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Periodontal Status and Quality of Life in Individuals with Diabetes visiting the Dental Department of a Tertiary Care Centre

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ABSTRACT

Introduction: Diabetes mellitus significantly impacts periodontal disease, in turn, periodontitis negatively affects glycaemic control and the course of diabetes. Well controlled diabetes and good periodontal maintenance is believed to enhance a person's quality of life.

Objective: To assess the periodontal status and quality of life among diabetic individuals visiting Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, Nepal.

Methods: Total of 132 patients diagnosed with diabetes were recruited from the hospital OPD following a convenience sampling method. Periodontal status using CPI and LOA index and oral health related quality of life using OHIP-14 were assessed. Data collected were analysed in SPSS version 20. Mann-Whitney U test and Kruskal-Wallis H tests were used to compare OHIP-14 scores between gender and periodontal status, respectively. Statistical significance was established at $p < 0.05$.

Results: Most of the participants (81, 61.4%), had pocket depth of 4-6 mm with a CPI score of 3. Similarly, the majority (49, 37.1%), had a loss of attachment of 4-5mm with a LOA score of 1. There was no significant difference in median OHIP-14 scores between males and females ($p = 0.960$). The OHIP scores among participants with the highest CPI and LOA had a statistically significant difference ($p = 0.001$ and $p < 0.001$, respectively).

Conclusions: Uncontrolled diabetes with poor periodontal condition significantly impacted a person's oral health related quality of life. To improve quality of life, appropriate periodontal care along with glycaemic control is necessary.

Keywords: Diabetes; periodontitis; quality of life.

INTRODUCTION

Diabetes and periodontitis are both prevalent chronic diseases with an established bidirectional relationship.[1] Periodontitis is more common in people with diabetes, and the magnitude of the increased risk depends on the patient's glycaemic control. In addition to physical effects, diabetes patients with periodontal disease have psychosocial and emotional consequences on individuals.[2] The patients' general health deteriorates due to their inability to chew food properly, which affects their quality of life.[3]

Diabetic patients have a three-fold increased chance of getting periodontitis in comparison to non-diabetics.[4] The concept of oral health-related quality of life (OHRQoL) is relatively new but is expanding quickly. Some studies have analysed the association between periodontal status, patients' attitude towards oral health, and its impact on quality of life.[5] Individuals with chronic periodontitis are reported to have poorer OHRQoL with significantly negative functional, social, and psychological effects than periodontally healthy individuals of the same age and gender.[6]

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The objective of this study was to assess the periodontal status and quality of life among patients with diabetes. Many people are unaware of the connection between dental health and systemic disorders.

METHODS

This hospital-based analytical cross-sectional study was carried out at Tribhuvan University Teaching Hospital from 2023 May to 2023 July in the Dental Outpatient Department (OPD). The study was conducted after the ethical approval from Institutional Review Committee (IRC), Institute of Medicine, Tribhuvan University [Ref. 509(6-11) E2]. Patients diagnosed with diabetes were recruited from the hospital OPD following a convenience sampling method. Sample size was calculated using formula below based on a previous study conducted by Bhagat et al.:[7]

$$n = Z^2 pq / e^2$$

Where, n = Sample size; p = prevalence of condition = highest loss of attachment (LOA) score 9-11 mm = 0.048 (4.8%);[7] q = 1–p = 0.952; e = permissible error taken = 0.04 (4%); Z = 1.96 at 95% CI (Confidence Interval). Placing these values in formula provided above, n = 109.71. Adding 20% non-response rate, total estimated sample size = 131.65 ≈ 132.

Thus a total of 132 individuals with diabetes, willing to participate in the study with HbA1C level ≥6.5 were enrolled in the study. Those individuals who had undergone scaling or any other periodontal therapy in the last six months, mentally or physically challenged individuals were excluded. Study participants were explained about the research and an informed consent was taken from the participants willing to participate voluntarily. Patients were interviewed for assessment of quality of life using translated and validated Nepali version of Oral Health Impact Profile-14 OHIP-14 questionnaire.[8] Based on Locker's adaptation of the World Health Organisation (WHO)'s disease-impairment-disability-handicap classification, the 14-item OHIP-14 questionnaire addresses seven domains of oral health impact: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap.[9] Each domain now only has two questions, each with a Likert response format (4 = very often, 3 = often, 2 = occasionally, 1 = barely ever, and 0 = never).

The oral examination for periodontal status was done using WHO probe and a mouth mirror to measure the Community Periodontal Index (CPI) and Loss of Attachment (LOA).

Data were entered in Microsoft Excel Sheet and analysed using SPSS version 20 (IBM Corp., Armonk, N.Y., USA). Mean, standard deviation, median, and interquartile range were calculated for quantitative data; and frequency and percentage for qualitative data. Kolmogorov-Smirnov test was used to determine normality of the data set and the outcome variables showed skewed distribution. Therefore, Mann-Whitney U test and Kruskal-Wallis H tests were used to compare median OHIP-14 scores between gender and periodontal status respectively. Statistical significance was established at $p < 0.05$.

RESULTS

A total of 132 participants were included in the study. The mean age of the participants was 55.32 ± 13.09 years. Their mean OHIP-14 score was 30.78 ± 11.74. Periodontal examination for assessment using CPI and LOA revealed no participants having healthy gingiva and five (3.8%) participants having no loss of attachment (Table 1). Most participants had a pocket depth of 4-6 mm with a CPI score of 3 (81, 61.4%). Similarly, another majority of participants had a loss of attachment of 4-5 mm with an LOA score of 1 (49, 37.1%).

Regarding the responses of individual participants to the OHIP-14 questionnaire, out of total participants, 62 (47.0%) had trouble with pronunciation, 56 (42.4%) had felt an alteration in taste sensation, 67 (50.8%) had painful aching in the mouth, 62 (47.0%) felt uncomfortable eating foods, and 51 (38.6%) felt tense (Table 2).

There was no significant difference in median OHIP-14 scores between males and females ($p = 0.960$). There was a significant median difference observed in OHIP-14 scores between different highest CPI ($p = 0.001$) and LOA ($p = 0.001$) status of study participants (Table 3).

Table 1: Periodontal status of participants (N = 132).

Highest CPI score	
Condition (Score)	**n (%)**
Normal (0)	-
Bleeding on Probing (1)	-
Calculus (2)	8 (6.1)
Pocket depth 4-6 mm (3)	81 (61.4)
Pocket depth 6 mm or more (4)	43 (32.6)
Highest LOA score	
Condition (Score)	**n (%)**
Loss of attachment 0-3 mm (0)	5 (3.8)
Loss of attachment 4-5 mm (1)	49 (37.1)
Loss of attachment 6-8 mm (2)	38 (28.8)
Loss of attachment 9-11 mm (3)	27 (20.5)
Loss of attachment 12 mm or more (4)	13 (9.8)

Table 2: OHIP-14 responses of the study participants.

OHIP-14 questionnaire	Responses to questionnaire, n (%)				
	Never	Hardly ever	Occasionally	Often	Very often
Have you had trouble pronouncing any words because of problems with your teeth or mouth?	3 (2.5)	13 (9.8)	62 (47.0)	32 (24.2)	22 (16.7)
Have you felt that your sense of taste has worsened because of problems with your teeth or mouth?	32 (24.2)	17 (12.9)	56 (42.4)	14 (10.6)	13 (9.8)
Have you had painful aching in your mouth because of problems with your teeth or mouth?	6 (4.5)	13 (9.8)	67 (50.8)	28 (21.2)	18 (13.6)
Have you found it uncomfortable to eat any foods because of problems with your teeth or mouth?	21 (15.9)	15 (11.4)	62 (47.0)	20 (15.2)	14 (10.6)
Have you been self-conscious because of problems with your teeth or mouth?	43 (32.6)	24 (18.2)	41 (31.1)	15 (11.4)	9 (6.8)
Have you felt tense because of problems with your teeth or mouth?	47 (35.6)	22 (16.7)	51 (38.6)	7 (5.3)	5 (3.8)
Have your diet been unsatisfactory because of problems with your teeth or mouth?	65 (49.2)	25 (18.9)	38 (38.8)	2 (1.5)	2 (1.5)
Have you had to interrupt meals because of problems with your teeth or mouth?	82 (62.1)	20 (15.2)	26 (19.7)	2 (1.5)	2 (1.5)
Have you found it difficult to relax because of problems with your teeth or mouth?	81 (61.4)	25 (18.9)	23 (17.4)	1 (0.8)	2 (1.5)
Have you been a bit embarrassed because of problems with your teeth or mouth?	63 (47.7)	35 (26.5)	27 (20.5)	2 (1.5)	5 (3.8)
Have you been a bit irritable with other people because of problems with your teeth or mouth?	83 (62.9)	16 (12.1)	16 (12.1)	2 (1.5)	3 (2.3)
Have you had difficulty doing usual jobs because of problems with your teeth or mouth?	64 (48.5)	45 (34.1)	18 (13.6)	2 (1.5)	3 (2.3)
Have you felt that life in general was less satisfying because of problems with your teeth or mouth?	73 (55.3)	29 (22.0)	26 (19.7)	1 (0.8)	3 (2.3)
Have you been totally unable to function because of problems with your teeth or mouth?	83 (62.9)	25 (18.9)	21 (15.9)	1 (0.8)	2 (1.5)

Table 3: Comparison between OHIP-14 scores and study variables.

Study variables	No. of study participants	Median (Q1-Q3)	OHIP score (Mean ± SD)	Mean rank	P value
Gender					
Male	68	29 (21-37)	30.76 ± 11.90	66.34	0.960*
Female	64	28 (22-40.25)	30.80 ±11.67	66.67	
Highest CPI score					
Supra or Subgingival calculus (2)	8	22 (18.50-45.75)	30.75 ± 18.81	55.38	0.001[a]
Periodontal pocket depth 4-5 mm (3)	81	24 (21-34)	28.20 ±10.65	57.89	
Periodontal pocket depth 6 mm or more (4)	43	34 (28-45)	35.65 ± 10.86	84.79	
Highest LOA score					
Loss of attachment 0-3 mm (0)	5	20 (16.50-23)	19.80 ± 3.50	24.60	<0.001[a]
Loss of attachment 4-5 mm (1)	49	23 (20-29)	25.08 ± 8.33	47.08	
Loss of attachment 6-8 mm (2)	38	28.50 (21.75-36.25)	29.63 ± 8.55	66.32	
Loss of attachment 9-11 mm (3)	27	36 (27-49)	38.04 ±_13.70	88.65	
Loss of attachment 12 mm or more (4)	13	47 (38.50-51)	44.77 ± 8.64	110.35	

* Mann-Whitney U test; [a] Kruskal-Wallis H test.

DISCUSSION

This study was conducted to determine if periodontal status influences oral health related quality of life among individuals with diabetes. In this study of 132 participants, the findings indicate individuals with high CPI and LOA scores demonstrated significantly higher OHIP-14 scores (35.65 ± 10.86 and 44.77 ± 8.64 respectively, p = 0.001). This finding is consistent with the existing study conducted by Bhagat et al. using the Nepali version of OHIP-14 questionnaire in diabetes patients visiting medical and dental OPD at a tertiary care centre of Nepal and found that periodontal status was poor among patients with diabetes with significant impact on their oral health related quality of life.[7] Similar findings was seen in a study conducted by Durham and his coworkers to assess the impact of chronic periodontitis on OHRQoL using a full version of OHIP-49 and Oral Health Quality of Life-UK (OHQoL-UK) questionnaires which concluded that OHRQoL was poorer in periodontitis patients compared to the healthy patients.[6] Several Studies have been conducted to study the impact of Periodontitis on OHRQoL and most of them conclude that oral health related quality of life is negatively impacted by periodontitis.[5,6,10,11]

Based on the responses obtained from OHIP-14 in the present study, most of the patients reported physical pain, discomfort and functional limitation (trouble speaking and worsened sense of taste). Similar findings were noted in a study conducted by Levin et al., the authors found that patient with chronic periodontitis exhibited worse OHIP-14 global scores with worse score in the domain of functional limitation and physical pain.[12] In contrast, a study conducted by Fuller et al. showed highest impact being noted in domains of psychological discomfort such as feeling embarrassed, physical pain, and social problems whereas the lowest scoring domain was found for functional limitation.[13] These discrepancies may arise from the fact that patients frequently base their responses on their own perceptions when asked to rate their quality of life. One person may respond using a psychological perspective, while another may use a physical perspective. The concept of quality of life refers to an individual's perception of their position in life within the cultural and value systems of their community, as well as in relation to their personal goals, expectations, standards, and concerns.[14]

In this study, gender was not significantly associated with OHRQoL in which male and female showed

similar oral health impact (p = 0.960). However, in a study conducted in Shimla, India, significant difference in impact with regard to gender where greater impact was seen among females than males.[15]

In the present study, periodontal examination for assessment using CPI and LOA revealed that none of the participants had healthy gingiva and bleeding on probing only. Very few, five (3.8%) participants had no loss of attachment. Most participants (81, 61.4%) had a pocket depth of 4-6 mm with a CPI score of 3. Similarly, another majority of participants (49, 37.1%), had a loss of attachment of 4-5 mm with an LOA score of 1. These findings are corroborated with a study by Rahim et al. which conclude that patient with uncontrolled Diabetes Mellitus had worse periodontal health with increase pocket depth and clinical attachment loss.[16] The relationship between diabetes and its effect on periodontium has been demonstrated by different literature.[17,18] Although the connection is very complex and require more research, it is important to aware people regarding correlation between periodontal health and diabetes.

Nevertheless, some limitations of this study must be acknowledged. The study's data was limited because it did not account for other dental diseases such caries, tooth surface loss, or oral trauma. Moreover, the OHIP-14 is a general quality of life measure related to oral health and does not allow for attributing the oral impacts to specific oral conditions. Another potential limitation could be the questionnaire selection process. According to John et al., the 5-, 14-, 19-, and 49-item versions showed a strong correlation, meaning that each version measures OHRQoL quite well, with OHIP-49 being the best.[19] They do, however, also imply that general dentists can evaluate OHRQoL with the OHIP-5 and it can replace the longer versions. While many chronic systemic disorders are linked to periodontitis, this study only included diabetics. In order to comprehend the relationship between oral health and systemic disorders, further research needs to be emphasized.

According to the present study, diabetic individuals' quality of life is significantly impacted by periodontitis. This study used a reliable, validated short version of OHIP-14 questionnaire.[8] The results from this study indicate an association between periodontal status and quality of life. Efforts should be made to prevent early diagnosis and treatment of periodontitis, in order to improve the quality of life of individuals. With early diagnosis, proper periodontal treatment and maintenance, quality of life can be improved and retained. OHRQoL must be considered an important aspect of the global oral health program since it can serve as the foundation for any oral health care program.[20] It is becoming widely accepted as a legitimate parameter for patient assessment in almost all areas of physical and mental health care, including oral health.[21]

CONCLUSIONS

This findings of this study reveal that oral health-related quality of life is negatively impacted by periodontal disease among individuals with diabetes. To improve the quality of life for these individuals, both periodontal maintenance and glycaemic control are necessary. Further research in this area is required until then emphasis should be given to frequent professional evaluations and patient education by health care providers.

Conflict of interest: None.

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