

Knowledge, attitude, and performance of internists regarding the relationship of periodontal disease and diabetes mellitus

Houra Shahhosseini¹, Simin Zahra Mohebbi DDS, PhD²,
Siamak Yaghoobee DDS, MSc³, Mohammad Javad Kharazifard DDS, MSc, MPH⁴

Original Article

Abstract

BACKGROUND AND AIM: Studies have confirmed a strong association between periodontal disease (PD) and diabetes mellitus (DM). Treatment of DM is in the field of internists. This study aimed to assess the knowledge, attitude, and performance of Iranian internists regarding the relationship of DM and PD.

METHODS: In this cross-sectional study, a questionnaire comprising of five domains and 34 questions was utilized (12 questions regarding demographics, 2 questions regarding the need for continuing education courses on oral health for physicians, 5 questions about knowledge, 12 questions about attitude, and 3 questions about the performance of physicians regarding the association of PD and DM). This questionnaire has been previously used in a study conducted in North Carolina, United States of America. The questionnaire was translated to Persian and its validity and reliability were confirmed. Next, 134 internists participating in a national congress filled out the questionnaire. The response rate was 97%. Data were analysed using the linear regression model in SPSS software.

RESULTS: The mean and standard deviation (SD) of score of knowledge, attitude, and performance of internists was 57 ± 26 , 61 ± 12 , and 37 ± 28 , respectively, out of one hundred. Among the participants, 96% emphasized on the significance of cooperation with dentists in management of patients with DM and 81% of them confirmed the need for periodontal examination training for physicians. The total score of performance was significantly higher in internists with academic positions ($\beta = 0.177$, $P = 0.047$), older age ($\beta = 0.234$, $P = 0.011$), higher mean weekly working hours ($\beta = 0.185$, $P = 0.043$), and those who had passed a course regarding clinical, dental, and periodontal examination as part of their educational curricula ($\beta = 0.190$, $P = 0.035$).

CONCLUSION: This study showed that internists had low level of knowledge and performance regarding the relationship of PD and DM. This casts light on importance of enrichment of the educational curriculum and continuing medical educations in this regard.

KEYWORDS: Periodontal Disease; Diabetes Mellitus; Knowledge; Attitude; Professional Practice

Citation: Shahhosseini H, Mohebbi SZ, Yaghoobee S, Kharazifard MJ. **Knowledge, attitude, and performance of internists regarding the relationship of periodontal disease and diabetes mellitus.** J Oral Health Oral Epidemiol 2019; 8(2): 81-8.

Diabetes mellitus (DM) is among the most challenging health dilemmas of the 21st century.¹ Its incidence is increasing worldwide due to increased mean age of the population, lifestyle changes, urban living, industrialization, and growing prevalence of obesity and sedentary

lifestyle.^{2,3} The five-year prevalence of DM in Iran was estimated to be 13.73% in 2015.⁴

Periodontal disease (PD) is among the most common infectious diseases worldwide. PD and dental caries are the two major causes of tooth loss.⁵ Review articles have confirmed a strong correlation between PD

1- Student of Dentistry, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

2- Associate Professor, Research Center for Caries Prevention, Dentistry Research Institute AND Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

3- Associate Professor, Department of Periodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

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

Correspondence to: Simin Zahra Mohebbi, DDS, PhD

Email: smohebbi@tums.ac.ir

and DM such that uncontrolled DM can lead to PD. Also, PD can affect blood sugar control.⁶⁻⁸ Moreover, PD is the sixth most common complication of DM.⁹

The American Diabetes Association (ADA) in 2003 published the standards of medical care for patients with DM and stated that oral examination should be part of physical examination of such patients.¹⁰ Physicians often examine the oral cavity by asking the patients to open their mouth and stick out their tongue and then they take a quick look at the pharynx. However, this method of examination overlooks many important clinical symptoms that may be present in the oral cavity.^{11,12} Dentists, physicians, and other healthcare providers should perform periodontal screening for patients with DM on a regular basis and recommend periodontal check-ups to their patients.¹³ Thus, some studies have recommended correct periodontal examination of patients with DM by physicians prior to their referral to dentists.^{14,15}

In the healthcare system, internists play an important role in treatment of patients with DM. Thus, assessment of their level of knowledge, attitude, and performance with regard to PD and its association with DM is imperative.

To the best of authors' knowledge, no similar previous study has been conducted at the national level in Iran. Thus, this study aimed to assess the knowledge, attitude, and performance of Iranian internists regarding the relationship of PD and DM.

Methods

This cross-sectional study used a questionnaire confirmed in a similar study conducted in North Carolina, United States of America.¹⁶ The English questionnaire was translated to Persian by a senior dental student fluent in English and was then back-translated to English by a native English speaker fluent in Persian. The questionnaire was then evaluated by a panel of experts comprising of 3 periodontists and 3 oral

medicine and community dentistry specialists in terms of content and face validity in a descriptive manner. The necessary revisions were then made. In order to assess the reliability of the questionnaire, the questionnaire was filled out by 10 internists in a pilot study. After one month, the questionnaire was filled out again by the same internists and the results were compared. The reliability for all questions was > 0.84 .

The final questionnaire comprised of 34 items and included closed and open Likert-scale questions in five domains. Of all, 12 questions were related to demographic and background information including age, gender, years providing care to patients with DM, mean weekly work hours, percentage of patients who have DM, percentage of patients with DM who experience PD, experience in having PD, last dental visit, self-perceived oral health, having any clinical experience with dentists or oral hygienists, having a dental model in office, and being interested in having a dentic for oral hygiene instruction in their office, 2 questions were related to the need for continuing education courses on clinical periodontal and dental examination by physicians, 5 questions were related to the knowledge of physicians about the association of PD and DM, 12 questions were related to the attitude of physicians towards this relationship, and 3 questions were related to their performance in this respect. Each question in knowledge, attitude, and performance was given a score from 0 to 5, and finally the scores were calculated as percentages.

Using the multiple regression power analysis option, SPSS software (version 25, IBM Corporation, Armonk, NY, USA), taking into account $\alpha = 0.05$ and $\beta = 0.20$ and 6 independent variables with $R^2 = 0.10$, the minimum sample size was estimated to be 130 samples.

The questionnaire was randomly administered among 134 internists participating in the 29th annual national congress of internists in Tehran, Iran (2018). Sampling was random using the

identification code of participants.

Data were analysed using a linear regression model via SPSS software. P-value < 0.05 was considered significant.

This study was approved by the Ethics Committee of Tehran University of Medical Sciences (ethical approval code: IR.TUMS.DENTISTRY.REC.1396.4626).

Results

The response rate was 97%. In table 1, the socio-demographic characteristics, oral health, and educational information of the respondents by number and percentage of total respondents is presented. Among the participants, 71% (n = 90) stated that less than 40% of their patients had DM.

Table 1. Sociodemographic characteristics, oral health, and educational information of respondents by number and percentage of total respondents

Variable	n (%)
Age (year)	
≤ 40	33 (25)
41-50	53 (41)
51-60	26 (20)
> 60	18 (14)
Gender	
Male	68 (52)
Female	62 (48)
Years providing care to patients with DM	
≤ 1-5	23 (18)
6-10	27 (21)
11-20	35 (27)
21-30	31 (24)
> 30	12 (9)
Mean weekly work hours	
≤ 10	24 (18)
11-20	20 (15)
21-30	6 (5)
31-40	36 (28)
41-50	22 (17)
> 50	22 (17)
Percentage of patients who have DM	
≤ 10	10 (8)
11-20	38 (30)
21-40	42 (33)
41-60	27 (21)
> 60	11 (8)
Percentage of patients with DM who experience PD	
0	1 (1)
1-10	12 (9)
11-20	17 (13)
21-40	18 (14)
> 40	23 (18)
I do not know	59 (45)
Have you ever been told that you have PD?	
Yes	13 (10)
No	107 (84)
Last time received dental care	
≤ 6 months ago	57 (45)
> 6 months to ≤ 1 year ago	27 (21)
> 1 year to ≤ 2 years ago	22 (17)
> 2 years ago	22 (17)
Never	0 (0)

Table 1. Sociodemographic characteristics, oral health, and educational information of respondents by number and percentage of total respondents (continue)

	n (%)
How do you rate your oral health status?	
Very good	18 (14)
Good	72 (56)
Moderate	28 (22)
Poor	8 (6)
Very poor	2 (2)
I do not know	0 (0)
Do you have any educational tool for oral hygiene instruction in your office?	
Yes	20 (16)
No	103 (84)
Are you interested in having educational tool for oral hygiene instruction in your office?	
Yes	94 (78)
No	27 (22)
Do you have any clinical experience with dentists or oral hygienists?	
Yes	25 (20)
No	99 (80)
How many hours of your educational curriculum were about oral health?	
≤ 3	104 (84)
> 3 to ≤ 5	17 (14)
> 5	3 (2)
Did your educational program include any clinical practice regarding dental examination?	
Yes	21 (16)
No	106 (84)

DM: Diabetes mellitus; PD: Periodontal disease

Also, 45% (n = 59) of physicians stated that they did not know what percentage of their patients with DM had periodontitis. The majority of physicians (80%, n = 99) had no clinical experience with dentists or dental hygienists, 84% (n = 104) of them reported receiving 0 to 3 hours of education about oral health and gingiva in their general medical and post-graduate education, and 84% (n = 104) reported no clinical practice with regard to gingival assessment in their educational curriculum.

The knowledge score of internists in this study ranged from 0 to 100 with a mean and standard deviation (SD) of 57 ± 26 . Table 2 presents the frequency distribution of the knowledge score of respondents. Of the participants, 64% (n = 81) reported that microbial plaque was the cause of PD. Also, 47% (n = 60) of physicians provided a correct definition for PD, i.e., bone loss around teeth. The majority of physicians (72%, n = 91) provided a correct definition for gingivitis, i.e., gingival inflammation.

Table 2. Frequency distribution of knowledge score of respondents regarding the relationship of periodontal disease (PD) and diabetes mellitus (DM)

Questions	n (%)
Which one is the cause of PD?	
Dental caries	34 (27)
Genetics	2 (2)
Microbial plaque	81 (64)
I do not know	9 (7)
What is the definition of PD?	
Gingival bleeding	11 (9)
Gingival redness	45 (35)
Bone loss around teeth	60 (47)
I do not know	11 (9)
What is the definition of gingivitis?	
Inflammation of gingiva	91 (72)
Gingival infection	23 (18)
Gingival bleeding	7 (6)
I do not know	5 (4)
What is the first symptom of gingival disease?	
Gingival recession	26 (21)
Gingival bleeding	82 (67)
Tooth mobility	7 (6)
I do not know	8 (6)
Which one is the symptom of periodontitis?	
Dental caries	17 (14)
Facial swelling	10 (8)
Tooth discoloration	8 (6)
Supporting bone loss	61 (49)
I do not know	29 (23)

PD: Periodontal disease

Table 3. Frequency distribution of attitude of respondents towards the relationship of periodontal disease (PD) and diabetes mellitus (DM)

Questions	Strongly agree	Agree	Do not know	Disagree	Strongly disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Studies confirm a strong correlation between PD and systemic health.	66 (52)	56 (44)	1 (1)	1 (1)	3 (2)
Periodontal health plays an important role in overall health.	80 (63)	45 (35)	0 (0)	0 (0)	2 (2)
Daily brushing and flossing is imperative for periodontal health.	103 (81)	22 (17)	0 (0)	0 (0)	3 (2)
I know about studies that confirm the association of PD and DM.	35 (27)	48 (37)	4 (3)	2 (2)	39 (31)
Patients with DM are at increased risk of severe PD.	62 (48)	44 (34)	4 (3)	2 (2)	16 (13)
Management of PD can improve glycemic control.	33 (26)	45 (35)	9 (7)	3 (2)	37 (30)
Risk of PD is higher in patients with poor glycemic control.	67 (52)	44 (34)	4 (3)	2 (2)	11 (9)
Internists should be taught to screen for PD in patients with DM.	52 (41)	51 (40)	17 (14)	3 (2)	4 (3)
Internists should cooperate with dentists to decrease the risk of PD in patients with DM.	81 (64)	42 (32)	2 (2)	0 (0)	2 (2)
I am interested in performing screening for PD to my patients with DM.	35 (28)	45 (36)	31 (26)	9 (7)	4 (3)
I need more information about PD and its effect on DM.	59 (47)	55 (43)	10 (8)	0 (0)	2 (2)
I am sure that I can perform oral health screening for patients with DM.	23 (19)	49 (40)	27 (21)	10 (8)	15 (12)

PD: Periodontal disease; DM: Diabetes mellitus

Only 49% (n = 61) of physicians correctly reported the symptoms of PD, i.e., supporting bone loss and more than half of physicians (67%, n = 82) correctly reported the first symptom of PD, i.e., gingival bleeding.

The attitude score of physicians ranged from 0 to 80 with a mean and SD of 61 ± 12. Table 3 shows the frequency distribution of attitude score of participants. Of the participants, 96% (n = 122) confirmed the presence of a strong correlation between PD and systemic health in the literature but only 64% (n = 83) of them knew about the studies that confirm the association of PD and DM. Of the physicians, 81% (n = 103) agreed that the internists should be trained for periodontal examination in patients with DM; 96% (n = 123) of them agreed to cooperate with dentists to decrease the risk of PD in patients with DM. An interesting finding was that 64% (n = 80) of physicians were interested in screening of patients with DM for PD and oral hygiene instruction; whereas, only 59% (n = 72) of

them were sure that they could correctly perform the screening. Also, 90% (n = 114) of physicians stated that they required further information about periodontitis and its effect on DM.

The minimum and maximum performance score in this study was 6 and 100, respectively, with a mean and SD score of 37 ± 28. Table 4 shows the frequency distribution of performance score of respondents. In response to the question "how many patients with DM you referred to a dentist for PD in the past year?" 40% (n = 51) reported zero and 31% (n = 40) reported 1 to 5 patients. Regarding the frequency of oral examination of patients with DM by physicians, 55% (n = 72) reported oral examination only when the patient complained of oral or gingival problems and 22% (n = 28) reported regular oral examination in each visit. Of all, 52% (n = 64) stated that they did not provide their patients with DM with any information about the risk of PD and its symptoms.

Table 4. Frequency distribution of the performance score of respondents regarding the relationship of periodontal disease (PD) and diabetes mellitus (DM)

Questions	n (%)
How many patients with DM did you refer to a dentist for PD in the past year?	
0	51 (40)
1-5	40 (31)
6-10	15 (12)
11-20	12 (9)
21-30	4 (3)
> 30	7 (5)
When do you perform oral examination for your patients with DM?	
In each visit	28 (22)
Self-reporting the problem by patient	72 (55)
Only in the first visit	9 (7)
Rarely or never	21 (16)
Do you instruct your patients with DM about PD and its symptoms?	
Yes	59 (48)
No	64 (52)

PD: Periodontal disease; DM: Diabetes mellitus

Our findings showed a positive correlation between the performance and attitude of physicians ($P = 0.001$). There was no statistically significant relationship between knowledge and performance.

Table 5 shows factors associating with performance in respondents as shown by linear regression (backward method). The mean performance score was significantly higher in physicians with academic practice ($\beta = 0.177$, $P = 0.047$), older physicians ($\beta = 0.234$, $P = 0.011$), those with longer mean weekly work hours ($\beta = 0.185$, $P = 0.043$), and those who had received training on oral and dental examination as part of their educational curricula ($\beta = 0.190$, $P = 0.035$). None of the background characteristics were associated with a higher knowledge and attitude.

Discussion

This study was aimed to assess the knowledge, attitude, and performance of internists regarding the relationship of PD

and DM. In the present study, the majority of internists were not aware of the signs and symptoms of PD and only 49% of them correctly mentioned the symptoms of PD. However, in studies conducted in other countries such as those by Tasdemir and Alkan (Turkey),¹⁷ Obulareddy et al. (India),¹⁸ and Asa'ad et al. (Saudi Arabia),¹⁹ 87.0%, 94.6%, and 80.0% of physicians correctly reported the signs and symptoms of PD, respectively. This difference may be attributed to the study populations as well as the field of specialty of physicians.

In the present study, the majority of physicians were aware of the strong correlation between PD and systemic health, which was in agreement with the results of previous studies such as those by Owens et al.,¹⁶ Tasdemir and Alkan,¹⁷ Obulareddy et al.,¹⁸ and Quijano et al.²¹ However, in a study by Al-Khabbaz et al., the majority of general physicians were not aware of this correlation.²⁰

Table 5. Factors associating with performance in respondents as shown by linear regression (backward method)

Performance	β	Non-Standard coefficient	P
Physicians with academic practice	0.177	11.463	0.047
Older physicians	0.234	0.626	0.011
Those with longer mean weekly work hours	0.185	3.958	0.043
Those who had received training on oral and dental examination as part of their educational curricula	0.190	14.923	0.035

In this study, the majority of physicians agreed that internists should receive training regarding gingival examination of patients with DM, and they need to cooperate with dentists to decrease the rate of PD in their patients with DM. This finding was in line with the results of Owens et al.¹⁶

An interesting finding of our study was that the majority of physicians stated that they were interested in performing gingival examination and oral health screening when examining their patients with DM; whereas, only 59% of them were sure that they could correctly perform such examinations. This finding highlights the need for training of physicians regarding periodontal examination.

On the other hand, our study showed that the majority (81%) of physicians agreed that internists should receive training regarding gingival examination of patients with DM. Moreover, Bassir Shabestari et al., in their study in Zanjan, Iran, indicated that 80.3% of medical interns agreed with the inclusion of oral medicine course in their educational curriculum.²² Considering the need for such training as well as the positive attitude of physicians towards it in Iran, it would be ideal to revise the medical educational curricula with respect to inclusion of training courses about PD. The majority of physicians expressed that they needed further information about PD and its effect on DM, which highlights the need for continuing education courses in this respect.

In our study, 60% of physicians stated that they referred their patients with DM to a dentist due to PD; whereas, Tasdemir and Alkan¹⁷ reported that they referred 56.5% of their patients to dentists due to general dental problems. The rate of referral of patients with DM to a dentist was 50.0% in the study by Al-Habashneh et al.²³ and 48% in the study by Owens et al.¹⁶

Physicians in our study reported that they never or rarely performed an oral examination for patients or did it only for those who complained of an oral problem. This finding was in agreement with that of

Owens et al.¹⁶ and Quijano et al.²¹

In our study, 52% of physicians stated that they did not inform their patients with DM about the risk of PD and its signs and symptoms and did not recommend periodontal examination as part of their medical care. This finding supported that of Owens et al. (47%).¹⁶ On the other hand, evidence shows that patients with DM have a low level of knowledge and attitude about the oral presentations and complications of DM.^{13,24} Therefore, providing patients with the information in this respect by the internists can enhance their level of knowledge.

Our findings showed a positive correlation between the performance and attitude of physicians. Similarly, Al-Habashneh et al. reported that physicians with high score of attitude referred higher number of patients to dentists.²³

The performance score of physicians with longer clinical experience was found to be higher in our study, which highlighted the need for inclusion of theoretical and practical courses in this respect in their medical educational curricula.

There was a probability that internists would not cooperate in completing the questionnaires. To solve this problem, oral health educational packages were prepared and delivered to the participants as an incentive. Future studies are required to assess strategies to increase the cooperation of physicians and dentists, enhance their knowledge, and revise their continuing education courses to maximize their efficacy.

Conclusion

This study revealed that internists had a low level of knowledge and performance with respect to the relationship of PD and DM; however, they had a rather positive attitude towards it. The majority of physicians emphasized on the significance of cooperation with dentists for treatment of patients with DM and agreed with periodontal examination training for

physicians. Thus, it is recommended to revise the educational curricula of physicians to pay more attention to the relationship of oral health and DM. Furthermore, continuing education courses in this respect seems imperative to enhance the level of knowledge of physicians and increase their level of cooperation with dentists in order to promote the health of patients with DM.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

This study was part of a DDS thesis supported by Tehran University of Medical Sciences (grant number: 6347). We would like to thank the specialist physicians for their participation in the work.

References

1. International Diabetes Federation. IDF Diabetes Atlas. Brussels, Belgium: International Diabetes Federation; 2013.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004; 27(5): 1047-53.
3. Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. *Nature* 2001; 414(6865): 782-7.
4. Ebrahimi H, Emamian MH, Hashemi H, Fotouhi A. High incidence of diabetes mellitus among a middle-aged population in Iran: A longitudinal study. *Can J Diabetes* 2016; 40(6): 570-5.
5. Phipps KR, Stevens VJ. Relative contribution of caries and periodontal disease in adult tooth loss for an HMO dental population. *J Public Health Dent* 1995; 55(4): 250-2.
6. Mealey BL. Periodontal disease and diabetes. A two-way street. *J Am Dent Assoc* 2006; 137(Suppl): 26S-31S.
7. Kim J, Amar S. Periodontal disease and systemic conditions: A bidirectional relationship. *Odontology* 2006; 94(1): 10-21.
8. Taylor GW, Borgnakke WS. Periodontal disease: Associations with diabetes, glycemic control and complications. *Oral Dis* 2008; 14(3): 191-203.
9. Loe H. Periodontal disease. The sixth complication of diabetes mellitus. *Diabetes Care* 1993; 16(1): 329-34.
10. American Diabetes Association. Standards of medical care for patients with diabetes mellitus. *Diabetes Care* 2003; 26(Suppl 1): S33-S50.
11. Herring ME, Shah SK. Periodontal disease and control of diabetes mellitus. *J Am Osteopath Assoc* 2006; 106(7): 416-21.
12. Parks ET, Lancaster H. Oral manifestations of systemic disease. *Dermatol Clin* 2003; 21(1): 171-82.
13. Al Habashneh R, Khader Y, Hammad MM, Almuradi M. Knowledge and awareness about diabetes and periodontal health among Jordanians. *J Diabetes Complications* 2010; 24(6): 409-14.
14. Finney LS, Finney MO, Gonzalez-Campoy JM. What the mouth has to say about diabetes. Careful examinations can avert serious complications. *Postgrad Med* 1997; 102(6): 117-26.
15. Laudenbach JM, Simon Z. Common dental and periodontal diseases: Evaluation and management. *Med Clin North Am* 2014; 98(6): 1239-60.
16. Owens JB, Wilder RS, Southerland JH, Buse JB, Malone RM. North Carolina internists' and endocrinologists' knowledge, opinions, and behaviors regarding periodontal disease and diabetes: need and opportunity for interprofessional education. *J Dent Educ* 2011; 75(3): 329-38.
17. Tasdemir Z, Alkan BA. Knowledge of medical doctors in Turkey about the relationship between periodontal disease and systemic health. *Braz Oral Res* 2015; 29: 55.
18. Obulareddy VT, Nagarakanti S, Chava VK. Knowledge, attitudes, and practice behaviors of medical specialists for the relationship between diabetes and periodontal disease: A questionnaire survey. *J Family Med Prim Care* 2018; 7(1): 175-8.
19. Asa'ad F, Al-Maflehi N, Alelyan B, Asaad L, Alrumaih W, Al Assad F, et al. Knowledge and orientations of medical interns toward periodontal disease in Saudi Arabia. *Saudi J Oral Sci* 2014; 1(2): 98-104.
20. Al-Khabbaz AK, Al-Shammari KF, Al-Saleh NA. Knowledge about the association between periodontal diseases and diabetes mellitus: Contrasting dentists and physicians. *J Periodontol* 2011; 82(3): 360-6.
21. Quijano A, Shah AJ, Schwarcz AI, Lalla E, Ostfeld RJ. Knowledge and orientations of internal medicine trainees toward periodontal disease. *J Periodontol* 2010; 81(3): 359-63.
22. Bassir Shabestari S, Shirinbak I, Shervin Badv R. Evaluation of the knowledge and diagnostic skills of the Zanjan University of Medical Sciences interns in the the field of oral medicine. *J Med Educ Dev* 2014; 7(13): 9-15. [In Persian].
23. Al-Habashneh R, Barghout N, Humbert L, Khader Y, Alwaeli H. Diabetes and oral health: Doctors' knowledge, perception and practices. *J Eval Clin Pract* 2010; 16(5): 976-80.
24. 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; 35(3): 218-23.