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Original Article

Impact of Tooth Loss on Quality of Life

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Abstract

Objective: To evaluate the impact of tooth loss on the quality of life of patients at the Cesmac University Center. **Material and Methods:** A cross-sectional study was performed, whose sample was composed of 224 volunteers from various health units of the selected health service with at least 12 years of age and one missing tooth. Quality of Life (QOL) was assessed using the Oral Health Impact Profile (OHIP -14) and tooth loss was assessed with the dental chart. A structured interview that assessed the socio-economic condition of the individual was also applied. For interpretation of the OHIP-14, values were assigned using the multiplicative method: 0-3 points = no impact; 3.01 to 6 points = low impact; 6.01 to 10 points = moderate impact; and> 10.01 points = high impact. All volunteers received guidance on oral health and, when necessary, a referral to the dental care provided by this institution was performed. **Results:** The mean OHIP ranged from no impact (30.9%) to high impact (27.8%). The correlation between the number of missing teeth and QOL scores was statistically significant ($p < 0.05$), as well as the correlation between number of missing teeth and age of volunteers ($p < 0.0001$). The dimensions of the OHIP-14 that showed the most influenced domains were pain, psychological discomfort, psychological disability. **Conclusion:** Increasing age has shown influence on tooth and tooth loss affected the QOL of volunteers. QOL may be influenced by other factors such as loss of anterior teeth and schooling.

Keywords: Quality of Life; Oral Health; Tooth loss.

Introduction

The World Health Organization (WHO) rejects the notion that health is merely the absence of physical disease or infirmities and considers the physical and psychological context and the social well-being of the individual [1]. This definition allows the statement that an individual, even without presenting any organic alteration, to be considered healthy, has to live with quality of life (QOL) [2]. WHO defines QOL as the individuals' perception of their position in life in the context of culture and some values in which they live in relation to their goals, expectations, living standards and concerns [3].

The expression Oral Health (OH) can be conceptualized as a set of biological and psychological conditions that enable the human being to perform functions like chewing, swallowing and speaking. The impossibility of performing one or more of these functions leads to a transient or permanent oral inability, whose degree, extent and evolution vary from individual to individual, according to time, clinical characteristics, therapeutic possibilities and social inclusion [4].

Progressive advances that occurred from the second half of the last century, which brought to health professionals not only the need for greater knowledge about the feelings and perceptions of patients about their health conditions, but also the need for measuring the impact of possible therapeutic interventions on their quality of life, were responsible, in part, by increasing concern with quality of life (QOL) in the health area [5,6].

Quality of life indicators are designed to measure health from a holistic approach, i.e., including psychological and sociological aspects that are expressed by subjective feelings [7]. Some indexes are used to evaluate OH-related quality of life such as OHIP-49 (Oral Health Impact Profile), the shorter version OHIP-14, the GOHAI (Geriatric Oral Health Assessment Index) and the OIDP (Oral Impact on Daily Performance) [8].

The OH indicator that has been described as the most negatively influencing QOL is tooth loss, which may be associated with advancing age. Therefore, it is important in any analysis of entire populations to consider both age and tooth loss. If one of these variables is not observed, it may result in incomplete assessment of OH-related QOL [9].

A study conducted at the Faculty of Dentistry, University of Santa Catarina, observed that chewing deficiency produces significant and negative impact on oral health-related quality of life and both poor quality of life and chewing deficiency are related with reduced number of natural teeth [10].

Despite the growing number of scientific articles focused on quality of life, how oral conditions affect the well-being of people is still relatively little known [7], since the prevalence of diseases, including, oral diseases are described in various populations, little is known about how these diseases and their symptoms affect the daily life of people and their quality of life [11]. Thus, the aim of this study was to evaluate the impact of tooth loss on the quality of life (QOL) of outpatients of various health courses at a higher education institution of Maceió, Brazil.

Material and Methods

A cross-sectional study was conducted with patients of a higher education institution of Maceió, Alagoas, Brazil, attended at Campus I – "Professor Eduardo Almeida" - Cesmac University Center, from March to September 2013. This study was approved by the Ethics Committee in Research and Teaching (COEPE) of CESMAC University Center under protocol number 1540/12.

The sample was not probabilistic by convenience composed of individuals of both sexes under treatment at the outpatient clinics of various health programs of the institution in the observation period, according to the sample from the spontaneous demand of the selected service. Overall, 261 subjects were interviewed and of these, 224 volunteers participated in the survey for meeting the inclusion criteria: to have at least 12 years of age and have at least one missing dental element.

The researchers were previously trained to answer possible questions from participants as to understand each answer choice such as never = no time; rarely = 1 time per year; sometimes = 2 to 3 times per month; repeatedly = 2 to 3 times per week; always = every day. A pilot test was conducted to verify the applicability of the instrument and to answer questions from respondents or even from the researcher.

Volunteers were recruited in the waiting room, through direct, subtle and individual approach, where the objectives and methodological steps of the research were exposed. Volunteers who agreed to participate signed the Informed Consent Form (ICF) and were referred to the dental clinic of the institution to perform clinical examination and the interview. Underage participants had the consent form signed by parents or guardians.

During the clinical examination, tooth loss was observed and this information was recorded on a dental chart. The presence or absence of third molars was not considered for this research. Data were collected from an individual record, which did not show participant's name, only the age of the volunteer, protocol number, and gender, and participants were asked to answer a structured interview containing 28 questions that constitute the study variables. Of the 28 questions, 8 evaluated schooling and financial profile; 20 evaluated the volunteer's perception regarding oral health, 6 questions related to oral health knowledge and 14 regarding the Oral Health Impact Profile instrument - short form (OHIP-14). Then, all participants received guidance on oral health and, when necessary, were referred to dental treatment provided by the institution.

A translated version of OHIP-14, validated and culturally adapted to Portuguese [12] was chosen. The OHIP-14 consists of 14 questions that assess seven dimensions: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability and incapacitation.

The OHIP scores range from 0 to 28 points: the range from 0 to 3 corresponds to no impact; 3.01 to 6 points corresponds to lower impact; 6.01 to 10 points corresponds to moderate impact and above 10.01 high impact. The multiplicative method was used to calculate the OHIP of each individual.

After collection, data obtained were stored in a spreadsheet (Microsoft Excel 2003® Redmond, WA, USA) as databases. The results were tabulated and frequencies of variables of each group were calculated and arranged in graphical and/or tabular forms. Tabulated data were processed by the Statistical Package for Social Sciences software (SPSS ©) (version 15.0 for Windows, SPSS Inc).

Sample normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) confirmed their non-normal distribution ($p < 0.05$). The correlation between numerical variables was assessed using Spearman correlation test at 5% significance level. The differences of the mean QOL score for variables loss of anterior teeth and dental prosthesis were evaluated using the Mann-Whitney-Wilcoxon test at 5% significance level. The same test was used to assess the statistical significance of the impact of OHIP-14 on QOL between genders. To measure the differences in the mean number of tooth losses among groups, the Kruskal-Wallis H test was used at 5% significance level.

Results

Regarding the distribution of participants according to gender, it was observed that 82.6% were females and 17.4% were males. The average age of volunteers was 43.35 years. It was also observed that 86.6% of participants lived in the capital of the state of Alagoas, 41.5% had incomplete primary education, that is, low schooling, 71% lived in their own homes and 44.2% received the minimum wage.

Regarding the use of dental prosthesis, 36.16% (81 volunteers) reported its use, and of these, 62% used removable partial denture (RPD), 26% complete denture (CD), 4.5% CD in one of the arches and RPD in the other; 2.5% prosthesis on implants (POI); 2.5% fixed partial denture (FPD) and 2.5% RPD in one arch and FPD on the other. Regarding the loss of anterior teeth, 54.5% reported loss of at least one anterior tooth element.

In assessing the impact of OHIP-14 on the quality of life (QOL) of volunteers in this sample, 30.9% had no impact, 20.7% had low impact, 20.6% had moderate impact and 27.8% had high impact, with no statistically significant difference between males and females ($p = 0.314$, Chi Square Mann Whitney test).

Statistically significant correlations were observed when the Spearman correlation test was applied between OHIP-14 scores and number of missing teeth ($p < 0.05$) and between number of missing teeth and age of volunteers ($p < 0.0001$) as shown in Figures 1 and 2.

When comparing the mean OHIP-14 score among groups of individuals with anterior and posterior tooth losses, the results showed that there was a greater negative impact on quality of life (QOL) of individuals who have lost at least one anterior tooth when compared to those who have lost only posterior teeth (Mann-Whitney-Wilcoxon test, $p < 0.009$) (Table 1).

Of the 224 participants, 143 did not use prosthesis and had mean QOL score = 7.95 ± 6.82 and 81 used prosthesis and had mean QOL score = 6.57 ± 5.85. Applying the Mann-Whitney-Wilcoxon test, there was no statistically significant difference between groups ($p = 0.282$). These

results suggest that, in this study, the use or not of dental prostheses has no significant impact on the QOL of individuals.

The QOL dimensions that were most affected by oral health status were pain, psychological discomfort and psychological disability. Dimensions physical disability and incapacitation had high rates of response never, not interfering in the OHIP-14 score.

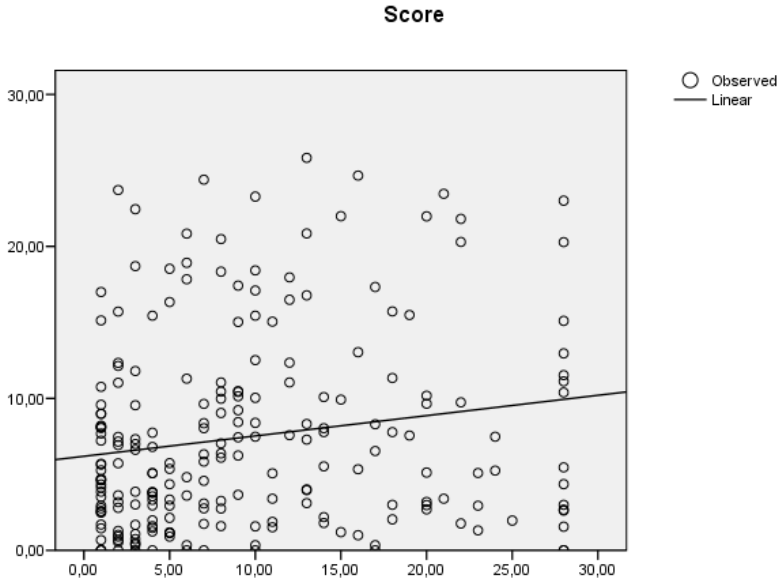

Figure 1. Correlation between OHIP-14 scores and number of missing teeth (p=0,012).

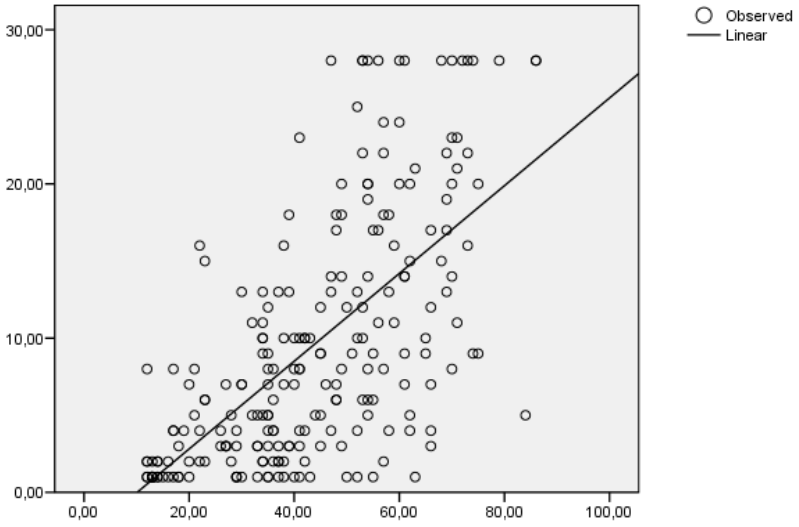

Figure 2. Correlation between number of missing teeth and age of volunteers (p<0,0001).

Table 2 presents the average number of tooth losses according to the schooling of participants. The illiterate group had average number of losses significantly higher than the other groups ($p < 0.05$). Statistically significant difference was observed between average number of

missing teeth of people with incomplete primary education compared to those with high school and individuals with complete primary education and incomplete higher education.

Table 1. Average OHIP-14 scores of groups of individuals with loss of anterior teeth and loss of posterior teeth.

Loss of anterior teeth	Number	Mean QOL score	Standard deviation	p-value
No	102	6.28	5.85	0.009*
Yes	122	8.43	6.70	

*Statistically significant (Mann-Whitney-Wilcoxon test, p <0.05).

Table 2. Average number of missing teeth according to volunteers' schooling.

Schooling	Number	Mean tooth losses ± Standard Deviation	Confidence interval
Illiterate	17	18.76 ± 8.15*	14.57 – 22.95
Incomplete primary education	95	10.03 ± 8.33	8.31 – 11.74
Complete primary education	8	10.62 ± 7.53	4.32 – 16.92
Incomplete high school	31	7.32 ± 5.54	5.29 – 9.35
Complete high school	44	6. 81 ± 5.87	5.03 – 8.60
Incomplete higher education	9	5.77 ± 6.86	0.49 – 11.05
Complete higher education	22	9.22 ± 8.78	5.33 – 13.12
Total	224	9.45 ± 8.02	8.40 – 10.51

* Statistically different from other groups at p <0.05 (Kruskal-Wallis H test). Values connected by brackets show statistically significant difference at p <0.05 (Kruskal-Wallis H test).

Discussion

In this study, the OHIP-14 instrument, which is a short version of OHIP-49, was used to measure the impact of tooth loss on QOL. The OHIP-14 is an accurate, reliable, and valid instrument for assessing oral health-related quality of life [7]. This instrument was originally designed to be applied in the form of a questionnaire, but due to population characteristics of the various countries in which it has been validated, nothing prevents it from being applied in the form of interview [13] as was used in this research. One study compared the forms of OHIP-14 application (questionnaire and interview) and reported that there were no differences in total scores and in each domain according to the form of application [13]. The highest compliance values were found in the interview format and the total scores were not influenced by the application method. However, use of OHIP-14 in the form of questionnaire can result in lower completion rates and data loss because not all questions have been answered, since there is no interaction between volunteer and researcher [13].

As in this study, other studies had among volunteers a greater number of female participants [14,15], with low schooling [10,13] and low income [10]. Although female participants had higher QOL score (7.74) compared to males (6.09), the difference of impact on QOL between genders was not statistically significant (Mann-Whitney-Wilcoxon test, p = 0.304). Other studies have shown that women perceive their oral health as having greater impact on quality of life than men [16,17].

This study found a positive correlation between OHIP-14 scores and number of missing teeth ($p < 0.05$) and number of missing teeth and age of volunteers ($p < 0.0001$). In line with these results, another study found a positive correlation between number of missing teeth and age ($p < 0.001$) [10].

Similarly, other authors showed negative correlation between number of natural teeth and the total OHIP-14 scores (Spearman correlation coefficient-0.26, $p = 0.001$), and this is interpreted as presence of fewer natural teeth, the higher the OHIP-14 score, that is, worse QOL [10]. In another study, the authors also found that with increasing age there was an increase in tooth loss with consequent increase in QOL scores [18]. Tooth loss is one of the most influential OH indicators that negatively influence QOL and is related to aging [16]. Variables age and tooth loss are correlated, but have an independent effect on the OH-related quality of life [19].

Given the aesthetic importance of the smile, since change in facial aesthetics interferes with self-esteem and interpersonal relationships causing inhibition and/or embarrassment [20], correlation analysis was performed between loss of anterior teeth and OHIP-14 score and a statistically significant result was observed ($p < 0.0001$), which showed greater negative impact on quality of life (QOL) of individuals who have lost at least one anterior tooth when compared to those who have only lost posterior teeth. This result can be corroborated by studies that applied OHIP-14 before and after the completion of anterior implants, which observed a significant decrease in the instrument's score, thus improving the individual's quality of life after treatment with implants in the anterior region of the jaw [19].

During the validation of the OHIP-14 in Spain, the authors noted that from the clinical point of view, the presence of dental caries in need of extraction or endodontic treatment were the main factors that affected the OH- related QOL by being conditions generally related to pain; they also noted that the location of these teeth in visible areas of the mouth (anterior) showed significant association with increased impact on QOL ($p < 0.01$) [7], which findings are in agreement with the present work.

Also corroborating the present study, another study found that the replacement of missing teeth by individual dental implants in anterior areas and pre-molars can greatly improve the oral health perception especially among women [21].

In literature, there are studies in which the treatment of edentulism with traditional denture can often adversely affect the masticatory function due to limited retention and stability, in particular in the jaw, thus affecting the quality of life of patients [22,23].

Other studies have shown that individuals who use dentures may have lower quality of life because these prostheses are not well adapted or cause pain and when they are replaced with implant-supported prostheses, their quality of life greatly increased [24,25]. In a study with edentulous Spanish patients [7], an improvement in OHIP score was found after conventional prosthetic treatment, however, 6.5% of the study sample complained about the retention of dentures and the discomfort caused by them. Another study with older adults in Lebanon reported that

edentulous participants with upper and lower dentures had less impact on OH-related QOL compared with edentulous patients without prosthesis or with a single prosthesis [26].

Regarding the use or not of prosthesis, the results of this study showed that there is a tendency to reduce the impact on QOL among users; however, not statistically significant. This result can probably be explained by the fact that the majority of volunteers used RPD or CD.

The domains that most affected the QOL of volunteers in this study were pain, psychological discomfort and psychological disability. This result corroborates with several works that have made this type of analysis, and domains pain and psychological discomfort were present in works found in literature [7,9,10,27].

In this study, illiterate volunteers had high tooth loss and statistically significant when compared with the other groups, except for the group that had complete elementary school. This fact possibly occurred due to the confidence interval value of this group of volunteers with complete primary education. However, a numerical difference was observed between mean tooth loss between the group of illiterates [18,76] and the group of volunteers who had completed elementary education [10, 62]. The higher mean tooth loss in volunteers with higher education can be justified by the fact that of the 22 individuals with this education, 10 had more than 60 years, i.e., age increased the mean tooth loss.

These results suggest the reverse influence of schooling with tooth loss and consequently to OH-related QOL and corroborate studies that also reported the influence of schooling on the QOL of individuals [28,29]. In contrast, a study measured the impact of loss of upper anterior teeth on the QOL of 50 patients partially edentulous of their anterior teeth and found no relationship between number of missing teeth and schooling [30].

Conclusion

Among the volunteers of this study, increasing age and low educational level were associated with increased number of missing teeth. These, in turn, had a negative impact on OH-related quality of life, especially when losses involved anterior teeth, which can be evidenced by the increased OHIP-14 scores. The most affected domains were pain, psychological discomfort and psychological disability.

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