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Oral health knowledge, attitudes and practices of people with diabetes in south of Tehran, Iran

Mohammad Hadi Nazari [1,2], Simin Zahra Mohebbi [2,3*], Mohammad Javad Kharazifard [4]

1. School of Dentistry, International Campus, Tehran University of Medical Sciences, Tehran, Iran.

2. Research Center for Caries Prevention, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran.

3. Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

4. Dental Research Center, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran.

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**Corresponding author:*
Simin Zahra Mohebbi

Research Center for Caries Prevention, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran; Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

Tel: +98-21-84902473
Fax: +98-21-84902473
Email: smohebbi@Tums.ac.ir

ABSTRACT

Objective: This study assesses the oral health knowledge, attitudes, care practices, and related underlying factors of people with diabetes.

Materials and Methods: In a descriptive cross-sectional study using a random sampling method, 201 patients who referred to five comprehensive health centers in the South of Tehran, Iran, participated. A previously published questionnaire was used, and its reliability and validation analyses were performed. There were 31 Open-Ended, Closed-Ended, and Likert scale questions, including 26 on key underlying factors, one with 13 parts in oral health knowledge, one with nine parts related to oral health attitudes, and three on care practices. Data were entered into SPSS software version 24, and descriptive statistics and regression were used to analyze and report the results.

Results: The mean age of participants was 49 years (σ=7.6), and males accounted for 58.2% of the study population. 37.48% of the patients had poor oral health knowledge, whereas 61.76% of them reported average care practices, with 68.29% above average attitudes. Among the study population, only 33.3% brushed more than once per day. 35.8% considered bleeding gums while brushing unacceptable, and 42.3% reported gums swelling and redness as signs of disease. Over half of respondents (52.2%) strongly supported the idea of keeping their natural teeth as long as possible, while 41.8% were only agreed. On the other hand, patients with a higher level of education scored better in knowledge, attitudes, and care practices (p-value<0.05).

Conclusion: As the knowledge, care practices, and to some extent attitudes of people with diabetes toward their general oral health were unsatisfactory, an appropriate training program should be developed to warn diabetic patients of the importance of oral health and its two-way impact on diabetes.

Keywords: Knowledge; Attitude; Practice; Oral health; Diabetes.

Introduction

Diabetes is a common disease in the world. It includes several metabolic diseases in the body that cause severe problems due to insulin deficiency or dysfunction and, consequently, high blood sugar. It is estimated that about 422 million people worldwide have diabetes [1].

The population of diabetics is projected to increase from 171 million in 2000 to 366 million in 2030 [2]. Per a study conducted in 2011, 4.5 million Iranians had diabetes, of which 1.4 million were unaware of their disease. It is estimated that about 9.2 million people in 2030 will have diabetes in Iran [3]. According to WHO statistics, in 2016, diabetes accounted for about 2% of all deaths in Iran [4]. People with diabetes are at increased risk of microvascular and macrovascular diseases. These patients often develop retinopathy, vision loss, nephropathy, impaired renal function, hypertension, hyperlipidemia, atherosclerosis, peripheral vascular disease, and brain disease. Patients with poor diabetes control also suffer from poor tissue repair and an increased risk of infection [5]. Gingivitis and periodontitis are the most common periodontal diseases for people with diabetes. The prevalence of periodontitis is higher in people with diabetes (17.3%) than in people without diabetes (9%) [6]. Periodontal disease is one of the risk factors for diabetes and its serious complications such as vascular disease, neuropathy, and retinopathy. Several researchers have suggested that there is a two-way relationship between periodontitis and diabetes, stating that uncontrolled diabetes increases patients' susceptibility to not only periodontitis but also to severe periodontitis with increased risk of the blood vessel and cerebral side effects [7,8].

Lack of knowledge about oral health is one of the reasons for not following oral health care practices. Bowyer et al., in the UK, reported that 69% of people with diabetes never received any diabetes-related health advice [9]. A study by Shanmukappa et al. showed that the shorter the time to have diabetes, the fewer people knew about the relationship between periodontal disease and diabetes; when people were asked about the symptoms of periodontal disease, few knew the answer [10]. Another study in Jordan found that 27.7% of people with diabetes brushed their teeth once a day, and 28.1% more than once a day [11].

In Iran, according to studies, the level of awareness of diabetic patients about the increased risk of oral diseases has been reported to be inappropriate. In the study by Sadeghi et al., 36.5% of patients were aware of this relationship. The performance of diabetic patients concerning oral health has also been reported to be low [12]. In the study by Bakhshandeh et al., 29% of patients brushed twice a day, 54% once a day, and 17% occasionally [13]. Considering the prevalence of diabetes in Iran and the need for proper education in order to increase patients' awareness of oral health, we decided to conduct this study. The objectives of this study include measuring the knowledge, attitude, and practice of diabetic patients towards oral health and evaluating the impact of underlying factors on it.

Material and Methods

In a descriptive cross-sectional study using a random sampling method, 201 patients who referred to five comprehensive health centers in the South of Tehran, Iran, participated. The centers were selected systematically from a list of comprehensive health centers provided by the Vice-Chancellor for Health of Tehran University of Medical Sciences. Before the questionnaire distribution, all patients were interviewed face-to-face; the research project was thoroughly explained to them and signed written consent was taken. Inclusion criteria were as follows: (a) diagnosed with either type one or two diabetes for at least one year, (b) age 18 years old or above, and (c) having at least 20 natural teeth.

The ethics code IR.TUMS.DENTISTRY.REC.1397.4912 has approved by the research ethics committee of Tehran University of Medical Sciences. A previously published questionnaire by Bakhshandeh et al. with a similar theme was used in this study [14]. Its reliability and validation analyses were performed by an expert panel of four oral health experts and an epidemiologist (Appendix). There were 31 Open-Ended, Closed-Ended, and Likert scale questions, which were completed by the patient or the researcher on behalf of illiterate patients. The structure of the questionnaire was as follows:

Part one (General questions):

Background characteristics of respondents (26 questions).

Part 2 (Specific questions):

1) Knowledge of referring people with diabetes (1 question, 13 parts).

2) Attitudes of referring people with diabetes (1 question, 9 parts).

3) Care practices of referring people with diabetes (3 questions).

The researcher received 207 completed questionnaires, and 97% of them had reliable answers (N=201). The data so obtained was compiled and analyzed using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 24.0 for windows). Then the descriptive statistics, including mean, standard deviation, percent-

age, and frequency, were used to describe demographic variables as well as present data on prevalence. Moreover, the linear regression tests were used for statistical analysis. Each question was assigned a score of 0 or 1 in the field of knowledge, a score of 1 to 5 (1 being the lowest and 5 being the highest) in the field of attitude, and a score of 1 to 4 (from least to most significant) in the field of care practices (the highest scores are marked with color). The rest of the questions were either in the form of multiple-choice or yes/no.

Results

Underlying Factors

The mean age of participants was 49 years (σ=7.6), and males accounted for 58.2% of the study population. Only 76 out of 201 patients had a university education, constituting 37.9%, while 21.4% (N=43) had attained a diploma, 18.9% (N=38) had high school education, and 21.9% (N=44) were illiterate. 28.9% of the population study had no history of smoking, whereas 15.9% had used hookah. The insulin-dependent diabetes rate was 29%, and 68.1% had non-insulin-dependent diabetes. The patients were divided into two groups of having diabetes of up to ten years (47.3%, N=95) and over ten years (52.7%, N=106). 49.3% of the population study were aware of their HbA1c level (the index of diabetes control in the last quarter of life). It was below 7 in 49 patients (24.4%), between 7 and 8 in 27 patients (13.4%), and above 8 in 20 of them (10%). Only 29.8% of people did not have systemic diseases caused by diabetes.

Eighty-eight patients (44%) visited a dentist less than a year ago. Whereas, pain or other emergencies with greater than 53.7% (N=108) were the top reasons for the visit. Ninety patients (44.8%) admitted that their dentist was aware of their disease. However, 29.9% of the population study conveyed that they received advice on oral hygiene from their dentist in their last dental visit. Only 32.8% (N=66) did not lose any teeth. 81.6% of the population study admitted that they do not have any gum disease and have not had this disease recently. One hundred thirty-seven patients did not have bleeding gums. However, 21.4% of the population study confirmed that they clean the bleeding area more while brushing. One hundred thirteen patients stated that their general practitioner (GP) did not refer them to a dentist for oral health care. 45.77% suffered from dry mouth, and 41.79% felt a bitter taste in their mouth. 58.2% of the population study were controlling their diabetes well/relatively well, with only 43.8% of the patients described their oral health well/quite well. 63.7% of patients did their dental treatment in one of the public health centers. One hundred twenty-five patients did not know about the effect of gum disease on diabetes. Moreover, 61.7% of the population study had no information about dental care and oral diseases, despite 38.3% with little figures where 28.4% of them received the statistics by their dentist.

Oral health knowledge

Regarding knowledge and awareness towards general oral health, the independent variables were age, sex, and level of education. In contrast, knowledge was taken as the dependent variable. The mean knowledge score was 37.48 (σ=33.71) in the range of 0 to 100, and the maximum score reached 92. Based on the multiple linear regression analysis, the level of education had a positive linear relationship with knowledge with p-value=0.000<0.05. However, this study could not indicate any meaningful relationship between age or sex and knowledge.

Oral health attitudes

For the evaluation of oral health attitudes, the independent variables were age, sex, and level of education. In contrast, the attitude was taken as the dependent variable. The attitude score of the population study ranged from 20 to 100, with a mean value of 68.29 (σ=7.6), a minimum of 44.44, and a maximum of 86.67. The multiple linear regression analysis revealed that the level of education had a positive linear relationship with the attitude resulting in p-value=0.000<0.05. However, a p-value greater than 0.05 indicated that there was no meaningful relationship between age or sex and knowledge.

Oral health care practices

For the evaluation of care practices, the independent variables were age, sex, and level of education. In contrast, the care practices were taken as the dependent variable. The minimum obtained score for care practices was 33.33, with a maximum of 100 and a mean value of 61.76 (σ=14.77). The multiple linear regression analysis revealed that the level of education had a positive linear relationship with the care practices resulting in p-value=0.000<0.05. However, a p-value greater than 0.05 indicated that there was no meaningful relationship between age or sex and care practices.

		Number	%			Number	%
Gender	Female	84	41.8	Level of education	illiterate	44	21.9
	Male	117	58.2		High School	38	18.9
Age	63-73	21	10.4		Diploma	43	21.4
	53-63	33	16.4		University degree	76	37.9
	43-53	87	43.3	Type of diabetes	Mellitus (Insulin-dependent)	60	29.0
	33-43	28	13.9		Mellitus (non-insulin-dependent)	141	68.1
					Unknown	6	2.9
	23-33	32	15.9	Duration of diagnosis of diabetes	Up to 10 years	95	47.3
					Over 10 years	106	52.7

Table 1. Background characteristics of people with diabetes who referred to comprehensive health centers in South of Tehran, Iran.

	1) False		2) Do not know		3) True	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1) Bleeding gums while brushing is normal.	72	35.8	100	49.8	29	14.4
2) A tooth is attached to the bone by delicate fibers.	1	0.5	145	72.1	55	27.4
3) The Symptoms of gum disease are swelling and redness.	0	0.0	116	57.7	85	42.3
4) Oral health alone can affect overall health.	0	0.0	92	45.8	109	54.2
5) Calculus may occur under the gums.	4	2.0	129	64.2	67	33.3
6) The remaining food particles and bacteria cause calculus on the teeth.	2	1.0	96	47.8	103	51.2
7) Mouthwashes and antibiotics are the most effective means of protecting gum against diseases.	0	0.0	158	78.6	42	20.9
8) Regular brushing is essential, despite a healthy gum.	1	0.5	68	33.8	132	65.7
9) The higher the amount of calculus in gum disease, the greater the rate of infection.	5	2.5	116	57.7	80	39.8
10) People with diabetes are more prone to oral diseases.	1	0.5	122	60.7	78	38.8
11) Diabetes causes tooth decay.	16	8.0	132	65.7	53	26.4
12) Diabetes causes fungal infection in the mouth.	8	4.0	136	67.7	57	28.4
13) Smoking damages the gum of diabetics more than non-diabetics.	1	0.5	114	56.7	84	41.8

Table 2. Knowledge and awareness of the population study.

Questions	Strongly agree		Agree		Do not know		Disagree		Strongly disagree	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1) Treating decayed teeth is more important than treating gum disease.	25	12.4	36	17.9	85	42.3	50	24.9	5	2.5
2) High dental treatment costs are the main reason why people avoid visiting a dentist.	40	19.9	148	73.6	3	1.5	6	3.0	3	1.5
3) Oral health is not as crucial as overall health.	5	2.5	9	4.5	56	27.9	65	32.3	65	32.3
4) As a child, I suffered from dental problems and could not do anything about it.	1	0.5	3	1.5	3	1.5	54	26.9	140	69.7
5) I desire to save my natural teeth as long as possible.	105	52.2	84	41.8	4	2.0	8	4.0	0	0.0
6) Forgetfulness and lack of time are the main reasons for my lack of dental care.	14	7.0	92	45.8	21	10.4	60	29.9	14	7.0
7) I believe that beautiful teeth are more important than a healthy gum.	5	2.5	8	4.0	112	55.7	66	32.8	10	5.0
8) The dentist does not provide enough information to patients.	4	2.0	5	2.5	110	54.7	74	3608	8	4.0
9) Diabetes increases the risk of infection after tooth extraction.	10	5.0	77	38.3	110	54.7	2	1.0	2	1.0

Table 3. Oral health attitudes of the population study.

Questions	Frequency	Percentage (%)
26) How often do you brush your teeth?		
1) sometimes	21	10.4
2) once a day	99	49.3
3) more than one per day	67	33.3
4) I do not brush my teeth.	14	7.0
27) Which device do you utilize to clean your interdental areas?		
1) dental floss	62	30.8
2) toothpick	76	37.8
3) interdental brushes	14	7.0
4) I do not use any specific device.	49	24.4
28) How frequently do you use the above devices?		
1) sometimes	67	33.3
2) once a day	70	34.8
3) more than one per day	28	13.9
4) once a week	29	14.4

Table 4. Care practices of the population study.

Discussions

The present study aimed to investigate the knowledge, attitudes, and care practices of patients with diabetes concerning oral health. This survey found that diabetic patients had above average attitudes towards their oral health, with a score of 65% and above. However, their knowledge of oral health was under 40%, which was considered as poor. A score of 40% to 65% revealed average care practices among the patients.

In our study, 61.2% (N=123) of the population study were unaware of the association between diabetes and oral diseases. In line with this figure, a systematic review by Poudel et al. showed that more than half of people were unaware of the impact of diabetes on oral health (especially gum tissue) [15].

In the current study, eighty-one (40.3%) diabetic patients were aware of dental care to prevent oral diseases, of which 28.4% received the information from dentists, 4% from GPs, and the rest from resources and publications. In a study by Sadeghi et al., 36.5% of people knew about the connection between oral health and diabetes, of which for 23.7%, the source of information was dentists, and 12.8% were GPs [12]. The relationship between gum disease and diabetes control was quite well known only in 37.8% (N=76) of our population study, whereas 31.3% of them had obtained this information from a dentist or a dental nurse. Our result was further confirmed by a study of Bahammam in which 21.8% (N=99) of people were aware of this connection [16].

The current survey disclosed that 70.1% (N=141) of the population study did not receive a recommendation for oral hygiene and care at their last dental visit. This figure is quite in concordance with Bowyer, who studied a similar population in the UK, where the majority of people with diabetes went to the dentist once or twice a year. However, more than two-thirds of them acknowledged that the dentist did not provide them with enough information on oral health [9]. Moreover, the present study shows that diabetic patients do not have enough knowledge of the bilateral effects of diabetes on oral health, and one of the possible reasons is the oral health neglect by GPs and dentists. Similar results have been found in the literature [17-20]. Regular dental check-ups were 14.4% in our study, which is in agreement with a study in Iran by Bakhshandeh [14]. In both studies, dental referrals for periodic check-ups were low compared with the UK, where nearly 37% of patients had regular check-ups [21]. This difference shows that unlike Western countries, oral health is not the main priority for diabetic patients in Iran. 57.7% (N=116) of our population study were not conscious of the symptoms of gum disease, which are swelling and redness. Moreover, 64.2% (N=129) did not consider bleeding gums while brushing as abnormal. However, in a study by Eldarrat in the UAE, 70% of patients knew that bleeding gums while brushing were a sign of gum disease, and 63% believed that swollen and red gums were signs of periodontal disease [22]. The culture or setting of the group of participants was the main reason for the rate difference in the two countries.

The attitude of diabetic patients toward oral health determines the importance of this topic for them and is a tool to assess the condition of the mouth and teeth [15]. With 49% frequency in the US, our study showed that 64.6% (N=130) of the population study believed that oral health was as important as overall health [23].

The high cost of dental treatment was the primary reason for 93.5% (N=188) of the patients on not visiting a dentist. Whereas, approximately 44% of the people in the UK had the same reason in 2011 [9]. It seems that the high cost of dental care is an international concern that needs to be addressed [15]. Meanwhile, 52.7% (N=106) of the population study reported forgetfulness and lack of time as the primary reasons for lack of dental care. While in a study by Sahril et al. in 2014 in Malaysia, the lack of need for dental care, lack of dental problems, and not taking oral problems seriously were the main reasons for not visiting a dentist [24].

The care practices of the patients about oral health was monitored by brushing and flossing. In this study, 49.3% (N=99) brushed once a day, 33.3% (N=67) brushed more than once per day, and only 7% (N=14) did not brush at all. 37.8% (N=76) used toothpicks to clean the interdental areas, 30.8% (N=62) used dental floss, and 7% (N=14) used interdental toothbrushes.13.9% (N=28) used the above devices more than once a day, and 24.4% (N=49) did not use any special device to clean the interdental areas. Moreover, in a study by Eldarrat in the UAE, 31% of patients brushed once a day, and 50% twice a day, 11% used dental floss once a day, and 66% did not floss at all [22]. Also, in a study by Zeidi et al. in Iran, people with diabetes had poor oral hygiene, with only 22.7% of people brushed twice a day [25]. In all of these studies mentioned above, the care practices of diabetic patients toward oral health were low. Dentists should instruct oral health care to people with diabetes, especially on tooth brushing and flossing methods, and diabetic patients should also be warned

that if they do not follow the oral health care practices, gingivitis and periodontitis will increase and will harm their diabetes control process [16]. Better oral hygiene knowledge, attitude, and care practices were found in patients who had a higher level of education with p-value<0.05. Meanwhile, the study of Zeidi et al. in Iran also revealed that the higher the level of education, the better self oral care with p-value=0.05, and r=0.118 [25]. Moreover, a study by Bahammam in Saudi Arabia showed that patients with a higher level of education were more aware of the relationship between periodontal disease and diabetes (p-value=0.026) [16].

Study limitations

This study examined the knowledge, attitude, and care practices of diabetic patients towards their oral health and identified the related underlying factors. The executive limitation of the project was that a questionnaire was used in this study, so some people may refuse to provide a real answer and give an unrealistic answer or do not participate. However, by explaining the importance of the research and its practical purposes, public participation engagement would be increased. Moreover, the generalizations from this study may not apply to other areas in Tehran province as the South of Tehran is unique in its social and demographic factors.

Conclusion

The level of knowledge, care practices and to some extent attitudes of diabetic patients regarding oral health is not satisfactory. Steps must be taken to develop an appropriate training program for dentists and GPs on teaching oral hygiene to people with diabetes and to warn diabetic patients of the importance of oral health and its two-way impact on diabetes. Also, dental health education should be structured in such a manner as to gain the patient's interest and obtain a high priority of social acceptance.

Conflict of Interest

There is no conflict of interest to declare.

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