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Oral Health Awareness in Patients with Diabetes: A Cross Sectional Study from Saudi Arabia

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Abstract

Aim: The aim of this study was to (1) evaluate the oral health knowledge and awareness among patients with diabetes and (2) to assess the overall attitude and habits towards dental health care among patients with diabetes.

Methods: This cross-sectional survey was conducted at the King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia, from August 2019 to September 2019. A total of 572 patients with diabetes was included in this study. Demographic variable such as age, gender, education, body mass index, smoking and duration of diabetes were collected and a standardized, validated questionnaire consisting of 35 different statements used to collect the oral health awareness and knowledge.

Results: The overall finding of the study showed that the knowledge about oral health care awareness among diabetes was poor. Majority of the responders (59.4%) visited dental clinic, only if they had a problem. Majority (48.6%) of the responders brushed their teeth 1-2 minute and dental aids used by 69.6% of the responders. A total of 264 (47.14%) persons noticed bleeding in their gums, 48.12% reported bleeding means inflamed gingivae. A total of 264 (46.2%) responders noticed bleeding in their gums, 44.8% reported bleeding means inflamed gingivae. A total of 304 (53.1%) noticed a bad smell from their mouth and heard about the term dental plaque as staining of teeth (24.5%). More than 28% of the responders stated that gum inflammation and dental disease may increase blood sugar in patient with diabetes and 30.1% stated that cleaning gum and treating dental disease may help in improving their blood sugar level. A total of 254 persons agreed that certain systemic diseases can manifest in the oral cavity and 84.6% stated that oral health has an influence on the overall quality of life.

Conclusion: The study concluded that there is a significant lack of awareness and knowledge about oral manifestations among diabetes patients and hence steps have to be taken to upsurge their awareness through various outreach programs. Further, well-designed randomized controlled trials with higher sample sizes are essential to validate our findings.

Keywords

Oral health, Oral diseases, dental cavities, gum disease, Saudi Arabia

Introduction

In a latest article, the World Health Organization (WHO) has emphasized on the dramatic increase of the diabetes mellitus (DM), in the past three decades, in countries across all income groups [1]. During the last few years, the rate of prevalence of diabetes has shown a steep increase in Saudi Arabia, where a substantial number of adult population is suffering from this disease at the moment, thereby showing one of the highest rates in the world in terms of diabetes prevalence and incidence [2-5]. The worrying forecast released by the International Diabetes Federation (IDF) indicated that if protective measures are not taken, half of the Saudi population will be diabetic by 2030. In numerous studies, this ubiquitousness of diabetes in Saudi Arabia has been coined, as "epidemic" [2,4-8].

Oral health is a basic human right and an significant public health problem but is a ignored area of international health [9]. The oral health is influenced by systemic health, and one of the most common chronic diseases encountered in dental practice is diabetes mellitus and diabetes can worsen oral infections and vice versa [10]. In both type 1 and type 2 diabetes, long-term poor glycaemic control can generate major complications comprising oral diseases [11]. Studies reported that treatment of dental (periodontal) disease by scaling/root planning and oral hygiene in people with diabetes caused in a mean

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decrease in HbA1c levels [12,13]. Despite growing evidence about the associations between oral health problems in patients with diabetes, there is limited research investigating oral health awareness in patients with diabetes in Saudi Arabia. Hence the present study aimed to evaluate the oral health knowledge and awareness and assess the overall attitude and habits towards dental health care among patients with diabetes in Saudi Arabia.

Methods

This cross-sectional survey was conducted at the King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia, from August 2019 to September 2019. A total of 572 (type 1, type 2 and gestational diabetes) diabetes patients was included in this study. To be eligible for participation in the study, the candidates needed to satisfy the following criteria: 20 to 79 years of age, having type 1 or type 2 diabetes or gestational diabetes. Patients with severe mental and/or physical disorder were excluded from this study, i.e. cerebral palsy, schizophrenia, substance abuse, Alzheimer's, severe stroke, or terminal stages of a disease. The study was conducted in accordance with the declaration of Helsinki and the study protocol was approved by the Research Ethics Committee of King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia.

Measures

Demographic variable such as age, gender, education, weight, smoking and duration of DM were collected. A standard validated questionnaire was used to collect the oral health awareness which developed from the previous literature designed in Arabic and English. The questionnaire contains five subcategories (1) demographic data, (2) clinical variables, (3) frequency of dental visit, (4) oral hygiene and (5) oral complication.

Statistical analysis

Data analysis was carried out using Microsoft Excel 2010 (Microsoft Corporation, Seattle, WA, United States) and Statistical Package for Social Sciences version 22 (SPSS Inc., Chicago, IL, United States). Descriptive analysis was used to analyze the data.

Results

Table 1 shows the demographic data of the responders. A higher number of responders were in the age group 50-59 (32.9%), weight 70-79 kg (28.7%), student category responders (51%), male (62.9%), earning a college degree (61.5) and Saudi nationals (92.3%).

Table 2 shows the clinical variables of the responders. The majority of the responders were having type 2 DM (89.2%), treated with oral hypoglycemic (49%), non-smokers (82.9%). A total of 98 (17.1%) responders were smokers, among them 80 (46.5%) responders used cigarettes. The majority of the participants had diabetes $\leq$ 10 years (276, 48.3%).

Table 3 shows the frequency of dental visit among the responders. The majority of the responders (59.4%) visited dental clinic, only if they had a problem and visited a dental clinic (32.2%) in the last 3 months. A higher number of the responders reported that they visited a dental clinic for pain (20%) and due to lack of time (24.8%) many persons not visited the dental clinic.

Table 4 shows the oral hygiene of the study population. The majority of the responders were brushing their teeth (91.6%) everyday and majority of the responders (79%) brushed by the manual toothbrush and toothpaste and higher number of responders brushed one time in a day (39.9%). Medium type of brush used by (42.7%) many responders, and combined (horizontal, vertical and circular) technique used for brushing (51.7%). A total of 468 (81.8%) persons changed their toothbrush periodically and 32.2% responders changed their toothbrush once in 6 months. The majority (48.6%) of the responders brushing their teeth 1 to 2 minute and dental aids used by 69.6% of the persons, mainly toothpick (44.1%) and clean

Parameter	n (572)	(%)
Age –(years)		
20-29	44	7.7
30-39	28	4.9
40-49	136	23.8
50-59	188	32.9
60-69	136	23.8
70-79	40	7.0
Weight		
40-49 kg	8	1.4
50-59 kg	32	5.6
60-69 kg	84	14.7
70-79 kg	164	28.7
80-89 kg	140	24.5
90-99 kg	64	11.2
$\geq$ 100 kg	80	14.0
Occupation		
Government	128	22.4
Private	52	9.1
Retired	40	7.0
Student	292	51.0
Other	60	10.5
Gender		
Male	360	62.9
Female	212	37.1
Education		
Below college	160	28.0
College	352	61.5
Postgraduate	60	10.5
Nationality		
Saudi	528	92.3
Non-Saudi	44	7.7

Table 1: Demographic data of the responders

their tongue by 36.4% responders and mouth wash used by 23.8% of responders.

Table 5 shows the oral complication of the study population. A total of 264 (46.2%) persons noticed bleeding in their gums, 44.8% reported bleeding means inflamed gingiva. A total of 304 (53.1%) noticed a bad smell from their mouth and heard about the term dental plaque as staining of teeth (24.5%). More than 28% of the responders stated that gum inflammation and dental disease may increase blood sugar in diabetic patient and 30.1% stated that cleaning my gum and treating dental disease may help in improving their blood sugar level. A total of 254 persons agreed that certain systemic diseases can manifest in the oral cavity and 84.6% stated that oral health has an influence on the overall quality of life.

Discussion

Oral health status must be considered in the care of patients with DM. The health of these patients' mouths may have important effects on their overall health and evolution of their disease [14]. Regular dental checkups are necessary for all patients mainly among diabetes. A study reported that more frequent the dental visits, the lower the rate of tooth loss and the lesser the number of teeth with active decay, the higher, however, the average number of fillings. The study also suggests that frequent dental visits help to delay tooth loss and to continue dental function, they do not apparently help to

Parameter	n (572)	(%)
Type of diabetes you have		
Type 1	54	9.4
Type 2	510	89.2
Gestational diabetes mellitus	8	1.4
Medication		
Insulin only	72	12.6
Oral hypoglycemic only	280	49.0
Insulin and oral hypoglycemic	84	14.7
Herbal Medication only	20	3.5
No medications	116	20.3
Currently Smoking :		
Yes	98	17.1
No	474	82.9
What kind of cigareetes you are smoking (circle all relevant)		
Cigareetes	80	46.5
Cigar	4	2.3
Pipe	0	0.0
Electronic cegarettes	0	0.0
Shisha	12	7.0
Other	76	44.2
Duration of diabetes:		
≤ 10 years	276	48.3
> 10 years < 20 years	206	36.0
≥ 20 years < 30 years	47	8.2
≥ 30 years	43	7.5

Table 2: Clinical variables of the responders

prevent the onset of further disease [15]. In the present study we found that majority of the responders (59.4%) visited dental clinic, only if they had a problem and low number of patients visited a dental clinic (32.29%) in the last 3 months. We also found a higher number of the responders reported that they visited a dental clinic for pain (20%) and due to lack of time many responders (24.8%) not visited the dental clinic. The results of the finding showed the awareness of oral health was less among the Saudi diabetes. Earlier studies have demonstrated that delaying visit to oral health services upsurses the risk of poor oral health outcomes [9]. Socioeconomic conditions, cost, and a number of individual factors have been recognized as potential obstacles to accessing dental care [16,17]. In a study from Saudi Arabia also reported the reasons for the irregular visit mainly fear of anesthetic injection (88.2%), while dental surgical procedures (35.7%) and extractions (23%) were the most terrifying dental procedures. Lack of time (79.5%), cost (71.5%), far-situated dental services (62.2%), and fear (57.1%) were causes listed for irregular dental visits [18]. Several studies have indicated deficiencies in general oral health awareness among patients with diabetes. Additionally, most of these studies showed that a very low number of patients diagnosed with diabetes visit the dentist regularly for periodontal checkups, and many patients were unaware of the effect of diabetes on oral health [19-21].

A Saudi study indicated that inadequate health-related practices among the Saudi diabetes, the study reported that 22.2% brushed their teeth twice daily, 73.6% never flossed their teeth. Of the respondents, 94.8% reported that they had never received advice on oral hygiene tasks in relation to diabetes from a health professional [22]. In the present study we found that majority of the surveyed group were brushing their teeth (91.6%) and majority of the responders (79%) brushed by the manual tooth brush and tooth paste, a higher number of responders brushed one time in a day (39.9%). Medium type of brush used by (42.7%) many responders, and combined (horizontal, vertical and circular) technique used for brushing (51.7%). A previous study reported that powered toothbrushes reduce plaque

Parameter	n (572)	(%)
do you go to the dental clinic? If yes, how many times you go there annually !		
Only if I have a problem	340	59.4
Once in 3 months	36	6.3
Once in 6 months	68	11.9
Once in year	60	10.5
Never visited a dental clinic	68	11.9
When was your last dental visit (approximately)?		
In the last three months	184	32.2
In the last six months	128	22.4
In the last year	60	10.5
More than a year	132	23.1
I have never visited a dentist	68	11.9
Reason for visiting Dentist (patients may circle more than one box)		
Pain	204	20
General checkup	108	10.6
Root Canal Treatment	140	13.7
Hygiene and Cleaning my gum and teeth	156	15.3
Filling for my tooth/teeth	156	15.3
Crown and/or Bridge	124	12.2
Orthodontic treatment	24	2.4
Extraction	88	8.6
Any Other (specify)	20	2.0
If you do not like or have not visited dental clinic before what is the main reason (circle only the most relevant)?		
Fear of drilling toll	90	15.7
Fear of Needle	46	8.0
High Cost	196	34.3
Lack of Time	142	24.8
Any Other	98	17.1

Table 3: Frequency of dental visit among the responders

and gingivitis more than manual toothbrushing in the short and long term [23,24]. In the present study we found that a total of 468 (81.8%) persons changed their toothbrush periodically and 32.2% responders changed their toothbrush once in 6 months. The majority (48.6%) of the responders brushing their teeth 1 to 2 minute and dental aids used by 69.6% of the persons, mainly toothpick (44.1%) and clean their tongue by 36.4% responders and mouth wash used by 23.8% of responders. A study stated that insufficient tooth brushing may result in greater harmful oral effects. Maintaining oral health will prevent oral chronic diseases and ameliorate the consequences of chronic inflammatory processes [14].

Studies reported that diabetes can lead to modifications in the oral cavity such as gum-related problems like gingival hyperplasia and periodontitis. Other diabetes-related oral conditions comprise dental decay, candidiasis, and glossodynia [25,26]. In the present study we found a total of 264 (46.2%) persons noticed bleeding in their gums, 44.8% reported bleeding means inflamed gingiva. A total of 304 (53.1%) noticed a bad smell from their mouth and heard about the term dental plaque as staining of teeth (24.5%). More than 28% of the responders stated that gum inflammation and dental disease may increase blood sugar in diabetic patient and 30.1% stated that cleaning gum and treating dental disease may help in improving their blood sugar level. A previous study stated that only 28% of responders specified that they followed up gum diseases with the dentist; 48% were aware that diabetic patients are more prone to gum diseases and oral health complications. About a third (38%) recognized that their periodontal health might affect their glycaemic level [20].

Parameter	n (572)	(%)
Do you clean or brush your teeth?		
Yes	524	91.6
No	48	8.4
If yes, then how do you clean your teeth? (you may circle more than one box)		
Manual tooth brush and tooth paste	452	79.0
Electric or electric toothbrush and tooth paste	40	7.0
Finger and Tooth powder	8	1.4
Miswak	216	37.8
Any other	8	1.4
How often do you brush your teeth daily?		
Occasionally	100	17.5
Once Daily	228	39.9
Twice Daily	196	34.3
More than twice Daily	48	8.4
What type of tooth brush do you use?		
Hard	204	35.7
Soft	40	7.0
Medium	244	42.7
Never noticed	84	14.7
Which technique do you use for brushing?		
Horizontal	50	8.7
Vertical	78	13.6
Circular	124	21.7
Combined	296	51.7
Never noticed	24	4.2
Do you change your tooth brush periodically ?		
Yes	468	81.8
No	104	18.2
If yes, then how often do you change the brush		
When useless	182	31.8
Once in 3months	152	26.6
Once in 6 months	184	32.2
Once a year	54	9.4
How many minutes you spend in brushing your teeth?		
Less than 1 minute	124	21.7
1 - 2 minute	278	48.6
More than 2 minute	108	18.9
Never noticed	62	10.8
Do you use any other dental aids?		
Yes	398	69.6
No	174	30.4
if yes, which dental aid (you may circle more than one)?		
Dental Floss	232	40.6
Toothpick	252	44.1
Inter dental brush	52	9.1
Other	52	9.1
when you brush your teeth, do you clean your tongue?		
Yes	208	36.4
No	192	33.6
Some times	136	23.8
Never noticed	36	6.3
Do you use mouthwash?		
Yes	136	23.8
No	228	39.9
Some times	204	35.7
Never noticed	4	0.7

Table 4: Oral hygiene of the responders

Parameter	n (572)	(%)
Have you ever noticed bleeding in your gums?		
Yes	264	46.2
No	116	20.3
Sometimes	184	32.2
Never noticed	8	1.4
Bleeding gums means inflamed gingiva?		
Yes	256	44.8
No	96	16.8
I do not know	220	38.5
Have you ever noticed a bad smell from your mouth?		
Yes	304	53.1
No	164	28.7
I do not know	104	18.2
Have you ever heard about the term (dental Plaque)?		
Soft debris on teeth	112	19.6
Staining of teeth	140	24.5
Hard Debris on teet	124	21.7
Don't Know	196	34.3
Gum inflammation and dental disease may increase blood sugar in diabetic patient?		
Yes	160	28.0
No	38	6.6
I do not know	374	65.4
Cleaning my gum and treating dental disease may help in improving my blood sugar level?		
Yes	172	30.1
No	36	6.3
I do not know	364	63.6
Certain systemic diseases can manifest in the oral cavity?		
Agree	254	44.4
Disagree	22	3.8
I do not know	296	51.7
Oral health has an influence on the overall quality of life.		
Yes	484	84.6
No	14	2.4
Ido not know	74	12.9

Table 5: Oral complication of the responders

The major limitations of this study include: a relatively small sample size, cross-sectional in nature and limited number of risk factors examined. More studies on a larger scale are needed to address the limitations indicated in the study. Despite the limitations, the study delivers valuable data for the oral health awareness and knowledge in patients with diabetes in Saudi Arabia. Conclusively, the findings of this study evidently illustrated that the oral health awareness and knowledge among Saudi diabetes was poor. Further, well-designed randomized controlled trials with higher sample sizes are essential to validate our findings.

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References

1. World Health Organization. 2018.
2. Al Dawish MA, Robert AA, Braham R, Al Hayek AA, Al Saeed A, et al. Diabetes Mellitus in Saudi Arabia: A Review of the Recent

- Literature. *Curr Diabetes Rev*. 2016;12(4):359-368.
3. Al-Rubeaan K. National surveillance for type 1, type 2 diabetes and prediabetes among children and adolescents: a population-based study (SAUDI-DM). *J Epidemiol Community Health*. 2015 Nov; 69(11):1045-1051.
 4. Robert AA, Al Dawish MA, Braham R, Musallam MA, Al Hayek AA, et al. Type 2 Diabetes Mellitus in Saudi Arabia: Major Challenges and Possible Solutions. *Curr Diabetes Rev*. 2017;13(1):59-64.
 5. Robert AA, Al-Dawish A, Mujammami M, Dawish MAA. Type 1 Diabetes Mellitus in Saudi Arabia: A Soaring Epidemic. *Int J Pediatr*. 2018 May;9408370.
 6. Alotaibi A, Perry L, Gholizadeh L, Al-Ganmi A. Incidence and prevalence rates of diabetes mellitus in Saudi Arabia: An overview. *J Epidemiol Glob Health*. 2017 Dec;7(4):211-218.
 7. Alqurashi KA, Aljabri KS, Bokhari SA. Prevalence of diabetes mellitus in a Saudi community. *Ann Saudi Med*. 2011 Jan-Feb;31(1):19-23.
 8. Bahijri SM, Jambi HA, Al Raddadi RM, Ferns G, Tuomilehto J. The Prevalence of Diabetes and Prediabetes in the Adult Population of Jeddah, Saudi Arabia--A Community-Based Survey. *PLoS One*. 2016 Apr;11(4):e0152559.
 9. Fagerstad A, Windahl J, Arnrup K. Understanding avoidance and non-attendance among adolescents in dental care - an integrative review. *Community Dent Health*. 2016 Sep;33(3):195-207.
 10. Kudiyirickal MG, Pappachan JM. Diabetes mellitus and oral health. *Endocrine*. 2015 May;49(1):27-34.
 11. Roy M, Gastaldi G, Courvoisier DS, Mombelli A, Giannopoulou C. Periodontal health in a cohort of subjects with type 1 diabetes mellitus. *Clin Exp Dent Res*. 2019 Mar;5(3):243-249.
 12. Teshome A, Yitayeh A. The effect of periodontal therapy on glycemic control and fasting plasma glucose level in type 2 diabetic patients: systematic review and meta-analysis. *BMC Oral Health*. 2016 Jul;17(1):31.
 13. Simpson TC, Weldon JC, Worthington HV, Needleman I, Wild SH, et al. Treatment of periodontal disease for glycaemic control in people with diabetes mellitus. *Cochrane Database Syst Rev*. 2015 Nov;(11):CD004714.
 14. Lifshitz F, Casavalle PL, Bordoni N, Rodriguez PN, Friedman SM. Oral Health in Children with Obesity or Diabetes Mellitus. *Pediatr Endocrinol Rev*. 2016 Dec;14(2):159-167.
 15. Sheiham A, Maizels J, Cushing A, Holmes J. Dental attendance and dental status. *Community Dent Oral Epidemiol*. 1985 Dec;13(6):304-309.
 16. Romaine MA, Bell JF, Huebner CE. Variations in children's dental service use based on four national health surveys. *Pediatrics*. 2012 Nov;130(5):e1182-1189.
 17. Fonseca EPD, Frias AC, Mialhe FL, Pereira AC, Meneghim MC. Factors associated with last dental visit or not to visit the dentist by Brazilian adolescents: A population-based study. *PLoS One*. 2017 Aug;12(8):e0183310.
 18. Gaffar BO, Alagl AS, Al-Ansari AA. The prevalence, causes, and relativity of dental anxiety in adult patients to irregular dental visits. *Saudi Med J*. 2014 Jun;35(6):598-603.
 19. Allen EM, Ziada HM, O'Halloran D, Clerehugh V, Allen PF. Attitudes, awareness and oral health-related quality of life in patients with diabetes. *J Oral Rehabil*. 2008 Mar;35(3):218-223.
 20. Al Habashneh R, Khader Y, Hammad MM, Almuradi M. Knowledge and awareness about diabetes and periodontal health among Jordanians. *J Diabetes Complications*. 2010 Nov-Dec;24(6):409-414.
 21. Leite RS, Marlow NM, Fernandes JK, Hermayer K. Oral health and type 2 diabetes. *Am J Med Sci*. 2013 Apr;345(4):271-273.
 22. Bahammam MA. Periodontal health and diabetes awareness among Saudi diabetes patients. *Patient Prefer Adherence*. 2015 Feb;9:225-233.
 23. Yaacob M, Worthington HV, Deacon SA, Deery C, Walmsley AD, et al. Powered versus manual toothbrushing for oral health. *Cochrane Database Syst Rev*. 2014 Jun;(6):CD002281.
 24. Goh EX, Lim LP. Fact or Fiction? Powered Toothbrushing is More Effective than Manual Toothbrushing. *Oral Health Prev Dent*. 2017;15(1):23-32.
 25. Chi AC, Neville BW, Krayner JW, Gonsalves WC. Oral manifestations of systemic disease. *Am Fam Physician*. 2010 Dec;82(11):1381-1388.
 26. Bharateesh J, Ahmed M, Kokila G. Diabetes and Oral Health: A Case-control Study. *Int J Prev Med*. 2012 Nov;3(11):806-809.