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Periodontal Health Status and its Impact on the Quality of Life among Diabetics attending Medical and Dental Out Patient Departments of a Tertiary Care Center of Nepal

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Abstract

Background: Diabetics are more prone to periodontal diseases leading to poor oral function affecting their quality of life. The objective of the study was to assess the impact of periodontal health on the quality of life among diabetics using the short version of the Oral Health Impact Profile (OHIP -14). **Methods:** It was a descriptive cross-sectional study. Data was collected using translated and validated Nepalese version of OHIP-14 questionnaire and clinical examination for periodontal status (Community Periodontal Index and Loss of Attachment index) was done using mouth mirror and World Health Organization probe under natural light. Data was entered and analyzed using SPSS version 11.5. Mann-Whitney U test and Kruskal-Wallis tests were used to compare OHIP-14 scores between genders and periodontal status respectively. Statistical significance was established at $p < 0.05$. **Results:** One hundred and forty-five subjects with confirmed diabetes participated in the study. Overall, 41% were male participants were as 59% were females. Majority of the participants had calculus with CPI score 1 ($n=131$, 90.3%) and another majority had loss of attachment 3-5 mm with LOA score 1 ($n=55$, 37.9%). There was no significant difference in mean scores between two genders ($p=0.231$). The OHIP scores among participants with highest CPI and LOA scores had statistically significant difference ($p=0.011$ and $p=0.006$ respectively). **Conclusions:** Periodontal status was poor among diabetics with significant impact on their oral health related quality of life. Glycemic control along with periodontal maintenance is required to enhance quality of life among such patients. This might be possible with comprehensive medical approach for diabetic patients.

Keywords: Diabetics, Periodontal health, Quality of life

Background

People suffering from diabetes mellitus are more prone to periodontal diseases especially deep periodontal pockets and gingival recession which in turn leads to functional limitation. As the patients are unable to chew properly their general health is also impaired leading to poor quality of

life. Diabetes mellitus is a major public health problem today. There is bidirectional relationship between periodontal disease and diabetes mellitus. Periodontal disease is considered as a common complication as well as a possible risk factor for poor metabolic control.¹ Diabetes Mellitus with its concomitant oral manifestations especially in the form of periodontal disease not only affects people physically but also has emotional and psycho-social consequences.^{2,3}

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Recent literatures have tried to explore, in a broader perspective, the relationship between various patient-centered outcomes of satisfaction factors and periodontal health.⁴ This emphasis on Quality of life (QoL) is consistent with the concept that health is a resource and not simply the absence of disease.⁵ Interest in the idea of ‘quality of life’ is growing rapidly. “Health-related quality of life” is a widely used concept employed for subjective assessment of an individual’s health and quality of life issues. Regarding the relationship of health and disease to quality of life, there appears to be an association between these domains which is not clearly defined. Locker suggested that health problems may affect quality of life but such a consequence is not inevitable. Individual attitudes are not constant, vary with time and experience, and are modified by phenomena such as coping, expectancy and adaptation.⁶ By definition, people who lose teeth are impaired (i.e., have lost a body part). Other less well documented consequences of tooth loss include disability like lack of ability to perform tasks of daily living such as speaking and eating. Similarly, minimizing social contact due to embarrassment with complete denture wearing can also be reported in the form of handicap.^{7,8}

The objective of the study was to assess the periodontal health status of diabetics attending medical and dental out patient departments of B. P Koirala Institute of Health Sciences, a tertiary care centre in Dharan, Nepal and assess its impact on the quality of life using the short form version of the Oral Health Impact Profile (OHIP -14).

Methods

It was a hospital based cross-sectional study. The patients were interviewed using a self-administered questionnaire of OHIP-14. OHIP-14 is a 14-item questionnaire which covers seven domains of oral health impact: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap based on Locker's adaptation of the WHO's classification of disease-impairment-disability-handicap (Locker, 1988).¹⁰ The number

of questions in each domain has been reduced to two and the Likert response format (4 = very often, 3 = often, 2 = occasionally, 1 = hardly ever, never = 0) is used. Frequency of impacts is calculated by summing the reported negative impacts (i.e., very often/often or occasionally) across the 14 statements. Ethical approval for the study was obtained from Institutional Ethical Review Board (IERB), BPKIHS [Ref. Aca. 709/069/070]. Written consent was obtained from participants who were enrolled.

OHIP-14 is a valid measure for Oral Health Related Quality of Life (OHQRoL). A major advantage of this measure is that the statements are derived from a representative patient group, and were not conceived by dental research workers. The social consequences of oral disorders that are considered to be important by the patients can be better explored using such sophisticated measure of oral health. The measure has been used in a number of oral health impact studies globally.⁹

Oral examination was done using WHO (World Health Organization) probe and plane mouth mirror to measure the Community periodontal Index and Loss of Attachment.¹¹ One hundred and forty-five patients, diagnosed with diabetes, were enrolled from the hospital OPD (diabetic clinic) purposively. All the patients giving written informed consent were included in the study.

Data were entered into computer using excel and analyzed using SPSS 11.5. The values are expressed as mean and standard deviation for continuous variables and percentage for nominal variables. Mann-Whitney U test and Kruskal-Wallis tests were used to compare OHIP-14 score between gender and periodontal status respectively. Statistical significance was established at $p < 0.05$.

Results

A total 145 participants were included in our study. The mean age of the participants was 50.7 years (SD 14). Majority of the participants were female (n=86, 59.3%).

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Periodontal examination for assessment using CPI and LOA revealed only one participant having healthy gingiva with no bleeding/calculus/pockets and 74 (51%) participants having no loss of attachment. Majority of the participants had calculus with CPI score 1 (n=131, 90.3%). Similarly, another majority had loss of attachment 3-5 mm with LOA score 1 (n=55, 37.9%). The periodontal status of the participants has been shown in detail in (Table 1).

Table 1: Periodontal status of participants (n=145)

Highest CPI score	
Condition (Score)	Frequency (Percentage)
Normal (0)	1 (0.7%)
Bleeding on probing (1)	131 (90.3%)
Calculus (2)	11 (7.6%)
Pocket depth 4-6 mm (3)	2 (7.6%)
Pocket depth 6 mm or more (4)	145 (1.4%)

Highest LOA score	
Condition (Score)	Frequency (Percentage)
Loss of attachment 0-3 mm (0)	74 (51%)
Loss of attachment 4-5 mm (1)	55 (37.9%)
Loss of attachment 6-8 mm (2)	9 (6.2%)
Loss of attachment 9-11 mm (3)	7 (4.8%)

The responses of individual participants to Oral Health Impact Profile (OHIP) questionnaire items has been shown in (Table 2). The internal consistency of the scale as measured by Cronbach's alpha was 0.898. Nearly 20% had painful aching in mouth, 14.5% felt uncomfortable to eat, 11.4% were self-conscious, 9.7% had to interrupt their meals, 3.5% felt tense, 5.5% felt difficult to relax, 2.8% had difficulty doing their jobs, 2.1% were unable to perform functions such as eating and speaking and 1.4% felt embarrassed.

Table 2: OHIP-14 responses of the participants

OHIP-14 questionnaire item	Responses to questionnaire [n (%)]				
	Never	Hardly ever	Occasionally	Often	Very often
Pronouncing words	124 (85.5%)	8 (5.5%)	11 (7.6%)	2 (1.4%)	0
Sense of taste worsened	119 (82.1%)	11 (7.6%)	13 (9%)	1 (0.7%)	1 (0.7%)
Painful aching (mouth, teeth)	81 (55.9%)	36 (24.8%)	23 (15.9%)	5 (3.4%)	0
Uncomfortable to eat any foods	117 (80.7%)	7 (4.8%)	18 (12.4%)	3 (2.1%)	0
Been self-conscious	127 (87.6%)	11 (12.8%)	26 (9%)	5 (1.7%)	2 (0.7%)
Felt tense	132 (91%)	8 (5.5%)	4 (2.8%)	1 (0.7%)	0
Diet been unsatisfactory	124 (85.5%)	14 (9.7%)	7 (4.8%)	0	0
Interrupt meals	124 (85.5%)	7 (4.8%)	11 (7.6%)	3 (2.1%)	0
Difficult to relax	133 (91.7%)	4 (2.8%)	6 (4.1%)	2 (1.4%)	0
Feel a bit embarrassed	137 (94.5%)	6 (4.1%)	2 (1.4%)	0	0
Irritable with people	136 (93.8%)	6 (4.1%)	3 (2.1%)	0	0
Difficulty doing usual jobs	132 (91%)	9 (6.2%)	4 (2.8%)	0	0
Life in general less satisfying	137 (94.5%)	7 (4.8%)	1 (0.7%)	0	0
Totally unable to function	134 (92.4%)	8 (5.5%)	3 (2.1%)	0	0

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Age and OHIP scores were found to have no significant association as shown by Pearson correlation $r=0.046$ ($p=0.580$). There was no significant difference in mean scores between two genders ($p=0.231$). The OHIP scores among participants with highest CPI and LOA scores had significant difference ($p=0.011$ and $p=0.006$ respectively) as shown in (Table 3).

Table 3: Comparison between OHIP-14 score and study variables

	OHIP score Mean (SD)	Mean rank OHIP score	p-value
Gender			
Male	2.24 (4)	68.24	0.231^a
Female	3.4 (5.4)	76.27	
Highest CPI score			
Normal (0)	6 (0)	120	0.011^b
Bleeding on probing (1)	2.5 (4.7)	69.42	
Calculus (2)	6.6 (5.5)	105.05	
Pocket depth 4-6 mm (3)	7 (8.5)	107.75	
Highest LOA score			
Loss of attachment 0-3 mm (0)	2.3 (4.8)	62.84	0.006^b
Loss of attachment 4-5 mm (1)	3.2 (4.9)	79.54	
Loss of attachment 6-8 mm (2)	5.7 (6.3)	97.61	
Loss of attachment 9-11 mm (3)	4 (4.4)	97.43	

^a Mann-Whitney U test

^b Kruskal-Wallis test

Bold signifies statistical significance at $p<0.05$

Post hoc analysis with pair-wise comparison showed significant difference between sub-groups with Highest CPI 2 and Highest CPI 3 (test statistic: -35.626; $p<0.004$). Similarly, post hoc analysis with pair-wise comparison showed significant difference between sub-groups with Highest LOA 0 and Highest LOA 1 (test statistic: -16.699; $p=0.018$); and significant difference between sub-groups with Highest LOA 0 and Highest LOA 3 (test statistic: -34.591; $p=0.027$).

Discussion

This study found significant difference among mean OHIP scores and different CPI and LOA groups. The relationship between oral disease and quality of life has been demonstrated in various literatures.¹²⁻¹⁴ Patient-oriented subjective measures like OHRQoL enhances the understanding of the relationship between oral health and general health and demonstrate to clinical researchers

and practitioners that improving the quality of a patient's well-being goes beyond simply treating oral diseases.¹⁵ Several studies have assessed impact of periodontitis on OHRQoL.^{16,17} An association between clinically diagnosed periodontal diseases and subjectively assessed OHRQoL with a dose-response relationship has been demonstrated in various studies.¹⁸ Similarly, Cunha-Cruz et al.¹⁹ showed that oral health-related problems in patients presenting to a periodontal specialist office negatively affect their quality of life. Individuals with severe marginal bone loss experienced worse quality of life compared with individuals with no/minor marginal bone loss in another study.²⁰ The studies have assessed the association across different populations.²¹ Clinicians have been recommended to use oral health assessment tools to determine individual treatment and approaches to promote the oral health of patients undergoing hemodialysis and improve their QOL.⁴

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Our study employed a specific diabetic population to assess the effect of periodontal disease in quality of life and found significant relation among the same. Similar finding was reported in study by Rao et al²² in Indian population where a significant impact of periodontal health on the quality of life among diabetics was demonstrated. DM associated with chronic periodontitis have shown to negatively affect QoL, even considering well-controlled diabetic patients.²³ Another study by Irani et al², however, showed that DM does not impact on overall Oral Health Related Quality of Life (OHRQoL) when measured by OHIP-49. Our study, on the contrary, used shorter form OHIP-14. OHIP-14 has demonstrated to have good reliability, validity and precision.^{9,24} It has been validated and used in context of Nepalese population.²⁵

Diabetes is shown to increase the risk for periodontitis. Meanwhile, evidence also suggest that advanced periodontitis compromises glycemic control.^{1,26} Exacerbated and dysregulated inflammatory responses are at the heart of the proposed two-way interaction between diabetes and periodontitis, and the hyperglycemic state results in various proinflammatory effects that impact on multiple body systems, including the periodontal tissues.²⁷ The diabetic patients predominantly suffer from psychological and psychosocial alterations that are due to local and systemic alterations. These local and systemic complications result in lowering of quality of life.³ Meanwhile, periodontitis and its clinical consequences, such as tooth loss, have shown a considerable negative effect on OHRQoL, while periodontal treatment and alleviation of the symptoms can lead to improvement in OHRQoL. Tooth loss leads to functional deterioration in terms of chewing, which can have far-reaching consequences such as temporomandibular disorders and changes in an individual's diet and nutritional intake. It, therefore, impacts on the self-perceived aesthetics and social wellbeing. Moreover, social life, life experiences and self-confidence which are aspects of human nature deeply interwoven with perceptions of happiness are severely affected by the disease.²⁸

It is noteworthy that the magnitude of severity as demonstrated in our study by CPI and LOA scores do not show significant difference in mean OHIP scores across all groups. This might hint towards lack of adequate precision of the QoL measure to identify difference among small groups as has been demonstrated in other studies.²⁹ Further studies using other OHRQoL measures are recommended. It should be emphasized that glycaemic control among diabetic patients may not be sufficient to address the quality of life of the patient unless underlying periodontal condition remains untreated. This calls for population specific programme with involvement of dental and medical professionals to minimize the effect of these comorbidities.

Conclusion

This study demonstrates the effect of periodontal disease in OHRQoL, as assessed by OHIP-14, among diabetic patients. Glycaemic control along with periodontal maintenance is required to enhance quality of life among such patients. This might be possible with comprehensive medical approach for diabetic patients. Hence, interventions should focus towards periodontal health of diabetics to ensure better quality of life.

Declaration

List of abbreviations

OHIP: Oral health Impact Profile

OHRQoL: Oral Health Related Quality of Life

CPI: Community Periodontal Index

LoA: Loss of Attachment

NA: Not Applicable

Ethics approval

The study was conducted after the ethical approval from Institutional Ethical Review Board (IERB), BPKIHS [Ref. Aca. 709/069/070]. Participants were explained about the research detail, its significance, the benefit and harm in Nepali language before obtaining the consent, their queries were answered. A statement indicating that the participants has understood all the information in the consent form and is willing to participate voluntarily was obtained. Participants were able to withdraw from

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the study at any time without giving any reason during the study period. The confidentiality of participants was assured and code number was used in each interview schedule and name of the participants was not mentioned anywhere.

Consent for publication

Individual written consent was obtained for publication of the study finding.

Competing Interests

The authors declare no competing interests.

Funding

B. P. Koirala Institute of Health Sciences funded the study.

Authors' contribution

TK, AS, JR, RM were involved in concept and design; Acquisition of data was done by TK, SKA, RM; TK, SKA, UG were involved in analysis and interpretation; TK and UG drafted the article; Final approval of the manuscript was done by all authors.

Acknowledgements: Sirjana Dahal and Abanish Singh for their valuable input during data collection.

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Endnotes

aMann-Whitney U test, bKruskal-Wallis test; Bold signifies statistical significance at $p < 0.05$ (Table 3)

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