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Oral health seeking behaviour among Malaysians with type II diabetes

Norhafizah Sahril [1*], Tahir Aris[1], Ahmad Sharifuddin Mohd Asari [2], Siew Lian Yaw[2], Natifah Che Saleh[2], Mohd Azahadi Omar[1], Chien Huey Teh[1], Khairiyah Abdul Muttalib[2], Mohd Feisul Idzwan[3], Low Lee Lan[4], Nooral Zeila Junid[2], Fatanah Ismail[5], Noor Aliyah Ismail[2] and Norain Abu Talib[6]

*Correspondence: norhafizah_s@moh.gov.my

[1]Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia, Malaysia.
[2]Oral Health Division, Ministry of Health Malaysia, Malaysia.
[3]Disease Control Division, Ministry of Health Malaysia, Malaysia.
[4]Institute for Health Systems Research, National Institutes of Health, Ministry of Health Malaysia, Malaysia.
[5]Family Health Development Divsion, Ministry of Health Malaysia, Malaysia.
[6]MAHSA University College, Malaysia.

Abstract

Background: Chronic periodontitis has been recognised as one of the complications of diabetes mellitus. Individuals with diabetes are at higher risk of destructive periodontal disease. The objective of this study was to examine the oral health seeking behaviour of diabetic patients in Malaysia in order to improve their oral health condition.

Methods: A cross-sectional study on Type II diabetes patients was conducted at selected public sector health clinics across four states, using self-administrated questionnaires. Descriptive data analysis was performed using SPSS version 19.

Results: Of the 4,017 respondents, only 35.5% (95% CI: 34.10-37.10) acknowledged the association of diabetes and oral health. Less than half [48.4% (95% CI: 46.90-50.00)] had dental check-up since their diagnosis of diabetes. Of these, only 35.3% (95% CI: 33.10-37.40) had their last dental visit within the past one year. This accounted for only 16.7% of all respondents. Among those who had dental check-up, majority of them [95.4% (95% CI: 94.30-96.30)] were self-motivated while the remaining [4.6% (95% CI: 3.70-5.70)] were referred by healthcare staff. About 79.2% (95% CI: 77.90-80.40) claimed that dental check-up is important for diabetes patients. However, only 59.9% (95% CI: 58.30-61.40) wanted to be referred for dental care. Three main reasons for not wanting a referral were perceived lack of necessity for a dental check-up, the absence of dental problems and the perception that dental problems were not serious.

Conclusion: Despite majority of diabetes patients claiming the importance of dental check-up (79.2%), the demand for dental referral (59.9%) and actual oral healthcare utilisation (48.4%) were low. Referral of diabetes patients for oral healthcare by healthcare workers was very low. There is a need to increase the oral health awareness of diabetes patients and to improve their utilisation of oral healthcare. Healthcare workers need to routinely refer diabetes patients for a dental check-up.

Keywords: Diabetes patients, oral health-seeking behaviour, dental check-up, diabetes mellitus

Introduction

Diabetes mellitus is a chronic metabolic disorder that affects millions of people worldwide. Diabetes patients need continuous medical care and meticulous patient self-management including monitoring and maintaining good glycaemic control in order to prevent acute complication, which can reduce the risk of long term complications.

Medical complications associated with diabetes include neuropathy, retinopathy, peripheral vascular disease, coronary heart disease and also oral health complications [1-4]. These oral health complications include chronic periodontitis, gingivitis, dental caries, mucosa, burning mouth syndrome, tooth loss, mouth dryness, taste impairment and sialosis [3,5-10].

Many studies have proven that the prevalence, severity and progression of periodontal diseases are significantly increased in patients with diabetes [11]. In a nationwide survey, people with especially poorly controlled diabetes have a significantly higher prevalence of severe periodontitis [12].

Findings from a previous study also indicate that periodontal destruction is higher in children and adolescents with diabetes [13]. Children with diabetes had significantly more dental plaque and gingival inflammation than non-diabetic children [14]. In addition, patients with diabetes were found to be more likely to develop periodontal diseases [15] and certain oral mucosal disorders compared to non-diabetic individuals [16]. There is also evidence that patients with diabetes are more prone to developing caries [8,17-19] and suffering tooth loss [9,10], and children with diabetes have a greater risk of developing gingivitis [20]. Hence, the prevalence of gingivitis among children and adolescents with diabetes is nearly twice than

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those without diabetes [21].

The treatment guideline produced by the Centre of Disease Control and Prevention (CDC) recommends dental care for diabetics patients at least once in every 6 months. More frequent dental visits are recommended for those with periodontal disease [22]. Furthermore, the American Diabetes Association (ADA) standards also recommend that examination of the oral cavity be carried out as part of the patient's initial visit [23]. However, the referral practice of diabetes patients for dental care is not included in the current Clinical Practice Guidelines (CPG) for the management of diabetic patients in the public health sector in Malaysia. The objective of this study was to examine the oral health seeking behaviour of diabetes patients and their utilisation of oral healthcare services. The findings of this study will contribute invaluable input to the holistic management of diabetes patients.

Material and methods

Study design

This is a cross-sectional descriptive study conducted among Type II diabetes patients attending public sector health clinics in four states (Kedah, Negeri Sembilan, Terengganu and Johor). In this study, data obtained from the states of Kedah and Negeri Sembilan will serve as baseline data for a further intervention study (with Kedah and Negeri Sembilan as the 'test' states and, Terengganu and Johor as the 'control' states). The selections of these states were based on the prevalence of diabetes as reported by the Third National Health and Morbidity Survey 2006 [24].

Sampling

The sample size for each state was calculated using the formula for prevalence study with estimated prevalence of only 50% of the diabetes patients had dental referral, precision of 0.05 and 20% non-respondents. This gave rise to the estimated sample size of 460. The sample size was multiplied by design effect of 2.0 since the sampling was cluster sampling. There were four clusters for each state:

1. Clinic with Family Medicine Specialist in Urban area.
2. Clinic without Family Medicine Specialist in Urban area.
3. Clinic with Family Medicine Specialist in Rural area.
4. Clinic without Family Medicine Specialist in Rural area.

Total sample size was increased to 1000 per state for ease of sampling (i.e., 250 sample for each cluster). For each cluster, one health clinic was chosen randomly and 250 patients were selected from each clinic to be included in the study.

The classification of urban or rural locality described in this study was provided by Department of Statistics Malaysia where areas with population greater than 10,000 are gazetted as 'urban' and those below 10,000 populations as 'rural' [25].

All patients who fulfilled the inclusion criteria of age 18 years old and above, and with a confirmed diagnosis of Type II diabetes were included in the study. Non-Malaysians, patients with Type I diabetes and pregnant mothers were excluded.

Instrument

Two sets of pre-coded questionnaire were designed for this study, one set for the healthcare workers managing diabetes patients and another set for the diabetes patients. All healthcare workers who managed diabetes patients in the selected clinics were invited to participate in this survey. However, the findings on healthcare workers are not presented in this paper.

For the diabetes patients, the questionnaire was prepared in Malay, English and Mandarin. Using a forward-backward technique, the original English-language questionnaire designed for this study was translated into Malay language, and translated back to English. Similarly, for the Mandarin-English language questionnaire, the English-language questionnaire was translated to Mandarin, and the translated Mandarin questionnaire was translated back to the English language. Only the Malay and English questionnaire were pre-tested for clarity of content at a public clinic in Federal Territory Kuala Lumpur (was not involved in the survey), prior to the commencement of the survey. The final questionnaire consisted of eight questions on diabetes mellitus and oral health, oral health seeking behaviour and oral healthcare utilisation.

The self-administered questionnaire was distributed to all eligible diabetes patients attending the selected clinics. Illiterate patients were assisted by healthcare workers in administering the questionnaire. Field data collection was conducted from November 2011 to February 2012.

Data analysis

Data analysis was performed using SPSS version 19.0. Simple descriptive data for socio-demographic characteristics such as gender, race, age and residency were illustrated. Bivariate analysis was performed to determine oral health seeking behaviour of patients with diabetes and their utilisation of oral health services by socio-demographic profiles.

Results

Socioeconomic characteristics of respondents

There were 4,017 Type II diabetes patients recruited in this study. More than half of them (55.7%) resided in rural areas. Majority of them were females 62.3%. The sample was mainly constituted by Malays (71.1%), followed by Chinese (15%), Indians (13.8%) and other ethnicity (0.1%).

Patients in the age group of 55-59 years made up the highest percentage (35.2%), followed by those aged 60-69 years (30.2%). About 15.2% of patients were 70 years and above and 14.6% were between 40-49 years. A small percentage of patients (3.7%) were between 30-39 years while 1.1% were between 18-29 years (**Table 1**).

Duration of diabetes and perceived association between diabetes and oral health

Overall, the mean years of duration for which the patients

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Table 1. Socio-demographic characteristics of respondents.

Socio-demographic Characteristics	%	CI
Gender		
Male	37.7	36.20-39.20
Female	62.3	60.80-63.80
Location		
Urban	44.3	43.20-45.50
Rural	55.7	54.60-56.90
Ethnicity		
Malay	71.1	69.60-72.50
Chinese	15.0	13.90-16.20
Indian	13.8	12.80-14.90
Others	0.1	0.00-0.30
Age Group		
18-29 years	1.1	0.90-1.50
30-39 years	3.7	3.10-4.30
40-49 years	14.6	13.60-15.80
50-59 years	35.2	33.70-36.70
60-69 years	30.2	28.80-31.70
70 years and above	15.2	14.10-16.30

had diabetes was 7.22±5.95. More than a third of the patients, [39.4% (95% CI: 37.9-40.9)] have been diagnosed with Type II diabetes since four years ago. About 30.4% (95% CI: 29.0-31.9) claimed that they have had diabetes between 5 to 9 years, and 18.5% (95% CI: 17.4-19.8) between 10-14 years. About 6.0% (95% CI: 5.3-6.8) had diabetes for 15-19 years and the remaining 5.6% (95% CI: 4.9-6.4) have had diabetes for 20 years and above (**Table 2**).

Only 35.5% (95% CI: 34.1-37.1) of patients perceived there was an association/relationship between diabetes and oral health, and it did not differ significantly across socio-demography. Of note, more than 60.0% of the patients did not know the association between diabetes and oral health, regardless of the duration of illness.

Dental check-up, mode of referral and reasons for not seeking dental care since being diagnosed with diabetes

Overall, 48.4% (95% CI: 46.9-50.0) of the patients sought dental check-up since the diagnosis of diabetes. Similar prevalence of dental visits since were seen since being diagnosed with diabetes among males, 48.8% (95% CI: 46.3-51.4) and females 48.1% (95% CI: 46.2-50.1) and also for those living in urban, 49.8% (95% CI: 47.5-52.1) and rural areas 47.4% (95% CI: 45.3-49.4).

By ethnicity, the highest prevalence of diabetes patients who had a dental visit since their diagnosis of diabetes were among the Indians 50.9% (95% CI: 46.7-55.1), followed by Malays, [49.1% (95% CI: 47.2-50.9)] and Chinese [42.5% (95% CI: 38.6-46.5)].

Table 2. Duration of having been diagnosed with type II diabetes and perceived association between diabetes and oral health.

Duration of diabetes	%		CI	
< 5 years	39.4		37.90-40.90	
5 – 9 years	30.4		29.00-31.90	
10 – 14 years	18.5		17.40-19.80	
15 – 19 years	6.0		5.30-6.80	
≥20 years	5.6		4.90-6.40	
Socio-demographic Characteristics	**Aware of perception on association between diabetes and oral health (n=3970)**			
	Yes		**No**	
	%	**CI**	**%**	**CI**
ALL	35.5	34.10-37.10	64.5	62.90-65.90
Gender				
Male	35.5	33.10-38.00	64.5	62.00-66.90
Female	35.5	33.60-37.40	64.5	62.60-66.40
Location				
Urban	35.1	32.90-37.30	64.9	62.70-67.10
Rural	36.0	34.00-38.10	64.0	61.90-66.00
Ethnicity				
Malay	37.3	35.50-39.10	62.7	60.90-64.50
Chinese	26.8	23.40-30.60	73.2	69.40-76.60
Indian	35.1	31.20-39.20	64.9	60.80-68.80
Others	50.0	12.30-87.70	50.0	12.30-87.70
Age Group				
18-29 years	52.2	37.90-66.10	47.8	33.90-62.10
30-39 years	45.9	38.00-54.00	54.1	46.00-62.00
40-49 years	44.3	40.40-48.40	55.7	51.60-59.60
50-59 years	38.5	36.00-41.10	61.5	58.90-64.00
60-69 years	31.7	29.10-34.40	68.3	65.60-70.90
70 years and above	24.1	20.90-27.70	75.9	72.30-79.10

Comparing across age groups, those aged 18-29 years reported the highest dental visit while the lowest was among those aged 70 years and above. However, there were no significant statistical differences for dental check-up by other socio-demographic characteristics.

Overall, 16.7% (95% CI: 15.6-17.9) of the respondents had a dental check-up in the last one year. Of those who had a dental check-up, only 35.3% (95% CI: 33.1-37.4) had their last dental visit within the last year (**Table 3**).

Majority of the patients [95.4% (95%CI: 94.3-96.3)] who have ever had a dental check-up since their diagnosis with diabetes were self-motivated to do so and only 4.6% (95% CI: 3.7-5.7) were referred by the healthcare staff.

Among the patients who claimed that they have never sought dental care since being diagnosed with diabetes, the two most commonly reported reasons for not seeking care were that their teeth problems were not serious (51.3%) and

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Table 3. Respondents who had a dental check-up and timing for last dental visit since diagnosed with type II diabetes.

Socio-demographic Characteristics	Had dental check-up since diagnosed with diabetes (n=4008)				Timing for last dental visit since diagnosed with diabetes (n=1941)			
	Yes (n=1941)		No (n= 2067)		Less than 1 year		More than 1 year	
	%	CI	%	CI	%	CI	%	CI
ALL	48.4	46.90-50.00	51.6	50.00-53.10	35.3	33.10-37.40	64.7	62.60-66.90
Gender								
Male	48.8	46.30-51.40	51.2	48.60-53.70	37.0	33.60-40.60	63.0	59.40-66.40
Female	48.1	46.20-50.10	51.9	40.90-53.80	34.3	31.60-37.10	65.7	62.90-68.40
Location								
Urban	49.8	47.50-52.10	50.2	47.90-52.50	39.3	36.10-42.60	60.7	57.40-63.90
Rural	47.4	45.30-49.40	52.6	50.60-54.70	31.9	29.10-34.80	68.1	65.20-70.90
Ethnicity								
Malay	49.1	47.20-50.90	50.9	49.10-52.80	35.8	33.30-38.40	64.2	61.60-66.70
Chinese	42.5	38.60-46.50	57.5	53.50-61.40	34.7	29.00-40.90	65.3	59.10-71.00
Indian	50.9	46.70-55.10	49.1	44.90-53.30	33.6	28.20-39.40	66.4	60.60-71.80
Age Group								
18-29 years	60.9	46.20-73.80	39.1	26.20-53.80	44.4	27.20-63.10	55.6	36.90-72.80
30-39 years	54.4	46.30-62.30	45.6	37.70-53.70	53.8	42.80-64.60	46.2	35.40-57.20
40-49 years	55.9	51.80-59.80	44.1	40.20-48.20	41.6	36.40-47.00	58.4	53.00-63.60
50-59 years	50.4	47.70-53.00	49.6	47.00-52.30	37.4	33.80-41.00	62.6	59.00-66.20
60-69 years	46.2	43.40-49.00	53.8	51.00-56.60	31.4	27.60-35.40	68.6	64.60-72.40
70 years and above	39.0	35.20-43.00	61.0	57.00-64.80	21.2	16.40-27.00	78.8	73.00-83.60

the lack of awareness on the need for dental check-up (18.1%).

Perceived importance for diabetes patient to seek dental care

About 79.2% (95% CI: 77.9-80.4) of the patients perceived that it was important for them to seek dental care while, 6.8% (95% CI: 6.0-7.6) reported that it was not important and the rest, 14.1% (95% CI: 13.0-15.2) claimed they did not know the importance of seeking dental care with, prevailing diabetic conditions. Males, 80.3% (95% CI: 78.2-82.2), rural dwellers, 83.8% (95% CI: 82.2-85.3) and Malays, 85.6% (95% CI: 84.3-86.9) were more acknowledged on the importance of seeking dental care compared to their counterparts (**Table 4**).

Demand for dental care and reasons for not wanting a referral

More than half of the patients, 59.9% (95% CI: 58.3-61.4) wanted to be referred for dental care while the rest 40.1% (95% CI: 38.6-41.7) responded that they did not want to be referred. The three main reasons for refusing a dental referral were; the perceived lack of necessity for a dental check-up, [52.7 (95% CI: 50.3-55.2)], the absence of dental/gum problems, [28.9% (95% CI: 26.7-31.2)] and the perception that dental/gum problem was not serious, [9.2% (95% CI: 7.9-10.8)] (**Figure 1**).

Discussion

The findings of this study showed that all the patients had a fairly long duration of Type II diabetes, with at least four years history of the condition. Importantly, the findings also showed that only 35.5% of the diabetic patients perceived there was an association between diabetes and oral health. Conversely, more than 60.0% did not know the association/relationship between diabetes and oral health. This finding is supported by studies conducted by Valerio MA et al., and Bowyer V et al., which showed that the awareness and understanding on relationship between oral health and diabetes were minimal among the patient population [**26**,**27**]. Evidence was also observed that the lack of knowledge concerning the relationship between diabetes and oral health can lead to poor oral health-related behaviour [**28**,**29**].

The strong relationship between periodontal disease and glycaemic control is documented [**12**] and patients with diabetes who have better oral self-care will also have better glycaemic control [**9**,**30**,**31**]. As such, diabetes patients should be alerted that poor glycaemic control has negative consequences on their general health and health-related quality of life. As this study showed a low awareness of diabetes patients on the association between diabetes and oral health, multidisciplinary effort is needed to raise the awareness of the bi-directional

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Table 4. The perceived importance of seeking dental care among diabetes patients.

Socio-demographic Characteristics	The perceived importance of seeking dental care among diabetes patients (n=3996)					
	Important		Not Important		Do not Know	
	%	CI	%	CI	%	CI
ALL	79.2	77.90-80.40	6.8	6.00-7.60	14.1	13.00-15.20
Gender						
Male	80.3	78.20-82.20	6.3	5.20-7.70	13.4	11.70-15.20
Female	78.6	77.00-80.20	7.0	6.00-8.00	14.4	13.10-15.90
Location						
Urban	73.3	71.20-75.30	9.3	8.10-10.80	17.3	15.60-19.20
Rural	83.8	82.20-85.30	4.7	3.90-5.70	11.5	10.20-12.80
Ethnicity						
Malay	85.6	84.30-86.90	3.7	3.10-4.50	10.7	9.60-11.90
Chinese	57.5	53.40-61.40	14.6	12.00-17.70	28.0	24.50-31.70
Indian	69.6	65.60-73.30	14.2	11.50-17.40	16.2	13.30-19.60
Age Group						
18-29 years	91.3	79.00-96.70	2.2	0.30-13.90	6.5	2.10-18.40
30-39 years	89.0	82.90-93.20	2.7	1.00-7.10	8.2	4.70-13.90
40-49 years	86.2	83.10-88.70	5.5	3.90-7.60	8.4	6.40-10.90
50-59 years	81.6	79.50-83.50	5.6	4.50-7.00	12.8	11.10-14.60
60-69 years	75.6	73.10-77.90	8.0	6.60-9.70	16.3	14.40-18.50
70 years and above	70.6	66.80-74.10	9.4	7.30-12.00	20.0	17.00-23.40

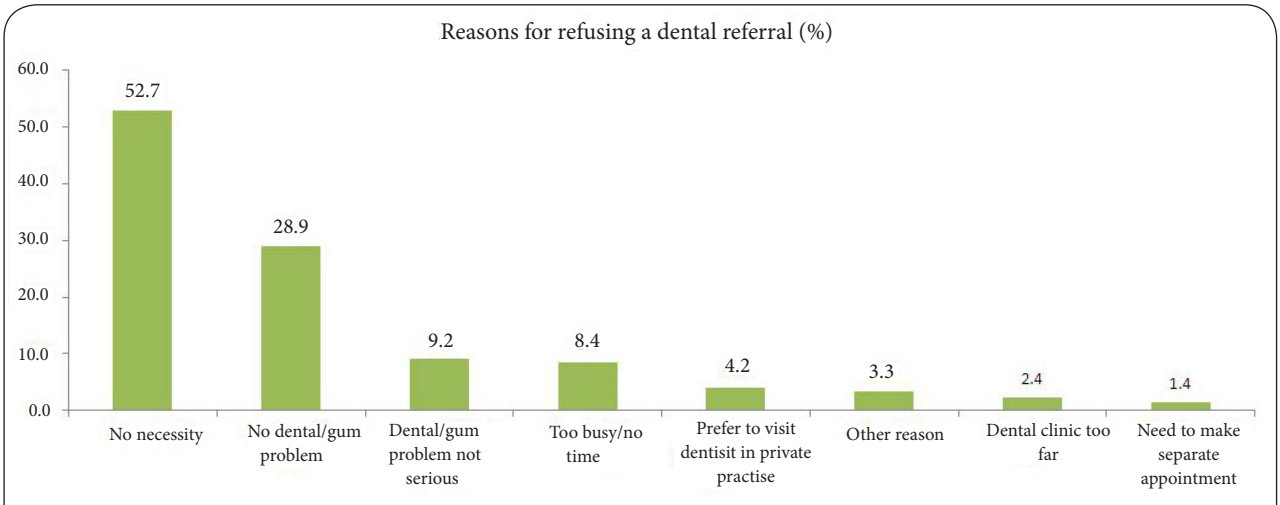

Figure 1. Reasons for refusing a dental referral.

relationship between diabetes and oral health among the diabetics. Promoting this awareness is essential and important in the management of diabetes patients.

In this study, less than half of the patients had a dental check-up since their diagnosis of diabetes. Indians and those aged 18-29 years old had frequent dental check-up, however the prevalence did not differ by sex and locality. Contradictory to our finding, a previous study has reported that regular dental check-up habits were more frequently found among diabetics in urban than in rural areas [32]. Good oral health has been shown to be strongly associated with frequent dental visits [33]. Although regular dental check-ups are important to maintain good oral health in diabetes patients, several studies clearly showed that the attitude of the diabetes patients

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with regard to regular dental check-ups for oral health was poor. These studies showed that the percentages of diabetes patients who went for dental check-up were 37% [34], 47% [35], 59% [36] and 14% [37] and the figures were fairly similar to the finding in this study.

The findings in this study also indicated that among those who had a dental check-up since their diagnosis of diabetes, only about 1 in 3 patients (35.3%) had their dental visit within the last year. It has been reported that diabetes patients were significantly less likely to see a dentist within a year than non-diabetes [14]. Compared to this study, a study conducted in United Arab Emirates (UAE) showed a slightly higher percentage (40%) of yearly visits by diabetics [37]. Another study found that people who were diagnosed with diabetes were less likely to have seen a dentist within the preceding 12 months (64.5%) compared to have seen a physician or other healthcare provider for diabetes care (86.3%) [38]. Study by the Indian Health Service also showed relatively low level of compliance with recommended regular dental visit [39]. Swedish aged 20-70 years old with type 1 diabetes of a long duration (mean 29 years) or a short duration (mean 5 years) were found less likely to have seen a dentist within the preceding 2 years (89% and 83% respectively) than those without diabetes 97% [40]. However in contrary to the Behaviour Risk Factor Surveillance System (BRFSS 2004) conducted in United States, most of dentate adults with diabetes were reported to have had a dental visit during the preceding 12 months of the survey [41]. The lack of awareness on the association of oral health and diabetes in this study is a possible contributing factor to the low proportion of diabetes patients who had their last dental visit a year ago. For the betterment of diabetic self-management behaviours, it is befitting that health care providers strengthen their role in improving their patient's knowledge about their disease [42,43].

Notably, less than 5% of diabetes patients who last went for a dental check-up were referred by healthcare workers. This showed the referral of diabetes patients for oral healthcare by public sector healthcare workers is very low. All healthcare workers need to be aware of the bi-directional relationship between diabetes and oral health. Thus, more emphasis should be given to healthcare workers in improving the perceptions of diabetes patients towards oral health care and referring them for such services.

The referral of diabetes patients for dental care is not yet included in the Clinical Practise Guideline (CPG) for the management of diabetes patients in this country. This may possibly be one of the contributory reasons for the low referral of diabetes patients for dental care by healthcare workers. The standards for medical care of diabetes mellitus patients by the American Diabetes Association has outlined the need for the referral of diabetes patients to a dentist for oral health assessment as part of the overall management of Diabetes Mellitus [44]. Awareness by both diabetes patients and healthcare workers of the role of periodontal disease in the glycaemic control of diabetes is crucial to maintain good oral health and general health in diabetics. Proper glycaemic control may possibly delay the onset of diabetic complication.

The findings in this study showed that while 8 in 10 diabetes patients perceived it was important for them to seek dental care, only 6 in 10 wanted to be referred for such care. This is indicative of a gap between perception and demand for dental care. The three most common reasons for not wanting a referral was the perceived lack of necessity for a dental check-up, the absence of dental problems and the perception that their dental problem was not serious. Bowyer V et al., reported that individuals with diabetes may be unaware of the importance of maintaining good oral health as part as their diabetes management plan, and often do not perceive a need to visit a dentist [45]. A study on adults with diabetes in the United States reported that, among dentate individuals aged 25 years old and above, the most common reason for not seeing a dentist within the preceding 12 months was the absence of perceived need to visit a dentist (37.2%) [38].

Limitations of the study

The study is a cross-sectional descriptive study of diabetes patients and healthcare workers managing diabetes patients at the selected clinics. As such, the findings in this study cannot be inferred to the population of diabetes patients in the country and needs to be interpreted with caution. Another potential bias of the findings could arise from the possibility that only physicians who treat with an above-average quality and only patients who are treated with an above-average quality are likely to participate in such a study. Nevertheless, the study had provided some measure of information for the parameters studied, and may serve as valuable input for improving the oral healthcare for diabetes patients.

Conclusion

In this study, it was found that patients with diabetes lack important knowledge about the association of oral health and diabetes mellitus. Although the majority of diabetes patients perceived the importance of dental check-up, the demand for dental referral was low among these patients. Notably, the findings also pointed towards a very low referral of diabetes patients for oral healthcare by healthcare workers. The poor oral health seeking behavior and the utilization of oral health services indicates a need to establish a comprehensive oral health promotion program for the diabetic population in healthcare settings as part of the management of diabetes patients. Additionally, there is a need for healthcare workers to routinely refer these patients for oral healthcare as part of the holistic care for diabetes patients.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	NS	TA	ASMA	SLY	NCS	MAO	CHT	KAM	MFI	LLL	NZJ	FI	NAI	NAT
Research concept and design	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Collection and/or assembly of data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Data analysis and interpretation	✓	✓	--	--	--	✓	✓	--	--	--	--	--	--	--
Writing the article	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Critical revision of the article	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Final approval of article	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Statistical analysis	✓	✓	--	--	--	✓	✓	--	--	--	--	--	--	--

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