

Preferences of dental practitioners from a subset of Karachi regarding screening of Diabetes Mellitus in dental units

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Running Title:

Chair Side Screening of Diabetes Mellitus By Dentist

Abstract:

Introduction: Diabetes Mellitus is a public health problem that has a deleterious impact not only on the oral cavity but also compromises the general health of the patient. For oral health professionals, screening of this disease is of utmost importance, in order to manage this disease.

Objectives: This study aims to evaluate the attitude and knowledge of Pakistani dentists' regarding diabetes mellitus and to assess barriers faced whilst carrying type 2 DM screening in the dental setting.

Methods: This cross-sectional study comprised of 385 participants from private and public dental practices in Karachi. The pre-validated questionnaire was used for collecting data online which was distributed via Google Forms. Statistical analysis was done using SPSS V.20. Frequency and

percentages were calculated for categorical data while mean and standard deviation were calculated for the numerical data. The associations between different variables were assessed by the Chi-square test. A P-value of <0.05 was considered to be statistically significant.

Results: Among the study participants, 27.5% were males while 72.5% were females and the mean age was 38.3 ± 5.2 years. The results showed that the public sector practitioners seemed to have more knowledge compared to the private sector. However, regarding attitude, most of the participants from the private sector agreed ($p=0.001$) on the cost-effectiveness of screening of DM. The results regarding risk factors involved in the development of DM showed uncertainty among all the study participants.

Conclusion: High proportion of dental practitioners have sufficient knowledge about the risk factors and the complications associated with DM. However, barriers remain to the implementation of chairside screening for DM in the dental setup.

Key Words: Knowledge, attitude, barriers, dental graduates, dental professionals' oral health, diabetes mellitus diabetes type-II screening.

Introduction:

Diabetes Mellitus (DM) is a chronic metabolic disorder that has a multi-factorial etiology (1). According to World Health Organization, about 422 million adults worldwide are currently affected by diabetes mellitus. According to a recent estimate by the International Diabetes Federation (IDF) the prevalence of DM is expected to reach 642 million people in 2040 (2). Globally, DM especially types 2 diabetes mellitus is considered to be a major public health epidemic resulting in a considerable number of disabilities, premature deaths and high rates of morbidity, and mortality (3). International Diabetes Federation released new statistical figures for DM in Pakistan on World Diabetes Day. Approximately around 17.1% of the adult population in Pakistan is a victim of diabetes. In addition, due to this increase in the prevalence of diabetes Pakistan is now ranked among the top 10 affected countries with an absolute increase in diabetes prevalence (4). Patients diagnosed with diabetes are considered to be in a high-risk group with greater susceptibility to severe forms of systemic and oral complications which has a greater impact on wellbeing. Dental problems which are commonly experienced by diabetic patients include gingivitis, periodontitis, slow wound healing and burning mouth syndrome caused by the reduced blood supply to the affected area. (5).

A systematic review published in 2018, showed insufficient knowledge and poor attitude towards oral health with a low frequency of dental visits among diabetic patients (6). Another survey

conducted in Uttar Pradesh, India in 2015 showed an overall sufficient knowledge about the manifestations of diabetes and commonly encountered dental emergencies among dental practitioners (6). In addition, a lack of adequate knowledge was also observed regarding the medications used by the diabetic patient (7). A survey was conducted in Karachi, Pakistan, regarding dental problems in 94 diabetic patients. The result of which showed that the majority of the participants were affected by periodontal problems (97.8%) while other dental problems experienced by the participants included endodontics (45.25%), debris in the mouth (77.45%), surgery (64.5%), inflamed, swollen or bleeding gum (74.2%), loose or carious tooth (50.55%), and loss of natural teeth in 47.3% of the participants (8). For early diagnosis, prevention, and management of these diseases, screening and counseling should be conducted on every single patient attended by any health care provider. In 2017 research conducted by Ali et al had only evaluated the attitude of dentists employed at various dental colleges in Karachi and feasibility of carrying out chairside examination for diabetes (9). However, our study focuses not only on understanding the attitude of dentist from both private and public sector but also we aim to assess the barriers faced by them whilst carrying our type 2 DM screening in the dental setting.

Materials & method:

Study setting and duration

This cross-sectional study was conducted during the time frame of January-May 2022. Dentists working at various private and public sector institutes were employed for this study while students and those not giving consent to participate were excluded. Our research questionnaires were distributed to the dentists using Google Forms.

Ethical approval

The ethical approval for this study was obtained from the Institutional review board of Liaquat College of Medicine and Dentistry (Ref. no: IRB/D-000031/22).

Study tool

Our research questionnaire was formulated using the previously conducted by Chinnasamy and Moodie (10). Initially the demographic details of the participants were enquired which comprised of age, gender, qualification, type of practice and experience. The subsequent portion of the questionnaire was further subdivided into three parts. The first part assessed the knowledge of the participants, second part evaluated the attitude and lastly the practice of the dentist was assessed using five items. To answer the questionnaire participants were given options using the Likert scale. The reliability of the questionnaire was calculated via Cronbach's alpha yielding 0.75.

Sample size

The sample size calculation was done using open epi software by taking a 50% proportion of the population and a 95% confidence interval yielding the sample size of 384.

Statistical analysis

Statistical analysis was performed using SPSS V.20. Frequency and percentages were calculated for the categorical data while mean and standard deviation were calculated for the numerical data. Chi-square was used to check the association between different variables. A p-value of <0.05 was considered to be statistically significant. The independent variable of this study was practice type while knowledge and attitude of dentists were considered as the dependent variables

Results:

As per the calculated sample size, 385 general dentists were approached, out of which 27.5% were male and 72.5% were females. The mean age of participants was 38.3 ± 5.2 .

Table 1. Knowledge of public and private sector dentists regarding diabetes.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	p-value
1	DM may go unrecognized by the patient for many years from the actual onset.					
Public	33 (8.6%)	38 (9.9%)	33 (8.6%)	52 (13.5%)	76 (19.7%)	0.011
Private	18 (4.7%)	14 (3.6%)	18 (4.7%)	24 (6.2%)	78 (20.3%)	
2	Early identification of “at-risk individuals” can delay or prevent the onset of the disease.					
Public	27 (7.0%)	25 (6.5%)	28 (7.3%)	65 (16.9%)	87 (22.6%)	0.246
Private	13 (3.4%)	13 (3.4%)	14 (3.6%)	36 (9.4%)	76 (19.7%)	
3	Treatment of periodontal disease by scaling and root surface debridement may improve the periodontal condition in patients with Diabetes Mellitus.					
Public	17 (4.4%)	32 (8.3%)	41 (10.6%)	82 (21.3%)	61 (15.8%)	0.002*
Private	5 (1.3%)	12 (3.1%)	18 (4.7%)	49 (12.7%)	68 (17.7%)	
4	There is good evidence to support the bi-directional link between poor glycemic control and periodontal disease.					
Public	13 (3.4%)	26 (6.8%)	41 (10.6%)	59 (15.3%)	94 (24.4%)	0.283
Private	6 (1.6%)	11 (2.9%)	32 (8.3%)	30 (7.8%)	73 (19.0%)	
5	Patients reporting a glycated haemoglobin level (hba1c) of less than 5.7% is indicative of good glycemic.					
Public	18 (4.7%)	38 (9.9%)	61 (15.8%)	32 (8.3%)	84 (21.8%)	0.036
Private	3 (0.8%)	20 (5.2%)	33 (8.6%)	23 (6.0%)	73 (19.0%)	

*Significant p-value

Table 1 identifies the knowledge of the private and public sectors. In general, the public sector practitioners seemed to have more knowledge when compared to those who were practicing in private sector hospitals. When the participants were enquired regarding role of periodontal treatment in improving periodontal condition of patient 82 (21.3%) of the public sector dentists agreed whilst 68 (17.7%) of private dentists strongly agreed with statistically significant results ($p=0.002$). When asked about the patients presenting with HbA1c less than 5.7%, most of the public (21.8%) and private (19%) sector respondents strongly agreed with this statement.

Table 2. The attitude of public and private sector dentists regarding diabetes.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	p-value
1	It is important for dentists to perform or conduct chairside screening for T2-DM.					
Public	28 (7.3%)	25 (6.5%)	43 (11.2%)	50 (13.0%)	87 (22.6%)	0.002*
Private	11 (2.9%)	7 (1.8%)	24 (6.2%)	23 (6.0%)	87 (22.6%)	
2	The dentist's knowledge of a patient's overall health is important for achieving Optimal oral health outcomes					
Public	20 (5.2%)	23 (6.0%)	20 (5.2%)	105 (27.3%)	65 (16.9%)	0.002*
Private	8 (2.1%)	11 (2.9%)	15 (3.9%)	46 (11.9%)	72 (18.7%)	
3	Screening patients for diabetes in the dental setting could offer new opportunities to identify patients with possible undiagnosed Diabetes.					
Public	12 (3.1%)	21 (5.5%)	32 (8.3%)	74 (19.2%)	92 (23.9%)	0.001*
Private	3 (0.8%)	11 (2.9%)	30 (7.8%)	24 (6.2%)	84 (21.8%)	
4	The uncontrolled glycaemic profile of patients in the dental setting will help them to understand the link between Diabetes and poor oral hygiene.					
Public	23 (6.0%)	50 (13.0%)	44 (11.4%)	48 (12.5%)	66 (17.1%)	0.001*
Private	5 (1.3%)	14 (3.6%)	26 (6.8%)	24 (6.2%)	81 (21.0%)	
5	Periodontal screening and subsequent follow-up may facilitate patients to communicate with medical practitioners when patients seek their care.					
Public	24 (6.2%)	18 (4.7%)	38 (9.9%)	47 (12.2%)	104 (27.0%)	0.055
Private	7 (1.8%)	8 (2.1%)	16 (4.2%)	29 (7.5%)	90 (23.4%)	
6	Is the patient's willingness important while screening DM?					
Public	10 (2.6%)	26 (6.8%)	120 (31.2%)	39 (10.1%)	38 (9.9%)	0.001*
Private	11 (2.9%)	13 (3.4%)	33 (8.6%)	30 (7.8%)	65 (16.9%)	
7	Is DM screening cost-effective?					
Public	14 (3.6%)	47 (12.2%)	105 (27.3%)	32 (8.3%)	34 (8.8%)	0.001*
Private	2 (0.5%)	17 (4.4%)	25 (6.5%)	35 (9.1%)	70 (18.2%)	
8	Is DM screening time-consuming?					
Public	30 (7.8%)	80 (20.8%)	93 (24.2%)	10 (2.6%)	20 (5.2%)	0.052
Private	13 (3.4%)	67 (17.4%)	43 (11.2%)	11 (2.9%)	17 (4.4%)	

*Significant p-value

Table 2 depicts the attitude of public and private sector dentists regarding diabetes. In general, the attitude of the study population towards screening of diabetes seemed to be welcoming. When the participants were enquired regarding importance of chairside screening of T2-DM, equal number

i.e. 87 (22.6%) of public and private sector strongly agreed, statistically significant association was identified. Regarding dentist's knowledge in achieving patient's Optimal oral health, 65 (16.9%) of public and 72 (18.7%) private sectors strongly agreed, statistically significant association was identified. When the participants were asked regarding screening patients in dental setting, to identify undiagnosed Diabetic patients, 92 (23.9%) of public and 84 (21.8%) of private sector strongly agreed, statistically significant association was also identified. Regarding the uncontrolled glycemic profile of patients in the dental setting which will help them to understand the link between Diabetes and poor oral hygiene, 66 (17.1%) of public and 81 (21.0%) of private sectors strongly agreed, statistically significant association was also identified. However when asked about the willingness of patients, and cost-effectiveness of chairside screening (questions no. 6 and 7) majority of dentists practicing in both the sectors marked the option neutral, however, private sector participants agreed ($p=0.001$) on the statement asked about the cost-effectiveness of screening of DM.

Table 3. Practices of public and private sector dentists regarding diabetes.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	p-value
1	I thoroughly ask my patients for risk factors associated with Diabetes as this may have important implications for their oral health.					
Public	10 (2.6%)	29 (7.5%)	43 (11.2%)	57 (14.8%)	94 (24.4%)	0.010
Private	3 (0.8%)	12 (3.1%)	14 (3.6%)	38 (9.9%)	85 (22.1%)	
2	I adjust the frequency of dental visits as needed for patients with dm.					
Public	13 (3.4%)	21 (5.5%)	50 (13.0%)	52 (13.5%)	96 (24.9%)	0.146
Private	7 (1.8%)	9 (2.3%)	25 (6.5%)	26 (6.8%)	83 (21.6%)	
3	I provide thorough periodontal therapies (scaling and root surface debridement, etc.) to my patients with diabetes					
Public	17 (4.4%)	27 (7.0%)	33 (8.6%)	59 (15.3%)	97 (25.2%)	0.092
Private	4 (1.0%)	11 (2.9%)	25 (6.5%)	34 (8.8%)	78 (20.3%)	
4	I am interested in collaborating more with physicians and nurses to improve the overall health of my patients.					
Public	15 (3.9%)	11 (2.9%)	49 (12.7%)	54 (14.0%)	103 (26.8%)	0.007
Private	4(1.0%)	19 (4.9%)	27 (7.0%)	49 (12.7%)	53 (13.8%)	
5	I regularly assess the knowledge of my dental staff about diabetes.					

Public	24 (6.2%)	55 (14.3%)	48 (12.5%)	49 (12.7%)	57 (14.8%)	0.085
Private	4 (1.0%)	38 (9.9%)	32 (8.3%)	36 (9.4%)	42 (10.9%)	

*Significant p-value

When the public and private sector dentists were inquired about the practices they follow for diabetes, disappointing findings were observed. None of the findings were statistically significant.

Table 4. Knowledge of dentists regarding risk factors of Diabetes mellitus

Risk Factors for Diabetes	Strongly Disagree F(P)	Disagree F(P)	Neutral F(P)	Agree F(P)	Strongly Agree F(P)
Genetics	20 (5.3%)	17 (4.4%)	41 (10.6%)	171 (44.4%)	136 (35.3%)
Periodontitis	19 (5.0%)	63 (16.4%)	100 (26.0%)	101 (26.2%)	102 (26.5%)
Increasing age	14 (3.6%)	41 (10.6%)	100 (26.0%)	99 (25.7%)	131 (34.0%)
High Blood Pressure	36 (9.4%)	70 (18.2%)	138 (35.8%)	77 (20.0%)	64 (16.6%)
Stress	28 (7.2%)	38 (9.9%)	84 (21.8%)	121 (31.4%)	114 (29.6%)
Smoking	26 (6.7%)	76 (19.7%)	143 (37.1%)	71 (18.4%)	69 (17.9%)
Alcohol	43 (11.2%)	62 (16.1%)	133 (34.5%)	77 (20.0%)	70 (18.2%)
Obesity	24 (6.2%)	39 (10.1%)	42 (10.9%)	139 (36.1%)	141 (36.6%)

Table 4 represents the knowledge of general dentists regarding risk factors of Diabetes mellitus. When the participants were asked about the risk factors of diabetes, majority of participants seemed to be agreed on genetics, age, stress, and obesity as one of the major risk factors. Furthermore, poor response was recorded regarding periodontitis, high BP, smoking and alcohol as risk factors for the development of diabetes.

Table 5. Knowledge of dentists regarding complications of Diabetes mellitus

Complications of Diabetes	Strongly Disagree F(P)	Disagree F(P)	Neutral F(P)	Agree F(P)	Strongly Agree F(P)
Cardiovascular	39 (10.1%)	37 (9.6%)	60 (15.6%)	128 (33.2%)	121 (31.4%)
Foot Ulcers	33 (8.6%)	27 (7.0%)	37 (9.6%)	155 (40.3%)	133 (34.5%)
Neuropathy	33 (8.6%)	27 (7.0%)	45 (11.7%)	166 (43.1%)	114 (29.6%)
Nephropathy	37 (9.6%)	30 (7.8%)	29 (7.5%)	174 (45.2%)	115 (29.9%)
Tooth mobility	27 (7.0%)	26 (6.8%)	46 (11.9%)	179 (46.5%)	107 (27.8%)
Stroke	24 (6.2%)	37 (9.6%)	139 (36.1%)	91 (23.6%)	94 (24.4%)
Osteoporosis	30 (7.8%)	95 (24.7%)	115 (29.9%)	66 (17.1%)	79 (20.5%)

When asked about the complications of diabetes the knowledge of most of the participants was satisfactory as shown in table 5.

Discussion

The current study aimed at evaluating the attitude and knowledge of health care professionals regarding diabetes and identifying the barriers faced while carrying out screening of TYP-2 DM in the dental setup. Findings from the current study report that dentists employed in the public and private sectors both strongly agreed regarding diabetes remaining unrecognized by patients for years. These findings are confirmed by the previously reported study by Lipman et al in the USA. (12). This suggests that the general population in Pakistan only visits the doctor in case of need and mostly fail to undergo routine tests, which can be due to a busy schedule or the cost of the tests. Similarly, in the current study dentists agreed upon the importance of undergoing routine medical examinations which will aid in the early detection of this disease.

It has been mentioned in literature that increased risk of periodontal disease is related to the level of glycaemia in patients(13). The results of our study showed that most of the dentists from both the sectors had sufficient knowledge regarding the direct relation between poor blood sugar levels and periodontal conditions. The study by Casanova et al stated that diabetics with well-controlled HbA1c of about 7% or lower, may help reduce the risk for periodontitis or other condition. But

the probability of acquiring problems increases markedly in case of uncontrolled diabetes (14). These findings are in agreement with the current study. Hence, the importance of maintaining adequate levels of HbA1c should also be explained to patients during dental visits.

In our study, most dentists recognized the significance of performing chair-side screening for type 2 diabetes. This is in contrast to a study led by Greenberg et al. where 85% dentist referred patients for screening to a physician, whilst 77% stated that dentists should perform chair-side screening for diabetes themselves (17). Most of the dentists from the current study stated that conducting chair-side screening in the dental setup would help the patients to understand the effect of uncontrolled diabetes on the oral cavity and increased susceptibility to bacterial and fungal infections(18).

In this study, the dentists appeared to have sufficient knowledge about the risk factors and the complications associated with DM. Majority of dentists identified genetics, increasing age and periodontitis as the main risk factors followed by tooth mobility, nephropathy, and neuropathy as the major complications. However, these findings are in contrast to the study led by Chinnasamy and Moodie in Australia where the participants identified physical inactivity and genetics as the main risk factor while the cardiovascular disease was reported as the major complication of diabetes(22). In addition, it was also suggested that dentists have equal responsibility as medical practitioners to educate and inform the patients regarding complications associated with DM and encourage proper oral health behaviors. Professional consideration must also be directed towards developing a strong relationship between oral and systemic health (19–21).

The major limitation of the study was involving dentist only from a subset of Karachi hence; the results of the study can not be generalized. In future, sample should be collected from different areas of Pakistan. It was recommended that dentists should undergo formal training sessions to improve the chairside screening of patients with DM.

Conclusion

The current study concluded that a high proportion of dental practitioners had sufficient knowledge about the risk factors and the complications associated with DM. However, barriers still remain for the implementation of chairside screening for DM in the dental setup for

identifying the undiagnosed cases.

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