (n=36, 46.2%) and half indigenous (n=39, 50.0%), with no significant difference between the three groups ( $p=0.069$  and  $p=0.169$ , respectively).

The level of schooling was significantly higher in the FIP group than in the other two groups ( $p<0.001$ ), while hygiene was significantly more satisfactory in the CD group ( $p=0.036$ ). The time of edentulism was significantly shorter in the FIP group ( $p=0.047$ ), but the groups did not differ with regard to time of denture use ( $p=0.215$ ).

The most commonly reported problems were non-denture-related (n=46, 59.0%). Patients in the CD group complained significantly more often of poor stability (n=6, 23.1%) and food retention (n=12, 46.2%) than patients in the FIP group (n=0, 0.0% and n=1, 3.8%, respectively) and the IOD group (n=4, 15.4% and n=1, 3.8%, respectively) ( $p<0.001$ ). Non-denture-related complaints were significantly more frequent in FIP (n=23, 88.5%) and IOD (n=18, 69.2%) ( $p<0.001$ ).

Most patients rated their dentures as very good (n=39, 50.0%) or good (n=25, 32.1%), with no significant difference between the groups ( $p=0.380$ ). Conventional dentures in the upper arch were most frequently observed in the CD group (n=25, 96.2%) and the IOD group (n=21, 80.8%). In contrast, patients in the FIP group had significantly more natural teeth in the upper arch (n=3, 11.5%) or removable dentures combined with natural teeth (n=3, 11.5%) ( $p=0.015$ ).

The plaque index was relatively high among users of implant-supported dentures, with no significant difference between FIP ( $73 \pm 34\%$ ) and IOD ( $70 \pm 36\%$ ) ( $p=0.525$ ) (Table 1).

**Table 1. Clinical and Sociodemographic Characteristics and Level of Satisfaction with Dentures in a Sample of 78 Edentulous Patients from Brazil, 2017**

|             |       | Group |       |       |                 |
|-------------|-------|-------|-------|-------|-----------------|
|             | Total | CD    | FIP   | IOD   | <i>p</i> -value |
| Sex         |       |       |       |       |                 |
| Male        | 19    | 2     | 10*   | 7*    | * <i>0.033</i>  |
|             | 24.4% | 7.7%  | 38.5% | 26.9% |                 |
| Female      | 59    | 24*   | 16    | 19    |                 |
|             | 75.6% | 92.3% | 61.5% | 73.1% |                 |
| Age         |       |       |       |       |                 |
| ≤65 years   | 41    | 9     | 17    | 15    | 0.069           |
|             | 52.6% | 34.6% | 65.4% | 57.7% |                 |
| >65 years   | 37    | 17    | 9     | 11    |                 |
|             | 47.4% | 65.4% | 34.6% | 42.3% |                 |
| Racial type |       |       |       |       |                 |
| Caucasian   | 36    | 10    | 9     | 17    | 0.169           |

|                     |       |       |       |       |                    |
|---------------------|-------|-------|-------|-------|--------------------|
|                     | 46.2% | 38.5% | 34.6% | 65.4% |                    |
| Afro-Brazilian      | 2     | 0     | 1     | 1     |                    |
|                     | 2.6%  | .0%   | 3.8%  | 3.8%  |                    |
| Indigenous          | 39    | 16    | 15    | 8     |                    |
|                     | 50.0% | 61.5% | 57.7% | 30.8% |                    |
| Asian               | 1     | 0     | 1     | 0     |                    |
|                     | 1.3%  | .0%   | 3.8%  | .0%   |                    |
| Level of schooling  |       |       |       |       |                    |
| Superior            | 18    | 0     | 11*   | 7     | * <b>&lt;0.001</b> |
|                     | 23.1% | .0%   | 42.3% | 26.9% |                    |
| High school         | 23    | 6     | 11*   | 6     |                    |
|                     | 29.5% | 23.1% | 42.3% | 23.1% |                    |
| Elementary          | 37    | 20*   | 4     | 13*   |                    |
|                     | 47.4% | 76.9% | 15.4% | 50.0% |                    |
| Hygiene             |       |       |       |       |                    |
| Excellent           | 1     | 1     | 0     | 0     | * <b>0.036</b>     |
|                     | 1.3%  | 3.8%  | .0%   | .0%   |                    |
| Satisfactory        | 27    | 15*   | 4     | 8     |                    |
|                     | 34.6% | 57.7% | 15.4% | 30.8% |                    |
| Fair                | 10    | 2     | 4     | 4     |                    |
|                     | 12.8% | 7.7%  | 15.4% | 15.4% |                    |
| Poor                | 40    | 8     | 18*   | 14*   |                    |
|                     | 51.3% | 30.8% | 69.2% | 53.8% |                    |
| Time of edentulism  |       |       |       |       |                    |
| ≤10 years           | 25    | 5     | 13*   | 7     | * <b>0.047</b>     |
|                     | 32.1% | 19.2% | 50.0% | 26.9% |                    |
| >10 years           | 53    | 21*   | 13    | 19*   |                    |
|                     | 67.9% | 80.8% | 50.0% | 73.1% |                    |
| Time of denture use |       |       |       |       |                    |
| ≤10 years           | 29    | 7     | 13    | 9     | 0.215              |
|                     | 37.2% | 26.9% | 50.0% | 34.6% |                    |
| >10 years           | 49    | 19    | 13    | 17    |                    |
|                     | 62.8% | 73.1% | 50.0% | 65.4% |                    |
| Upper arch          |       |       |       |       |                    |
| Natural teeth       | 6     | 1     | 3*    | 2     | * <b>0.015</b>     |
|                     | 7.7%  | 3.8%  | 11.5% | 7.7%  |                    |
| Removable denture + | 5     | 0     | 3*    | 2     |                    |
|                     |       |       |       |       |                    |

|                                  |       |       |       |       |                   |
|----------------------------------|-------|-------|-------|-------|-------------------|
| natural teeth                    | 6.4%  | .0%   | 11.5% | 7.7%  |                   |
| Complete CD                      | 60    | 25*   | 14    | 21*   |                   |
|                                  | 76.9% | 96.2% | 53.8% | 80.8% |                   |
| Implant-supported denture        | 7     | 0     | 6*    | 1     |                   |
|                                  | 9.0%  | .0%   | 23.1% | 3.8%  |                   |
| <b>Major complaint</b>           |       |       |       |       |                   |
| Appearance                       | 3     | 0     | 2     | 1     | <b>*&lt;0.001</b> |
|                                  | 3.8%  | .0%   | 7.7%  | 3.8%  |                   |
| Stability                        | 10    | 6*    | 0     | 4     |                   |
|                                  | 12.8% | 23.1% | .0%   | 15.4% |                   |
| Retention                        | 13    | 12*   | 0     | 1     |                   |
|                                  | 16.7% | 46.2% | .0%   | 3.8%  |                   |
| Chewing                          | 6     | 3     | 1     | 2     |                   |
|                                  | 7.7%  | 11.5% | 3.8%  | 7.7%  |                   |
| Other                            | 46    | 5     | 23*   | 18*   |                   |
|                                  | 59.0% | 19.2% | 88.5% | 69.2% |                   |
| <b>Satisfaction with denture</b> |       |       |       |       |                   |
| Excellent                        | 39    | 10    | 17    | 12    | <b>0.380</b>      |
|                                  | 50.0% | 38.5% | 65.4% | 46.2% |                   |
| Good                             | 25    | 9     | 7     | 9     |                   |
|                                  | 32.1% | 34.6% | 26.9% | 34.6% |                   |
| Fair                             | 8     | 3     | 2     | 3     |                   |
|                                  | 10.3% | 11.5% | 7.7%  | 11.5% |                   |
| Poor                             | 4     | 2     | 0     | 2     |                   |
|                                  | 5.1%  | 7.7%  | .0%   | 7.7%  |                   |
| Terrible                         | 2     | 2     | 0     | 0     |                   |
|                                  | 2.6%  | 7.7%  | .0%   | .0%   |                   |

Note. CD=conventional denture; IOD=implant-supported overdenture; FIP=fixed-implant prosthesis.

\*  $p < 0.05$ . Fisher's exact test or the chi-squared test.

### 3.2 QoL Scores and Satisfaction with Dentures

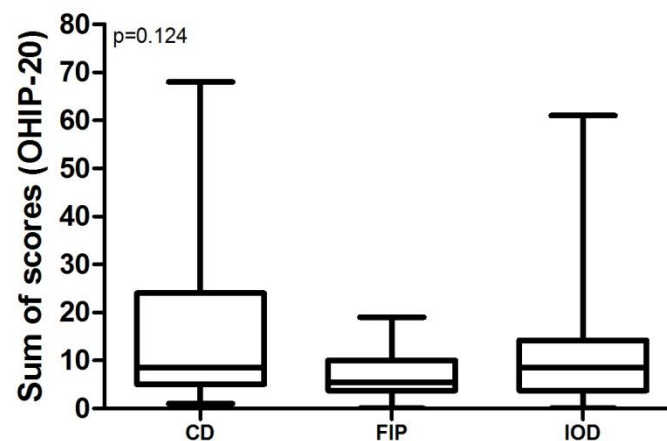
According to the patients' answers to the questionnaire (OHIP-20), chewing and pronunciation were less impacted in FIP and IOD than in CD ( $p=0.013$  and  $p=0.027$ , respectively). On the other hand, patients in the CD group reported more adaptation difficulties ( $p=0.006$ ) and more frequent avoidance of hard-to-chew foods ( $p=0.032$ ).

The groups did not differ significantly with regard to changes in appearance ( $p=0.723$ ) and digestion ( $p=0.449$ ), denture-related oral pain ( $p=0.580$ ), denture-related headache ( $p=0.496$ ) or ease of ingestion

( $p=0.066$ ).

Toothbrushing was less impacted in CD and IOD than in FIP ( $p=0.025$ ), but no significant differences were observed with regard to social well-being ( $p=0.317$ ), appearance of denture ( $p=0.218$ ), taste ( $p=0.054$ ), smiling ( $p=0.423$ ), sleep ( $p=0.625$ ), activities outside the home ( $p=0.263$ ), social life ( $p=0.246$ ), amusement ( $p=0.257$ ), working ability ( $p=0.534$ ) or denture maintenance ( $p=0.067$ ).

The sum of the scores obtained with the questionnaire ranged from 1 to 68 (CD), from 0 to 19 (FIP), and from 0 to 61 (IOD), with statistically similar median values (8.5, 5.5 and 8.5, respectively) ( $p=0.124$ ) (Figure 1).



**Figure 1. Sum of Scores of 78 Edentulous Patients Responding to the OHIP-20 Questionnaire. Brazil, 2017**

*Note.* CD=conventional dentures; FIP=fixed-implant prosthesis; IOD=implant-supported overdenture.

\* $p<0.05$ , Kruskal-Wallis test.

#### 4. Discussion

In a study evaluating the oral health-related QoL of college students, the total score on the OHIP-14 was positively associated with self-reported oral health, subjective symptoms and clinical condition, while poor oral health habits (inadequate food and toothbrushing) had a negative impact on oral health-related QoL (Yamane et al., 2016). In a study administering the OHIP-14 to adults, health-related QoL was severely impacted by poor oral health, age, pain and chronic disease (Zucoloto et al., 2016). As shown by the collected sociodemographic data, the choice of type of denture (conventional vs. implant-supported) was influenced by the level of schooling (a proxy for socioeconomic status), matching findings in the literature (Fontanive et al., 2013). Elevated cost, fear and lengthy treatment time may also be determining factors (Pennington & Parker, 2012). These results are supported by other studies (Walton & MacEntee, 2005; Awad, Rashid, & Feine, 2014). Nevertheless, despite the higher initial cost of implant-supported dentures in relation to CD, in the long run the former provide more health-related benefits and are more cost-effective, reducing health care

costs, especially in the elderly population (Vogel, Smith, & Valentine, 2013).

Our study identified oral hygiene as a particularly significant complaint among users of implant-supported dentures (toothbrushing was less impacted in CD;  $p=0.036$ ). The fact that the plaque index was high in both the FIP group ( $73\pm34\%$ ) and the IOD group ( $70\pm36\%$ ) highlights the importance of making patients aware of the role of oral hygiene in the maintenance of implant-supported dentures. The presence of plaque favors the emergence of mucositis which, if left untreated, can lead to peri-implantitis and bone loss (Santiago Junior et al., 2013).

Loss of teeth and time of denture use was >10 years for the majority of our cohort, the lowest percentage being that of the FIP group (50%). This suggests a tendency among patients with higher level of schooling and financial resources to choose implant-supported dentures. In a study evaluating factors associated with the choice of implant-supported dentures (with the exception of cost, since rehabilitation was free of charge), one third declined implant-supported dentures, while those who accepted it associated CD with poor appearance, pain and chewing difficulties (80%) (Walton & MacEntee, 2005). Others have suggested that patients replacing old conventional dentures with new ones, rather than getting implant-supported dentures, are likely to do so for financial reasons (Heydecke et al., 2003).

The concept of QoL varies over time, even within the same society, according to culture-specific needs and values, and the notion of well-being is highly dependent on socioeconomic status (Minayo, Hartz, & Buss, 2000). The fact that no association was found between the frequency of CD-related difficulties and the percentage of dissatisfaction with dentures may be explained by cultural factors and the history of edentulism in Brazil: not only is edentulism more prevalent in socioeconomically disadvantaged populations, but the impecunious also tend to be more accepting of inefficient rehabilitation (Machado et al., 2013). In addition, the impact of rehabilitation with implants varies across countries and populations; for example, in some cultures edentulism is not perceived as a social or occupational disadvantage (Awad, Rashid, & Feine, 2014).

Responses to the OHIP-20 questionnaire regarding functional limitations (chewing and pronunciation difficulties) were generally more negative in the CD group (50.0%) than in the other two groups (84.6%) ( $p=0.027$ ). On the other hand, responses regarding appearance and digestion were generally positive, regardless of denture type. Studies evaluating the impact on health-related QoL of the substitution of implant-supported dentures for CD show significant improvements in masticatory efficiency and QoL (Fueki et al., 2007; Farias Neto et al., 2012; Moura et al., 2016). Responses to the questionnaire employed in those studies (OHIP-EDENT) revealed a negative impact on some QoL aspects, especially physical pain, masticatory efficiency and functional limitation, matching our own findings.

The percentage of local pain caused by denture use was similar in the CD group and the IOD group ( $p=0.580$ ). Most patients in the FIP group (76.9%) reported never feeling pain, suggesting removable dentures are associated with pain during adaptation of the underlying mucosa. Our findings match



those of other researchers (Pocztaruk et al., 2009; Awad et al., 2014) who found the decision to change from CD to IOD to be motivated not only by the prospect of functional improvement but also by CD-related physical pain and the inconvenience of using adhesives (Zavanelli et al., 2010; Veronez et al., 2014).

The author of a recent study stressed that the prevalence of edentulism continues to rise worldwide, despite advances in dental implant technology (White, 2015). The McGill consensus statement on overdentures, which has helped foster an attitude in dentistry which takes advantage of this technology, indicates IOD as the rehabilitation of choice for patients with lower jaw edentulism (Feine et al., 2002). Our three groups did not differ significantly percentage-wise with regard to social disability, but denture maintenance was more frequent in the FIP group than in the IOD group and—especially—the CD group. This may be explained by socioeconomic factors and differences in level of schooling.

Responses regarding functional limitations and physical/psychological disabilities clearly show the advantages of implant-supported dentures over CD with regard to sense of taste, food chewability and—very importantly—smiling. However, it has been suggested that the choice of denture type depends on other factors (e.g., the patient's systemic condition, socioeconomic status and hygiene skills) and that therapists should evaluate patients' limitations before making a choice (Rivaldo et al., 2012).

Others have shown that prosthetic management in gerodontology is determined by factors such as patient cooperation, financial resources, health status and denture manufacturing techniques (Razak et al., 2014). More recently, the association between self-perception of oral health and physical/social conditions (especially chronic disease and personal relationships) was clearly illustrated in a study on elderly patients (Gomes, Pereira, & Abreu, 2017).

Our results stress the importance of developing comprehensive protocols of prosthetic rehabilitation for elderly patients capable of improving QoL, considering the current inefficiency of public geriatric oral health services, especially those attended by socioeconomically disadvantaged populations.

## 5. Conclusion

Depending on the patient's biological and financial circumstances, implant-supported dentures is the form of rehabilitation of edentulism providing the greatest improvement in QoL. The reported discomfort, functional limitations, hygiene difficulties and pain had no significant impact on satisfaction and QoL. Thus, more effort should be invested in consolidating current Brazilian public health care policies for rehabilitation with implant-supported dentures.

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