ORAL HEALTH STATUS OF DIABETIC PATIENTS: A CROSS SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL OF RAWALPINDI

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ABSTRACT

Objective: To determine the oral health status in adult diabetic patients using decayed, missed, filled teeth index and community periodontal index of treatment need. To determine the relationship of oral health status with duration of diabetes and self-reported glycaemic control in adult patients with diabetes visiting Benazir Bhutto hospital, Rawalpindi.

Study Design: Analytical cross-sectional survey.

Place and Duration of Study: Benazir Bhutto Hospital, Rawalpindi Pakistan, from Apr to Sep 2020.

Methodology: The sampling method employed was non-probability consecutive sampling on 367 type II diabetics. Hypothesis of the study was duration of diabetes has an effect on oral health status. The data was collected by using an adapted version of world health organization oral health questionnaire for adults and oral health status of each individual was marked by oral examination. Chi square test was employed to determine relationship of oral health status with duration of diabetes and self-reported glycaemic control.

Results: Of the 367 participants 228 (62%) were females, 184 (50%) were uneducated and 198 (54%) came from urban areas. Majority 279 (75.7%) used toothpaste/toothbrush to clean their teeth, 230 (62.7%) brushed once daily. Mean DMFT score of the participants was 6.9 ± 4.5, 158 (43.1%) had periodontal pockets, 206 (56.2%) reported bleeding gums and calculus and 3 (0.8%) had healthy gums. The association between duration of diabetes, self-reported glycaemic control and oral health status was significant, *p*-value was <0.05.

Conclusion: Oral health status of type-II diabetics with longer disease duration and poor glycaemic control was compromised.

Keywords: Caries, Diabetes, Oral health, Periodontal health.

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INTRODUCTION

Oral health is often regarded as a mirror of a person's general wellbeing. It is said, "There is no health without oral health".[1] Worldwide oral problems and diseases affected approximately 3.5 billion people.[2] Dental caries is ranked as the most prevalent oral condition affecting nearly 2.5 billion people.[3] Globally chronic periodontitis has been reported in almost 10% of the population.[4] In Pakistan >90% of oral diseases remain untreated. A survey reported caries and periodontal disease as prevalent among Pakistani adults.[5] Recent research has indicated possible association between chronic oral infection and diabetes. World health Organization has ranked Pakistan at number seven in diabetes prevalence.[6] And it is predicted to be at the fourth place by 2025.[7] Diabetic patients in comparison to healthy individuals are more susceptible to develop dental caries and periodontal disease. Despite of non cariogenic diet, the high risk of caries development in diabetics is linked to poor glycaemic control and hyposalivation.[8] Reduced salivary flow limits remineralization of tooth structure and favours caries development.[9] Periodontal disease is widely accepted as sixth major diabetes complication.[10] Risk of developing periodontal disease has been reported to be 3 times more in diabetics in comparison to those without the disease.[3] High risk of periodontal disease in a diabetic patient is linked to glycaemic control and disease duration.[11] Periodontal disease can also be utilized in screening of diabetes. Intervention studies have reported that periodontal disease treatment may improve glycaemic control and ultimately overall health outcomes in diabetic patients.[12] Despite of these established facts, oral health care is still not being perceived as a priority and remains a global health problem.[3] Recent research carried out in Pakistan concluded that majority of the diabetics were aware of medical complications of diabetes such as retinopathy, foot ulcers etc but very few participants knew about oral complications of diabetes.[7] The factors responsible for this could be lack of oral health counseling by the physician or negligence on the part of patients regarding regular dental visits. To address all these issues American Diabetes Association has included dental visit in routine diabetes care.[13]

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With increasing burden of diabetes mellitus across the globe much work is required to be done for improving the overall health of patients with diabetes. Unfortunately, oral health care is often ignored when trying to control other problems linked with diabetes and this leads to undue suffering and hidden morbidity from oral health problems. Thus, it is pertinent to study the oral health status among diabetic patients. This study is designed to evaluate the oral health status among type-II diabetics. It is believed that the study results will provide a baseline data of our population that will aid in improving the oral health of type-II diabetics by giving evidence based recommendations for oral health promotion.

METHODOLOGY

This analytical cross-sectional survey was taken at medical outpatient department of Benazir Bhutto Hospital, a tertiary care hospital in Rawalpindi which serves as a referral site for other health care centers. The study was conducted after taking ethical approval from institutional review board of Armed Forces Post Graduate Medical Institute, from April to September 2020. The sample size for the study was 367 calculated from statistical formula $n=Z^2 P*q/e^2$ using 32.9% as the prevalence of diabetes mellitus in Rawalpindi.[14] The sampling technique employed was non-probability consecutive sampling technique.

Inclusion Criteria: Adult type-II diabetics were included in the study.

Exclusion Criteria: Those patients who did not give consent and lost their teeth due to accidents were excluded from the study.

For oral health assessment oral cavity examination was carried out along with interviewer administered questionnaire. An adapted version of WHO oral health questionnaire for adults was used comprising four sections that include socio demographic characters, questions regarding diabetes, questions related to oral hygiene practice and oral health status. For all participants oral examination of all teeth and gums was performed by artificial light, community periodontal probe and mouth mirror. Oral cavity examination was carried out in a systematic way from one tooth to the next adjacent tooth/tooth space. Dental caries was measured by evaluating the DMFT index. A tooth was considered decayed when there was a carious lesion on any of its surface, missing if it was extracted and filled if it has a restoration for carious lesion. Community periodontal index was employed for the assessment of periodontal health. Periodontal examination was performed with the help of CPITN probe. Informed consent was taken from all participants and their privacy, anonymity, dignity was ensured. Statistical Package for Social Sciences version 23 was used for data entry and analysis. Mean and standard deviation of age and DMFT score was calculated. Analysis of other study variables was done by computing frequencies and percentages. Chi-square test was employed to determine oral health status relationship with diabetes duration and with self-reported glycaemic control. The *p*-value <0.05 was assumed for statistical significance.

RESULTS

The study enrolled 367 diabetic patients and the response came out to be 100%. Mean age of the respondents was 54.9 ± 9.42 years. Socio-demographic characteristics of the subjects are given in Table-I.

Table-I: Socio demographic characteristics of the respondents.

Characteristics	Frequency	Percentage
Gender		
Male	139	37.9%
Female	228	62.1%
Area of Residence		
Urban	198	54%
Rural	169	46%
Education		
Illiterate	184	50.1%
Primary Schooling	55	15%
Secondary Schooling	69	18.8%
Intermediate	31	8.4%
Graduation and Above	28	7.6%
Occupation		
Government Job	45	12.3%
Private Job	80	21.8%
Housewife	164	44.7%
Retired	26	7.1%
Business	06	1.6%
Other	46	12.5%
Monthly Income		
Less than 10,000	72	19.6%
10,000 to 30,000	208	56.7%
30,000 to 50,000	84	22.9%
More than 50,000	03	0.8%

While asse-ssing the medical history of patients it came to light that 175 (47.7%) had diabetes >5 years ago but <10 years ago, majority respondents reported hypertension as a co-morbidity, 170 (46.3%) were using oral hypoglycaemic drugs, good glycaemic control was reported by 168 (45.8%) and 228 (62.1%) of the patients reported that they had no complications due to diabetes. Chi-square test was performed to determine the relationship of oral health status with duration of diabetes and self reported glycaemic control (Table-II &

III). The *p*-value 0.001 indicated statistically significant association between duration of diabetes and oral health status. Diabetic patients with longer disease duration and suboptimal glycaemic levels reported advanced periodontal problems and high decayed, missed, filled teeth.

Table-II: Association between duration of diabetes and oral health status.

Duration of Diabetes /CPITN	Healthy Gums	Bleeding Gums	Calculus	Pocketing	*p*-value
Less than 5 years	(100)	56 (54.4%)	42 (40.8%)	27 (17.1%)	
5-10 years	-	33 (32%)	45 (43.7%)	97 (61.4%)	0.001
>10 years	-	14 (13.6%)	16 (15.5%)	34 (21.5%)	
Duration of diabetes/DMFT Score	Healthy Gums	T Score 1-7	T Score 8-14	T Score 15-21	
Less than 5 years	3 (50%)	86 (38.7%)	33 (33%)	6 (15.8%)	
5 to 10 years	3 (50%)	112 (50.5%)	49 (48%)	11 (29%)	0.001
More than 10 years	-	24 (10.8%)	19 (18.8%)	21 (55.3%)	

CPITN: Community periodontal index of treatment need, DMFT: Decayed, missing and filled teeth index

Table-III: Association between self reported glycaemic control and oral health status.

Glycaemic Control/ CPITN	Healthy Gums	Bleeding Gums	Calculus	Pocketing	*p*-value
Good	3 (100)	55 (53.4%)	69 (67%)	41(25.9%)	
Bad	-	26 (25.2%)	20(19.4%)	91(57.6%)	0.001
Do not know	-	22 (21.4%)	14(13.6%)	26(16.5%)	
Glycaemic Control/DMFT Score	Healthy	T Score 1-7	T Score 8-14	T Score 15-21	
Good	6 (100)	130 (58.6%)	29 (28.7%)	3 (7.9%)	
Bad	-	53 (23.9%)	52 (51.5%)	32(84.2%)	0.001
Do not Know	-	39 (17.6%)	20 (19.8%)	3 (7.9%)	

CPITN: Community periodontal index of treatment need, DMFT: Decayed, missing and filled teeth index.

DISCUSSION

This survey has tried to assess the oral health status of diabetic patients. Mean DMFT score of diabetics in the present survey came out to be 6.9 with a standard deviation of ± 4.45, a figure higher than reported by WHO. This result is analogous with a study carried out to evaluate dental caries status and its risk among type-II diabetics in Karachi and reported a mean DMFT score of 4.9.[8] Yet another study titled 'Dental caries and Diabetes mellitus" done in Pakistan highlighted a mean DMFT of 2.49.[15] High blood glucose levels and increased glucose concentration in saliva provides a favourable environment for the oral pathogens particularly bacteria to grow thereby causing an increase in caries in patients with diabetes. The results from recording of the gum and periodontal conditions illuminated that only a small proportion of the diabetic patients 3 (0.8%) had healthy gums and periodontium while the rest 364 (99.2%) presented with gum and periodontal problems such as bleeding gums, calculus accumulation and pocketing. These findings are similar to a study carried out to evaluate the status of oral health among diabetics visiting a tertiary healthcare institution in Nigeria which reported that none of the diabetic patients had a healthy periodontium.[16] Similarly, a local study from Karachi reported that 97.8% of the diabetic patients had periodontal problems.[17] The periodontal tissues inflammatory reaction to oral microorganisms in type-II diabetics is enhanced. Advanced glycation end products (AGE's) are synthesized when residual glucose unites with target proteins thus initiating chain of pro-inflammatory response. Oral hygiene practices of majority diabetics were inadequate, 230 (62.7%) brushed once daily as compared to 120 (32.7%) that brushed twice a day. Most common tooth cleaning aid was toothpaste/toothbrush used by 278 (75.7%), next in line was miswak used by 76 (20.7%) while none of the respondents reported use of dental floss. These results bore similarity to a Saudi survey which reported that 65% of the diabetics brushed once daily, brushing twice a day was reported by 22.2% while only a small percentage reported use of floss.[18] When relationship between status of oral health and diabetes duration was analyzed results showed that patients with a longer diabetes duration presented with more compromised oral health status. These results are consistent with other studies that reported poor oral health status in diabetics with a longer disease duration.[19] A case control study from Sudan reported high dental caries in a group of long duration type-II diabetics in comparison to the group of type-II diabetics with short duration. Also the long duration type-II diabetics group reported more missing teeth.[20] This finding is supported by literature as time plays an important role in dental caries progression.[21]

Small sample size, self reported data and cross sectional nature of the study limits generalization of

the findings. Future research studies in this area should be designed taking these limitations into account so that high quality evidence is generated which is both reproducible as well as generalizable.

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CONCLUSION

Overall results and findings within current study's limitations highlighted that dental health status of type-II diabetics with longer disease duration and poor glycaemic control was compromised. Statistically significant association was reported between diabetes duration and status of oral health (p=0.001). Moreover association between oral health status and self-reported glycaemic control came out to be statistically significant. Oral hygiene practices of the diabetic patients were not adequate.

Disclosure: This was the thesis of Masters in Public Health.

Conflict of interest: None.

Author's Contribution

JK: Literature search, data collection, HM: Concept, research guidances & analysis, MR: Proof reading, TM: Manuscript writing, DYS: Data anaysis, SZ: Data collection.

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