Effect of severity of periodontitis on oral health-related quality of life

Efecto de la severidad de la periodontitis en la calidad de vida relacionada con la salud bucal

Efeito da gravidade da periodontite na qualidade de vida relacionada à saúde bucal

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Resumen

Objective: To determine the effect of the severity of periodontitis on quality of life related to oral health.

Methods: Cross-sectional study that recruited a sample of 229 adults with mild, moderate and severe periodontitis. Quality of life was measured with the Oral Health Impact Profile (OHIP-14).

Results: Subjects with moderate periodontitis were found to have worse OHRQoL (40.2%) compared to those with mild (31.8%) and severe (28%) periodontitis. Statistically significant differences were found between the groups regarding functional limitation (p=0.004), physical pain (p=0.004), physical disability (p=0.015), psychological disability (p=0.01) and social disability (p= 0.004).

Conclusions: the psychological disability and psychological distress dimensions were similarly affected regardless of periodontal status. In subjects with severe periodontitis there was greater involvement in functional limitation and physical disability.

Keywords: quality of life, periodontal diseases, public health, epidemiology.

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Resumen

Objetivo: Determinar el efecto de la severidad de la periodontitis en la calidad de vida relacionada con la salud bucal.

Métodos: Estudio transversal que reclutó una muestra de 229 adultos con periodontitis leve, moderada y severa. La calidad de vida se midió con el Perfil de Impacto en la Salud Oral (OHIP-14).

Resultados: Se encontró que los sujetos con periodontitis moderada tenían peor OHRQoL (40,2 %) en comparación con aquellos con periodontitis leve (31,8 %) y grave (28 %). Se encontraron diferencias estadísticamente significativas entre los grupos en cuanto a limitación funcional (p=0,004), dolor físico (p=0,004), incapacidad física (p=0,015), incapacidad psicológica (p=0,01) e incapacidad social (p= 0,004).

Conclusiones: las dimensiones discapacidad psicológica y malestar psicológico se vieron afectadas de manera similar independientemente del estado periodontal. En sujetos con periodontitis severa hubo mayor afectación en limitación funcional e incapacidad física.

Palabras clave: Calidad de vida, Enfermedades periodontales, Salud pública, Epidemiología.

Resumo

Objetivo: Determinar o efeito da gravidade da periodontite na qualidade de vida relacionada à saúde bucal.

Métodos: Estudo transversal que recrutou uma amostra de 229 adultos com periodontite leve, moderada e grave. A qualidade de vida foi medida com o Oral Health Impact Profile (OHIP-14).

Resultados: Indivíduos com periodontite moderada apresentaram pior QVRSO (40,2%) em comparação com aqueles com periodontite leve (31,8%) e grave (28%). Foram encontradas diferenças estatisticamente significativas entre os grupos quanto à limitação funcional (p=0,004), dor física (p=0,004), incapacidade física (p=0,015), incapacidade psicológica (p=0,01) e incapacidade social (p= 0,004).

Conclusões: as dimensões deficiência psicológica e sofrimento psíquico foram afetadas de forma semelhante, independentemente do estado periodontal. Nos indivíduos com periodontite severa houve maior envolvimento na limitação funcional e incapacidade física.

Palavras-chave: Qualidade de vida, Doenças periodontais, Saúde pública, Epidemiologia.

Introducción

Periodontal disease is a condition that can compromise daily wellbeing physically and psychosocially and which negatively affects people's quality of life.[1]

In addition, its progression has been linked to factors such as low income and receiving care under state-funded dental care schemes.[2] This suggests that the impact on oral health-related quality of life (OHRQoL) is more significant for people who have difficulty affording periodontal treatment and receive state-funded dental care.[3,4]

Therefore, it is essential to understand the dynamics of the influence of periodontitis and its physical and psychosocial consequences in the Colombian state-funded scheme to properly manage the need and timeliness of treatment to prevent the progression of discomfort and thus the impact on quality of life.

We examined the results of the fourth National Oral Health Study (ENSAB IV) conducted in Colombia in 2014 and found that over half of Colombians have periodontitis and that moderate periodontitis is the most common variant.[5] Regarding prevalence, 61.8% of the entire population had some degree of periodontitis. Moderate periodontitis was the most frequent variant, impacting 43.46% of those affected. Advanced

periodontitis was observed in 10.62% of cases, while mild periodontitis was found in 7.72% of Colombians with periodontitis.

Previous studies have shown that periodontitis harms OHRQoL,[6,7] where self-perception and self-confidence are frequently affected. This is reflected in the deterioration of people's wellbeing in two main dimensions: physical and psychological distress. This creates insecurity, low self-esteem, and social interaction difficulties.[8]

Similarly, individuals with periodontitis tend to express a negative perception of their oral health status and poorer quality of life than healthy individuals.[9] Additionally, there are factors other than the connection between the disease and poorer OHRQoL, since individuals with advanced forms of periodontitis show higher levels of impairment in their quality of life.[10,11]

Consequently, this study aims to determine the impact of periodontitis severity on OHRQoL based on the OHIP-14 dimensions in a sample of patients treated at the subsidized care scheme provided by the General System of Health Social Security (SGSSS) in Santa Marta, Colombia.

Materials and methods

Participants and data collection

All the participants from the population who agreed to participate were included with the survey-like convenience sampling method. A total of 229 individuals covered by the SGSSS were selected from the dental practice of a state-funded health institution to make up the sample of this crosssectional, observational, quantitative study. People over 18 diagnosed with periodontitis with 18 or more natural teeth in the mouth were included. Patients under active specialized periodontal treatment or who had completed treatment in the last six months were excluded from the study, as were people with aggressive periodontitis, pregnant women, and individuals with psychiatric and/or cognitive conditions that prevented them from completing the questionnaire autonomously.

Measures

The clinical examination to determine the severity of periodontitis was conducted in 2017. Severity was determined following Eke's definition of severity for research purposes.[12] Mild periodontitis: attachment loss ≥3 mm in 2 interproximal sites or ≥5 mm probing depth in interproximal sites (on same tooth). Moderate periodontitis: 2 or more interproximal sites with attachment loss ≥4 mm, or ≥5mm periodontal pocket in more than two interproximal sites (not on the same tooth) Severe periodontitis: >2 interproximal sites with attachment loss ≥6 mm, or ≥5mm periodontal pocket in more than two interproximal sites.[12] After the clinical examination, participants were asked to complete a questionnaire including demographic, socioeconomic, health status, lifestyle, and dental care variables.

OHRQoL was measured with the Oral Health Impact Profile (OHIP-14). This scale includes 14 questions with responses on a Likert-type impact frequency scale over a three-month time period, where "always" = 4, "often" = 3, "sometimes" = 2, "rarely" = 1, and "never" = 0, to assess functional, social, and psychological outcomes of oral conditions. These questions encompass seven dimensions: functional limitation (FL), physical pain (PhP), psychological distress (PsyD), physical disability (PhDis), psychological disability (PsyDis), social disability (SD), and handicap (H). The final OHIP-14 scores are calculated by adding up the codes of the 14 responses. Therefore, the total scale score can range from 0 to 56, where higher values indicate a worse OHRQoL. The simple summation method was used to dichotomize responses and suggest that study participants had at least moderately experienced negative OHRQoL impairment: "never" and "rarely" indicated better quality of life, while "sometimes," "often" and "always" responses were grouped as a worse quality of life.[13,14]

Sociodemographic characteristics and OHRQoL were analyzed with descriptive statistics by calculating the mean and standard deviation of

the responses and the percentages of impact on OHRQoL in the participants. A bivariate analysis was performed using the Chi^2 test, and a $p<0.05$ significance level was determined. The Kruskal-Wallis multiple comparisons test with Dunn-Bonferroni posthoc correction was used to analyze differences between OHIP-14 total and dimension scores according to periodontitis severity. A significance level of $p<0.05$ was determined.

All data were stored and analyzed with SPSS Statistics 25.

Ethical consideration

This research was endorsed by the Institutional Ethics Committee for Research on Humans of Universidad CES (code 510) in the 87th session of 2015 and renewed in the 123rd session of 2018.

Results

Regarding age, of the total sample (n=229), 70.30% were aged between 18 and 44, of whom 39.70% had moderate periodontitis. In turn, the majority of the sample was female (79.90%), and 20.10% was male (20.10%). Regarding the place of residence, similarities were found between the percentage distribution of urban (49.30%) and rural areas (50.7%). Furthermore, 76% of the participants belonged to socioeconomic level 1, followed by level 2, with 14.4% of participants. The study groups presented significant statistical differences in age ($p<0.001$) and area of residence ($p<0.001$) (Table 1).

Table 1: Percentage distribution of sociodemographic characteristics of the sample according to the severity of periodontal disease

Variable	Severidad de la enfermedad periodontal			Total	Chi^2	p-value
	Mild–n (%)	Moderate–n (%)	Severe–n (%)			
Age					22,56	<0,001*
18 to 44	47 (20,5%)	91 (39,70%)	23 (10%)	161(70,30%)		
45 to 65	8 (3,50%)	31 (13,50%)	27 (11,80%)	66 (28,80%)		
over 65	0 (0%)	1 (0,40%)	1 (0,40%)	2 (0,90%)		
Sex					2,218	0,33
Male	10 (4,40%)	22 (9,60%)	14 (6,10%)	46 (20,10%)		
Female	45(19,70%)	101(44,10%)	37(16,20%)	183(79,90%)		
Area of residence					20,028	p<0,001*
Urban	16(7%)	60(26,2%)	37(16,2%)	113(49,30%)		
Rural	39(17%)	63(27,5%)	14(6,1%)	116(50,7%)		
Educational level					7,5	0,484
No education	3(1,3%)	3(1,3%)	2(0,9%)	8(3,5%)		
Primary	16(7%)	41(17,9%)	22(9,6%)	79(34,5%)		
Secondary	20(8,7%)	48(21%)	21(9,2%)	89(38,9%)		
Technician or Technologist	13(5,7%)	26(11,4%)	6(2,6%)	45(19,7%)		
University	3(1,3%)	5(2,2%)	0(0%)	8(3,5%)		
Occupation					15,014	0,059
Unemployed	16(7%)	27(11,8%)	8(3,5%)	51(22,3%)		
Employed	7(3,10%)	18(7,9%)	4(1,7%)	29(12,7%)		
Homemaker	20(8,7%)	50(21,8%)	20(8,7%)	90(39,3%)		
Freelance worker	7(3,10%)	25(10,9%)	18(7,9%)	50(21,8%)		
Student	5(2,2%)	3(1,3%)	1(0,4%)	9(3,9%)		
Socioeconomic status					4,74	0,08
Level 0	0(0%)	1(0,4%)	1(0,4%)	2(0,9%)		

Level 1	44(19,2%)	94(41%)	36(15,7%)	174(76%)		
Level 2	6(2,6%)	18(7,9%)	9(3,9%)	33(14,4%)		
Level 3	4(1,70%)	8(3,5%)	5(2,2%)	17(7,4%)		
Level 4	1(0,4%)	1(0,4%)	0(0%)	2(0,9%)		
Level 5	0(0%)	1(0,4%)	0(0%)	1(0,4%)		
Systemic disease					9,642	0,291
Diabetes	1(0,4%)	2(0,9%)	2(0,9%)	5(2,2%)		
Hypertension	4(1,7%)	9(3,9%)	9(3,9%)	22(9,6%)		
Kidney disease	1(0,4%)	0(0%)	0(0%)	1(0,4%)		
Others	3(1,3%)	8(3,5%)	4(1,70%)	15(6,6%)		
None reported	46(20,1%)	104(45,4%)	36(15,7%)	186(81,2%)		
Most recent dentist appointment					10,248	0,594
One week ago	8(3,5%)	7(3,1%)	4(1,7%)	19(8,3%)		
One month ago	6(2,6%)	18(7,9%)	3(1,3%)	27(11,8%)		
Three months ago	10(4,4%)	15(6,6%)	6(2,6%)	31(13,5%)		
Six months ago	3(1,3%)	14(6,1%)	6(2,6%)	23(10%)		
One year ago	10(4,4%)	22(9,6%)	11(4,8%)	43(18,8%)		
Over one year ago	18(7,9%)	45(19,7%)	20(8,7%)	83(36,2%)		
Never	0(0%)	2(0,9%)	1(0,4%)	3(1,3%)		

*Statistically significant differences between groups (p< 0.05).

Caries occurred 11% more frequently in people with moderate periodontitis than severe periodontitis and almost 6% more often in those with mild periodontitis. The study groups showed differences in the presence of caries (Table 2).

Table 2: Percentage distribution of oral health characteristics and habits of the participants according to the severity of periodontal disease.

Variable	**Severity of periodontal disease**			**Total**	**Statistical Chi²**	**p-value**
	Mild – n (%)	**Moderate – n (%)**	**Severe – n (%)**			
Caries					6,422	0,04*
Yes	25(10,9%)	37(16,2%)	12(5,2%)	74(32,3%)		
No	30(13,1%)	86(37,6%)	39(17%)	155(67,7%)		
Prothesis					1,593	0,451
Yes	2(0,9%)	9(3,9%)	5(2,2%)	16(7%)		
No	53(23,1%)	114(49,8%)	46(20,1%)	213(93%)		
Tobacco use					3,125	0,21
Yes	2(0,9%)	10(4,4%)	1(0,4%)	13(5,7%)		
No	53(23,1%)	113(49,3%)	50(21,8%)	216(94,3%)		
Alcohol consumption					11,919	0,155
Does not drink	53(23,1%)	110(48%)	45(19,7%)	208(90,8%)		
One glass per week	0(0%)	10(4,4%)	4(1,7%)	14(6,1%)		
> one glass per week	2(0,9%)	0(0%)	2(0,9%)	4(1,7%)		
> one glass per day	1(0,4%)	2(0,9%)	1(0,4%)	4(1,7%)		

*Statistically significant differences between groups (p< 0.05).

The overall impact on OHRQoL according to the severity of periodontitis showed a percentage of 31.8% for worse quality of life in individuals diagnosed with mild periodontitis. Additionally, 40.2% of participants with moderate periodontitis reported a poorer quality of life, and 28% of participants with severe periodontitis had a worse quality of life (Table 3).

Table 3: Overall impact on OHRQoL according to the severity of periodontitis.

Overall impact on OHRQoL	Severity of periodontitis		
	Mild	Moderate	Severe
Better oral health-related quality of life	21(17.2%)	80(65.6%)	21(17.2%)
Poorer oral health-related quality of life	34(31.8%)	43(40.2%)	30(28%)

Table 4 shows the significant differences ($p<0.05$) observed in five of the seven dimensions and the total score between the OHIP-14 scores according to the severity of periodontitis and the overall contrast. However, the mild and severe severity values were similar when comparing mean scores. This shows that the impact on functional limitation is more significant in severe periodontitis. Furthermore, PhP and PsyD values in the mild severity cases were more seriously affected. The PhDis domain also showed slightly higher values in the severe periodontitis group. Additionally, the PsyDis values of the mild and severe periodontitis groups were the same, and the SD results were similar in the mild and severe groups. Finally, the handicap scores had equal values in the mean of the groups with moderate and severe periodontitis. The mild periodontitis group stood out with the highest perception of handicap. (Table 4)

Table 4: Comparison of OHIP-14 total and dimension scores by severity of periodontitis.

OHIP-14	Periodontal severity			p-value
	Mild–mean (SD)	Moderate–mean (SD)	Severe–mean (SD)	
Total	15,4 (7,5)	11,6 (6,7)	15,2 (7,1)	0.001*
Functional limitation	1,2(1,4)	0,7(1,1)	1,5(1,6)	0.004*
Physical pain	3(1,5)	2,2(1,6)	2,7(1,4)	0.004*
Psychological distress	4,7(1,09)	4,5(1,2)	4,5(1,3)	0.6
Physical disability	2.5(1,8)	1.8(2,07)	2,7(2,06)	0.015*
Psychological disability	1,9(1,8)	1,2(1,5)	1,9(1,7)	0.01*
Social disability	1,3(1,6)	0,6(1,3)	1,2(1,6)	0.004*
Handicap	0.5(1,1)	0.3(0,8)		

*Differences between groups using the Kruskal-Wallis test

The posthoc analysis with the Dunn-Bonferroni test showed statistically significant differences between the moderate–mild (p=0.004) and moderate–severe (p=0.006) groups when comparing total scale scores. The comparison between the moderate and severe periodontitis groups yielded significant differences in FL (p=0.007); PhDis (p=0.03); and PsyDis (p=0.03). There were also significant differences in PhP between the moderate and mild samples (p=0.005) and in SD (p=0.011). (Table 5)

Table 5: Differences between OHIP-14 scores by periodontitis severity groups using the Dunn-Bonferroni posthoc test.

Severity of periodontitis	Domain					
	Total	**FL**	**PhP**	**IF**	**PsyDis**	**SD**
	(p-value)	(p-value)	(p-value)	(p-value)	(p-value)	(p-value)
Moderate–Severe	0,006**	0,007**	0,162	0,03*	0,03*	0,059
Moderade–Mild	0,004**	0,1	0,005**	0,09	0,055	0,011*
Mild–Severe	0,99	0,99	0,993	0,99	0,99	0,994

Significant differences between OHIP-14 scores of periodontitis categories at p<0.05*; p<0.01**.

Discussión

There is increasing interest in studying quality of life, which is considered by the academic and clinical community as a valid and vital indicator for scientific practice, public health policies, and healthcare provision. Consequently, the use and usefulness of health measurement scales as tools to assess the effects of diseases and the effectiveness of treatments on collective and individual health perception and wellbeing have also increased.

In Colombia, these studies are of great public health importance as they provide a focused view of the needs and priorities of health services. We must also consider the limited public resources allocated to health.

Regarding socioeconomic and demographic characteristics, it is interesting to see that over 35% of individuals reported having last seen a dentist over one year before. This is consistent with previous reports.[9,15] Additionally, the individuals in this sample attend oral care appointments irregularly. Cultural, social, and educational components may explain this low attendance and use of oral health services since the highest percentage of individuals who perceived they had a poorer quality of life were those with moderate periodontitis, and they were treated under the subsidized care scheme (90.4%) and had a low socioeconomic level (Levels 1 and 2).[9,16]

However, the fact that approximately 46% of participants considered their OHRQoL significantly impacted regardless of the degree of severity can be attributed to periodontitis care in Colombia, as the Obligatory Health Plan (POS) does not cover treatment for this condition. Given the above, limited access to specialized periodontal care could be considered a handicap.

This study shows that participants with moderate periodontitis had a worse overall OHRQoL. This may be explained by the fact that this group mostly comprised women aged 18-44. This population group is the one that shows the most interest in seeking health care.

Needleman et al.[6] evaluated OHRQoL in patients with periodontitis referred from a private periodontal practice. They found a significant impact on their OHRQoL. In this sense, the results of this study are consistent with this and other previous international studies,[11,17,18] indicating a clear association between periodontitis and OHRQoL due to the impairment of oral functions.

In this study, the severity of periodontitis was significantly associated with OHRQoL. Participants with mild periodontitis had the highest mean OHIP-14 total score, although the difference in mean total scores for the severe (15.2 ± 7.1) and mild (15.4 ± 7.5) groups was not substantially greater. In addition, the highest frequency for the highest degree of impact on OHRQoL appeared in the severe periodontitis group (40.2%). In contrast, Ng & Leung[9] found that individuals with severe periodontitis scored significantly higher as they perceived more significant OHRQoL

impact using the OHIP-14.

Assessing the scores for each OHIP-14 domain showed that periodontitis severity was positively associated with five out of seven OHRQoL dimensions. Consistent with Jansson et al.,[17] this study found that patients with severe periodontitis had comparatively higher scores than those with mild and moderate severity on the dimensions of functional limitation and physical disability. The lowest scores were found on social disability and handicap.

Masood et al.[1] noted that physical disability was most affected in individuals with severe periodontitis, which is consistent with the findings of this study in terms of the score in this domain. Moreover, previous studies (Habashneh et al.,[19] Borges et al.,[20] Jansson et al.,[17] and Palma et al.[18] mention that physical pain, functional limitation, and psychological distress are the OHIP-14 dimensions most associated with periodontal disease. Conversely, our results show that psychological distress was not related to the severity of periodontitis.

The fact that physical pain was the most affected domain could be linked to a low number of dental appointments, given that the most common reason for consultation is pain relief. Therefore, it was mostly possible to detect more problems in this oral health aspect as over 30% had dental caries in addition to periodontitis.

Severe periodontitis also had a considerable impact on physical disability, psychological disability, and social disability. This may indicate that the severity of periodontitis can significantly affect the overall wellbeing of individuals, given its potential for functional limitations and adverse effects on social relationships.[9]

These studies can be helpful for health policymakers, as their results point to the need to develop and implement a timely intervention method for periodontitis sufferers as they perceive a decline in their oral health status and also more significant limitations in their physical, psychological, and social functions.

Conclusions

Participants were similarly affected regardless of periodontal disease severity on the psychological disability and psychological distress dimensions. Additionally, subjects with severe periodontitis were more affected regarding functional limitation and physical disability. Finally, oral health-related quality of life is not only affected by periodontal disease but also by its severity.

Place where the research was conducted: Empresa Social del Estado (E.S.E) Alejandro Próspero Reverend, Address: a 24-289, Av. El Libertador ##24147, Santa Marta, Colombia.

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Authorship contribution

1. Conception and design of study
2. Acquisition of data
3. Data analysis
4. Discussion of results
5. Drafting of the manuscript
6. Approval of the final version of the manuscript

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