



Impact of Type 2 Diabetes Mellitus on Oral Health Related Quality of Life among Adults in Karachi, Pakistan - A Cross-Sectional Study

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Authors' contributions

This work was carried out in collaboration between all authors. Authors SFM and AF were involved in the study concept and design, edited and reviewed the manuscript. Author SFM researched data. Author NM wrote the manuscript and did analysis and data processing. Author AS analyzed and collected the data and reviewed the manuscript. Author AB was involved in the study concept, design and reviewed the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background: The global prevalence of diabetes mellitus is rapidly increasing. Diabetic patients show high risk of oral diseases, and Oral health related quality of life may influence their management and treatment modalities.

Objective: To assess the impact of type 2 diabetes mellitus on oral health related quality of life.

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Methods: This cross-sectional study was carried out at Baqai Institute of Diabetology and Endocrinology (BIDE), Karachi Pakistan. The study includes type 2 diabetic patients having age 30 or above. A short version of Oral Health Impact Profile (OHIP), known as OHIP-14 questionnaire was used. The questionnaire comprised of 14 questions evaluating oral health related problems in seven dimensions of impact i.e. physical pain, functional limitation, psychological discomfort, physical disability, social disability, psychological disability and handicap. Statistical analysis was performed using SPSS version 20.

Results: Overall mean age of participants was 53.3 ± 11.0 years. Mean score of OHIP was 5.67 ± 5.71 . Scores of seven dimensions were analyzed with respect to gender and was found to be significantly different in terms of functional limitations (p -value=0.012) and physical pain (p -value=0.019). No significant correlation was found between glycemic control and OHIP score of the participants.

Conclusion: In the light of these results, it appears that, OHRQOL is not adversely influenced by the presence of T2DM but it demonstrated a different pattern with respect to gender.

Keywords: Quality of life; oral health; type 2 diabetes mellitus.

1. INTRODUCTION

Type 2 diabetes is the most widely recognized type of diabetes, pursuing 95% of people with diabetes [1]. Diabetes mellitus is one of the major chronic disease in the world. According to the estimation of International Diabetes Federation, 415 million individuals suffer from diabetes in the world and more than 35.4 million individuals in the Middle East and North Africa (MENA) Region; this will ascend to 72.1 million by 2040. In Pakistan, more than 7 million cases of diabetes were reported in 2015 [2].

Diabetes mellitus, if left untreated can lead to many complications, in terms of systemic manifestations the more chronic disease leads to macro vascular disease, cerebrovascular disease, coronary artery disease, peripheral vascular disease, and microvascular diseases which classically includes neuropathy, retinopathy, nephropathy and others [3].

Diabetes mellitus also have many oral manifestations including periodontal diseases, oral candidiasis and dental caries [4]. Oral health comprises substantially more on healthy teeth and gums [5]. The World Health Organization characterizes oral health as “a condition of being free from mouth and facial pain, throat and oral cancer, tooth loses, tooth decay, oral infection and sores, periodontal (gum) disease and other disorders that limit an individual’s capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing” [6]. Oral conditions are very predominant and their effects are not just physical; they are social, economic and psychological as well. They genuinely debilitate quality of life (QOL) in an extensive number of

people and can influence different parts of life including appearance, oral function, and interpersonal relationships [7]. Quality of life is an essential wellbeing sequel in its own privilege, representing to a definitive objective of all wellbeing mediations. Quality of life is based on physical and social functioning, and perceived by physical and mental health [8].

Many studies show the effect of oral diseases on QOL [9-12] however, the impact in diabetic patients is not well researched. Few studies demonstrate that diabetes does not fundamentally influence Oral health related quality of life [13-15]. Whereas, some studies show evidence regarding the effect of OHRQOL among diabetic individuals [1,16-19]. Data regarding OHRQOL in patients with diabetes is scanty from Pakistan. Therefore, the purpose of the present study was to assess the oral health related quality of life in type 2 diabetic individuals by using OHIP-14 questionnaire.

2. METHODOLOGY

2.1 Study Design

The subjects of this cross-sectional study were recruited by convenience sampling technique from patients attending diabetic clinic at Baqai Institute of Diabetology and Endocrinology, Karachi from the duration of January 2015 to March 2015. A total of one hundred and one patients were included in this survey. All patients with known type 2 diabetes, aged ≥ 30 years were considered eligible to participate in the study. Patients with Type 1 and gestational diabetes were excluded from the study. The participants were informed about the aim of the

Table 1. The dimensions and subject of the questions related to them

Dimensions	Related subjects of the questions
Functional Limitations	Trouble in pronouncing words, Worsened taste
Physical pain	Aching in mouth, discomfort in eating food
Psychological discomfort	Feeling self-conscious, tense
Physical disability	Interrupted meals, poor diet
Psychological disability	Difficulty in relaxing, embarrassment
Social disability	Irritability, difficulty in doing usual jobs
Handicap	Unsatisfactory lifestyle, inability to function

obtained from each participant. Latest laboratory findings of the selected participants were retrieved from an electronic hospital database called Hospital Management System (HMS).

2.2 Questionnaire

A short version of Oral Health Impact Profile (OHIP), known as OHIP-14 questionnaire [20] was used for the assessment of Oral health related quality of life. The questionnaire comprised of 14 questions evaluating oral health related problems in seven dimensions of impact i.e. physical pain, functional limitation, psychological discomfort, psychological disability, physical disability, social disability and handicap [20]. Table 1 shows the dimensions and subject of the questions related to them. The observers were trained to ask questions and calibrated to record the findings.

2.3 Scoring Method

The responses were coded as 0= never, 1= sometimes, 2= regularly, 3= Often, 4= Very Often. The raw score was calculated by totaling the figures of fourteen answers. The raw score ranged from 0 to 56. A score of 0 represented the best possible while 56 represented the worst possible OHRQOL.

2.4 Statistical Analysis

The data was entered and analyzed by using Statistical Package for Social Sciences (SPSS) version 20. Results were represented as mean ± SD for continuous variables whereas; categorical variables were presented in frequencies and percentages. ANOVA analysis, Kendall's Tau-b and Mann-Whitney test were used where applicable. Statistical significance was considering at P-value < 0.05.

3. RESULTS

Table 2 shows the basic demographic and clinical characteristics of the study subjects

consisting of 39 males and 62 females with a mean age of 53.7±11.9 and 53.0±10.4 years respectively. No significant difference was found between gender in age, weight, BMI and socioeconomic status. However, gender was significantly related to education, height and smoking habits (p-value<0.05). Measure of glycemic control reported mean Glycated hemoglobin (HbA1c) level of 9.25±2.07 % whereas mean creatinine level was 1.08±0.75 mg/dl which was significantly different among males and females.

Most of the subjects had no difficulty in pronouncing words (70.3%) and 44.6% never felt aching in their mouth. Whereas, 42.6% subjects sometimes felt unfavorable taste, 22.8% felt self-conscious because of their teeth, mouth or denture and 20.8% were sometimes uncomfortable to eat food. Diet satisfaction was found to be good (82.2%), however 2% subjects interrupt their meals regularly due to dental difficulties. Majority of patients (84.2%) never had functional problems, and 78.2% never had difficulty in doing usual jobs. Additionally, only 2% of subjects were those who very often felt tensed, bit embarrassed and 3% often get bit irritable with other people (Table 3).

Overall mean score of OHIP was 5.67±5.71. Scores of seven dimensions were analyzed with respect to gender. Mean score of females was higher than males in terms of functional limitations and physical pain and this difference was statistically significant (p-value =0.012, p-value=0.019 respectively) (Table 4). No correlation was found between glycemic control and OHIP score (Table 5).

4. DISCUSSION

In Pakistan, there have been many studies on the QOL among diabetic patients. So far, only limited number of studies are reported regarding oral health-related quality of life. In the present study, which was conducted in BIDE, Karachi Pakistan, OHIP-14 questionnaire was

implemented to analyze the impact of OHRQOL. The results indicated that oral complications of diabetes did not adversely affect OHRQOL in these patients. The outcomes were consistent with the previous study of Allen et al., on the same sample size and age range, [13] and the study by Sadeghi et al., conducted in Iran [15], in which they implemented OHIP-20 questionnaire on 200 diabetic patients. Moreover, Sandberg et al., described that however general health related quality of life (HRQOL) was comparable in both diabetic and non-diabetic people, the non-diabetic people showed a superior health status contrasted with the diabetic group in regards to HRQOL scores [18]. In this study, out of seven domains of OHRQOL; physical pain, psychological discomfort, and functional limitations reported highest score. This outcome is in accordance with the findings of Oanta et al. [21]. Functional limitation and physical pain was observed significantly higher in females as compared to males. Corresponding to this, the study from Northeast Portugal by Paçô et al., showed a significant high OHIP-14 score in females as compared to males [22]. Moreover, a survey by Oyapero et al., observed the highest

scores in the sub domains of pain, discomfort on chewing, self-consciousness and embarrassment [23]. In the present study, no significant correlation was observed between OHIP scores and HbA1c, creatinine and lipid profile. Contrary to Rao et al., survey [16], the overall responses of OHIP-14 in this study were mostly showed low impact of OHRQOL. The possible reason can be the short duration of study. Limitations of the study should be considered in the elucidation of the outcomes. Firstly, these outcomes were gathered from patients who only referred to one hospital, so it cannot be reached out to every diabetic patient. Secondly, the outcomes were only based on the information provided by the questionnaire and the patients were not clinically examined. Moreover, duration of diabetes, previous dental visits of the subjects, their oral hygiene, woman's menopause status were not considered while selecting the study subjects and there was no control group (non-diabetic) for comparison in our study. Further large scale, randomized, community based and case control studies should be taken into the account of confounders that would be helpful to ascertain the findings of this study.

Table 2. Basic characteristics of study participants

Variables	Male	Female	Overall	P-value
n	39	62	101	-
Age (years)	53.7 ± 11.9	53.0 ± 10.4	53.3 ± 11.0	0.753
Height (cm)	167.5±5.91	154.47±5.57	159.65±8.56	<0.0001
Weight (kg)	76.48±11.93	68.91±14.55	71.92±14.01	0.008
BMI (kg/m ²)	27.20±3.65	28.82±5.61	28.18±4.97	0.114
Smoking habit				
Non-smoker	34 (87.2%)	62 (100%)	96 (95%)	0.015
Smoker	3 (7.7%)	0 (0%)	3 (3%)	
Ex-smoker	2 (5.1%)	0 (0%)	2 (2%)	
Education				
Educated	35(89.7%)	42(67.7%)	77(76.2%)	0.011
Uneducated	4(10.3%)	20(32.3%)	24(23.8%)	
Socio-economic status				
Low	12(30.8%)	22(35.5%)	34(33.7%)	0.493
Medium	14(35.9%)	26(41.9%)	40(39.6%)	
High	13(33.3%)	14(22.6%)	27(26.7%)	
HbA1c (%)	9.35±1.88	9.18±2.21	9.25±2.07	0.536
Creatinine (mg/dl)	1.06±0.21	1.09±0.96	1.08±0.75	0.004
Cholesterol (mg/dl)	159.20±51.12	180.48±57.38	171.80±55.57	0.069
Triglyceride (mg/dl)	172.70±124.55	174.29±120.52	174.44±120.66	0.714
LDL (mg/dl)	103.75±41.20	115.56±43.10	110.60±42.48	0.2
HDL (mg/dl)	34.73±10.38	37.48±11.30	36.33±10.94	0.181
RBS (mg/dl)	230.24±108.41	242.12±92.53	237.31±98.15	0.705
FBS(mg/dl)	178.42±78.56	181.27±96.22	180.24±89.36	0.799

Data presented as Mean ± S.D or n (%)
P-value <0.05 was considered statistically significant

Table 3. OHIP-14 questions responses

Questions	Never	Sometimes	Regularly	Often	Very often
Functional limitations					
Do you feel difficulty in pronouncing words	71 (70.3%)	26 (25.7%)	4 (4.0%)	0 (0.0%)	0 (0.0%)
Taste worsen because of the problem	35 (34.7%)	43 (42.6%)	15 (14.9%)	6 (5.9%)	2 (2.0%)
Physical pain					
Do you feel aching in the mouth	45 (44.6%)	40 (39.6%)	11 (10.9%)	5 (5.0%)	0 (0.0%)
Uncomfortable to eat food	73 (72.3%)	21 (20.8%)	5 (5.0%)	2 (2.0%)	0 (0.0%)
Psychological discomfort					
Have you ever feel self-conscious	54 (53.5%)	23 (22.8%)	17 (16.8%)	7 (6.9%)	0 (0.0%)
Felt tensed because of the problem	74 (73.3%)	22 (21.8%)	2 (2.0%)	1 (1.0%)	2 (2.0%)
Physical disability					
Interrupt meals because of the problem	84 (83.2%)	15 (14.9%)	2 (2.0%)	0 (0.0%)	0 (0.0%)
Diet unsatisfactory due to the problem	83 (82.2%)	12 (11.9%)	3 (3.0%)	3 (3.0%)	0 (0.0%)
Psychological disability					
Difficult to relax due to the problem	79 (78.2%)	19 (18.8%)	3 (3.0%)	0 (0.0%)	0 (0.0%)
Feel bit embarrassed because of the problem	86 (85.1%)	10 (9.9%)	2 (2.0%)	1 (1.0%)	2 (2.0%)
Social disability					
Feel bit irritable with other people	67 (66.3%)	24 (23.8%)	7 (6.9%)	3 (3.0%)	0 (0.0%)
Do you feel difficulty in doing usual jobs	79 (78.2%)	19 (18.8%)	3 (3.0%)	0 (0.0%)	0 (0.0%)
Handicap					
Life less satisfying due to the problem	86 (85.1%)	9 (8.9%)	2 (2.0%)	4 (4.0%)	0 (0.0%)
Unable to function	85 (84.2%)	14 (13.9%)	2 (2.0%)	0 (0.0%)	0 (0.0%)

Data presented as n (%)

Table 4. OHIP-14 mean scores

Dimensions	Male	Female	P-value	Overall
Functional limitations	1.00±1.21	1.51±1.11	0.012	1.31±1.17
Physical pain	0.76±1.01	1.35±1.33	0.019	1.12±1.24
Psychological discomfort	1.07±1.56	1.17±1.37	0.441	1.13±1.44
Physical disability	0.35±0.90	0.51±0.95	0.288	0.45±0.93
Psychological disability	0.35±0.81	0.58±1.00	0.194	0.49±0.93
Social disability	0.51±0.82	0.83±1.13	0.144	0.712±1.03
Handicap	0.28±0.64	0.51±0.91	0.304	0.42±0.82
Overall	4.35±5.14	6.5±5.93	0.012	5.67±5.71

Data presented as Mean ± S.D

P-value <0.05 was considered statistically significant

Table 5. Correlation of some Biochemical parameters with OHIP score

Biochemical	Correlation	P-value
HbA1c (%)	0.001	0.995
Creatinine (mg/dl)	0.025	0.747
Cholesterol (mg/dl)	0.086	0.289
Triglyceride (mg/dl)	0.133	0.103
LDL (mg/dl)	0.062	0.412
HDL (mg/dl)	0.005	0.957

Dependent variable: OHIP score

P-value < 0.05 was considered statistically significant

5. CONCLUSION

The results indicate that signs and symptoms of oral disease in diabetics does not have adversely affected OHRQOL in these patients but it has demonstrated a different pattern by gender. It seems that dental specialist contributes incredibly in advising diabetic patients' regarding oral complications and their impact on their quality of life. Additionally, it is recommended to introduce oral health in follow-up consultation of diabetic patients for the anticipation or early treatment of oral diseases.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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