



Original article

Assessment of Knowledge and Attitude Towards Oral Health and Periodontal Disease in Diabetic Patients among Libyan Physicians

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ABSTRACT

Background: Periodontitis is a chronic inflammatory disease characterized by the destruction of the supporting structures of the teeth. Emerging research suggests a bidirectional link between diabetes mellitus (DM) and periodontal disease (PD). This indicates that DM elevates the risk of developing PD, while periodontal inflammation may contribute to increased blood sugar levels and worsen glyceemic control.

Aim: To determine the knowledge and attitude of internal medicine physicians towards oral health and periodontal disease in public and private diabetic clinics within the city of Benghazi, Libya.

Methods: A cross-sectional study among practicing physicians who treat diabetic patients in various clinics within the city limits of Benghazi, Libya. A structured questionnaire consisting of 30 questions was utilized to assess the physicians' demographics, their understanding of periodontal disease, and their attitudes towards the oral health of diabetic patients.

Results: The study findings indicated that a positive attitude was more prevalent among female physicians (75%) than their male counterparts (25%). Conversely, a negative attitude was predominantly observed in senior house officers (93.8%), whereas consultants and physicians with over 10 years of experience demonstrated a positive attitude, accounting for 22.4% and 55.3% respectively. The data also revealed a statistically significant association between the attitude and knowledge level and the basic demographic characteristics of the participants, with a p -value < 0.05.

Conclusion: Although most physicians are aware of the impact that PD and DM have on overall patient health, a knowledge deficiency is evident among senior house officers. In contrast, consultants possess the most comprehensive knowledge. The physicians also expressed a willingness to enhance their understanding of PD to improve health outcomes for their diabetic patients.

Keywords: *Periodontitis, Diabetes Mellitus, Oral health, Physician, Knowledge.*

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INTRODUCTION

One of the most common chronic inflammatory non-communicable diseases (NCD) in humans is periodontal disease, according to statistics from the Global Burden of Disease (GBD) database.¹ Periodontitis is a chronic inflammatory disease characterized by the destruction of the teeth-supporting structures which, if left untreated, could lead to tooth loss.² The disease affects subjects in all age groups but is more common in adult

populations.³ More than 10% of the adult population worldwide may be affected by severe periodontitis, making it the 11th most prevalent disease globally, more prevalent than cardiovascular disease.⁴⁻⁶ In addition, male gender, smoking, diet, oral hygiene, diabetes mellitus, and various socioeconomic factors are considered risk factors for periodontal disease.^{7,8}

Periodontal diseases often result from inadequate brushing and flossing habits, allowing bacterial biofilm to accumulate either at the gum margins or within the gingival sulcus.⁹ Gingivitis causes inflammation of the gingival tissue without affecting the underlying structure. If left untreated, it can advance into periodontitis. This irreversible disease destroys the supporting structure of the tooth and migration of the junctional epithelium, which may lead to tooth loss.¹⁰

Periodontitis is also thought to influence systemic health, including the cardiovascular system, respiratory system, low birth weight preterm, and diabetes

mellitus.¹¹⁻¹³ In the early 1990s periodontitis was sometimes referred to as the sixth complication of diabetes,¹⁴ and individuals with diabetes increased their risk of developing periodontal diseases. Furthermore, patients with both diabetes and periodontal diseases develop poor glycemic control, rapid progression of periodontal disease, and tooth loss.¹⁵

Healthcare professionals play an important role in patient education on the prevention of periodontal disease. In addition, assessing and improving the existing knowledge about periodontal disease and its systemic manifestations among healthcare professionals will be beneficial to society; since healthcare professionals who are knowledgeable and stay up-to-date can effectively prevent and manage periodontal diseases through public awareness, timely treatment interventions or Interdisciplinary collaboration with different health professionals to provide comprehensive patient care. This leads to fewer cases of advanced periodontal diseases, tooth loss, and associated health complications.^{8,16}

There is a lack of population-based data on knowledge about periodontal disease in Libya. Also, no study has been done to assess the awareness of periodontal disease and knowledge among medical physicians in our country. Thus, the purpose of the present study was to determine the knowledge and attitude of internal medicine physicians towards oral health and periodontal disease in both public and private diabetic clinics within Benghazi, Libya.

MATERIALS AND METHODS

A cross-sectional study was conducted between December 2022 and August 2023, involving one hundred and twenty-two internal medicine physicians practicing in different areas of the Benghazi district. Most participants were affiliated with the governmental Benghazi Medical Centre (BMC) and Seidi-Hussein Diabetic Center, while the remaining physicians worked in private clinics at Al-Haram, Beirut, and Venezia hospitals, all of which treated diabetic patients in Benghazi, Libya. The study conveniently sampled a group of qualified medical professionals, including senior house officers, specialists, and consultants practicing within the diabetic unit.

All doctors voluntarily entered the study and were informed about the nature and purpose of the study. The knowledge and attitude of the doctors were assessed using the responses to the written questions, either yes or no. The questionnaire was developed based on a previous study that assessed the awareness of medical professionals about the etiology of periodontal diseases in India.¹⁷ The questionnaire included 30 questions with

multiple-choice answers, as depicted in the appendix section. It was divided into three sections; the first section comprised four questions related to socio-demographic personal data. The second included eighteen questions aimed at evaluating knowledge and awareness of periodontal disease. The third section consisted of nine questions exploring physicians' attitudes and behaviors toward oral health care and periodontal disease in their patients.

Statistical Analysis:The sample size was calculated based on a previous study.¹⁸ A minimum sample size of 97 subjects was found to be sufficient for estimating the knowledge and attitude at 0.1 margin of error and 95% confidence level. A typical piece of advice is to reject the null hypothesis H_0 if the corresponding p -value is smaller than 0.05.

A pilot sample of 20 subjects was chosen to assess the stability and validity of the questionnaire. The findings from this assessment were as follows:

Table 1: Stability and validity of the questionnaire:

	Cronbach's alpha	Test-retest reliability
Knowledge	0.85	0.792
Attitude	0.861	0.822
Total questionnaire	0.871	0.81

The transcript analysis of our data was fed to the computer and analyzed using IBM SPSS software package version 24. Quantitative data, including basic demographic data, knowledge level and attitude were described using numbers and percentages from the total number "122." Also, about the study the data were presented as the number of cases in each category and the corresponding percent.

The test used in the study of the relationship between each of the two variables was the Chi-square test. This test was used for categorical variables (number and percent). The significance of the obtained results was judged at the 5% level.

RESULTS

All participants completed the questionnaire without any reminders, resulting in a 100% response rate and 122 participants. According to the demographic characteristics shown in **Table 2**, the distribution of subjects participating in this study was a total of 122: 93 females (76.2%), and 29 males (23.8%). The number of participants who were senior house officers SHO 73

(59.8%) and less experienced in their field of work was great compared to specialists 32 (26.2%)

Table 2: Demographic characteristics of the study participants (n=122).

Variable	N (%)
Gender	
Female	93 (76.2)
Male	29 (23.8)
Working units (diabetic center)	
Diabetic unit	77 (63.1)
Other units treat diabetic patients	45 (36.9)
Specialization	
Senior house officer	73 (59.8)
Specialist	32 (26.2)
Consultant	17 (13.9)
Years of experience	
Less than 5 years	41 (33.6)
5-10 years	35 (28.7)
More than 10 years	46 (37.7)
Total	122 (100)

Assessment of knowledge and awareness of periodontal disease among Libyan physicians, as shown in **Table 3** below, showed statistically significant knowledge about gingivitis and periodontitis. Roughly 70 percent of the physicians had heard of the terms gingivitis and periodontitis, while only (30%) could distinguish between the two disease processes. Fifty percent of the participants could define dental plaque, less than (25%) understood that periodontal disease had both a plaque and a hereditary factor associated with it, and an additional (30%) had no idea what causes periodontal disease. However, (70%) of the participants claimed they knew the signs and symptoms of periodontal disease, and at least (90%) of the participants knew periodontitis had underlying causes of smoking and diabetes associated with it, while approximately (90%) understood that the condition could also affect the systemic overall health of the patient.

Table 3: The distribution of participants based on knowledge-related questions.

Questions	Number of (Yes) answers	Percent (%)
Have heard of the terms gingivitis and periodontitis	85	69.7
Difference between them	41	33.6
Specialties in dentistry	89	73.0
Periodontal disease is caused by		

Questions	Number of (Yes) answers	Percent (%)
Plaque	42	34.4
Hereditary factor	16	13.1
Both	27	22.1
Definition Dental plaque	60	49.2
Definition Dental calculus	70	57.4
Signs & symptoms of PD	89	73.0
If yes mention		
Bleeding	81	66.4
Redness	13	10.7
Mobility	17	13.9
Bad breath	8	6.6
Change in the contour and size	3	2.5
OH affects the periodontal health	121	99.2
Smoking affects periodontal tissues	118	96.7
PD is more in diabetic patients	112	91.8
DM and PD bidirectional way	99	81.1
Modifiable risk factors for PD		
Diabetes mellitus (DM)	92	75.4
Smoking	17	13.9
Stress	13	10.7
Treatment of PD improves glycemic control	89	73.0
PD associated with some systemic diseases	104	85.2
PD are preventable	114	93.4
Agree oral health is an integral part of general health	120	98.4
Mention six complications of DM		
1-3 (answer not included PD)	55	45.1
4-6 (24 persons only their answer included PD)	67	54.9
Importance of PD and oral	118	96.72
Seen patients with dental	98	80.33
Refer your patient to a dentist	103	84.43
Screen patients for PD	50	40.98
Refer your patient to		
Not refer	4	3.28
General Dentist	100	81.97
Periodontist	18	14.75
Prescribe to your patient a	75	61.48
Prevalence of gum disease-	110	90.16
Agree that treatment of PD	115	94.26
Accept to gain the knowledge regarding PD and implement it in your daily work	111	90.98

Moreover, the third section of our research showed that there was a statistically significant difference in the

distribution of the physicians regarding their knowledge level and attitude. As shown in **Table 4** sixty-seven percent of the physician’s overall knowledge was considered adequate or good, while (23.8%) had fair knowledge, and (9%) were considered to have poor knowledge. When assessing physician attitude, 76 had a positive attitude, while (24.6%) had a neutral attitude and (13.1%) had a negative attitude.

Table 4: The distribution of participants categorized by their level of knowledge and attitude

Variable	N (%)
Knowledge level	
Good	82 (67.2)
Faire	29 (23.8)
Poor	11 (9)
Attitude	
Positive	76 (62.3)
Neutral	30 (24.6)
Negative	16 (13.1)

Figure 1 illustrates the association between knowledge level and demographic characteristics among the participants. Specifically, most females demonstrated good knowledge, while males’ knowledge was poorly evaluated based on their responses. Additionally, the study assessed physicians’ experience levels in terms of knowledge and attitude, revealing that senior house officers had poorer knowledge compared to consultants. Furthermore, individuals with less than 5 years of experience exhibited lower knowledge levels than those with over 10 years of experience. Overall, a statistically significant relationship exists between knowledge level and participant characteristics.

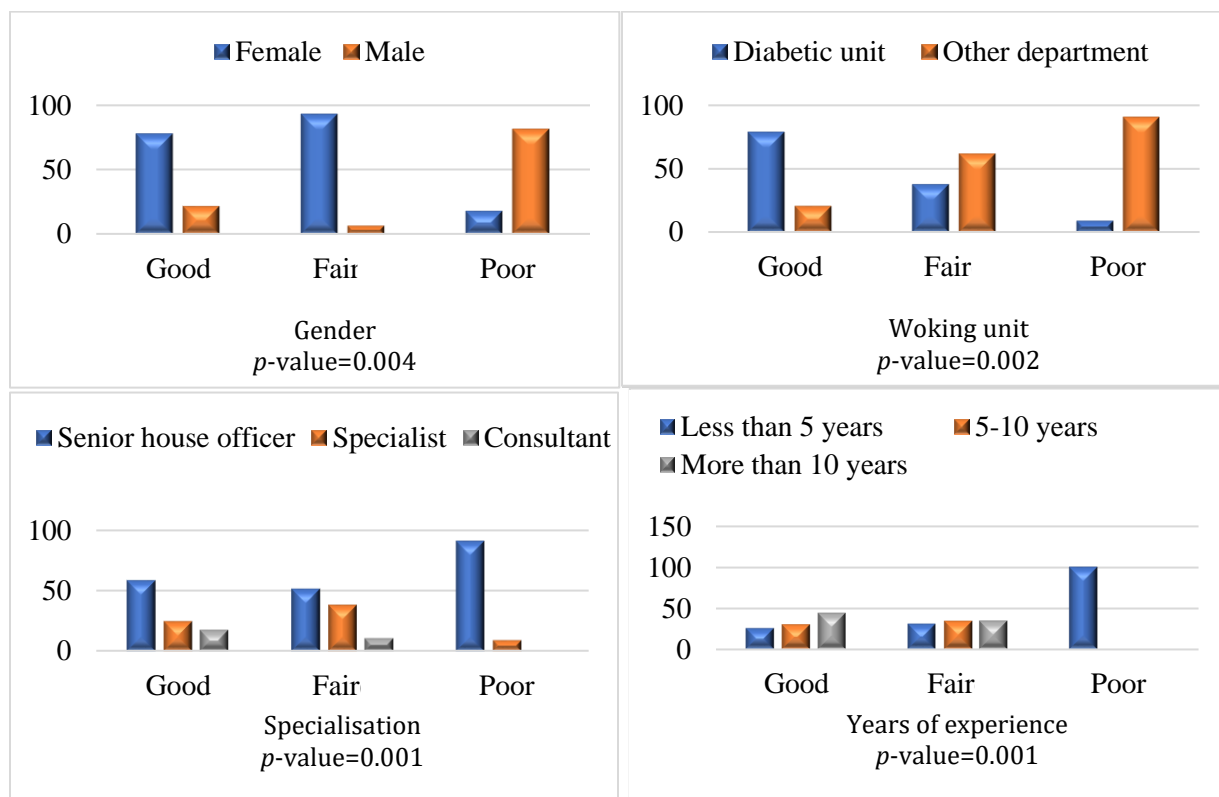


Figure 1: Differences in knowledge level between study participants based on demographic characteristics: gender, working unit, specialization, and year of experience (Chi-square test)

Table 5 shows that positive attitude was higher in females 57(75%) than in males 19(25%). Positive attitudes were higher in diabetic unit staff 60(78.9%) while most of the other units had negative attitudes 14(87.5%). Negative attitudes in senior house officers were higher (15, 93.8%) while all consultants had positive attitudes

(17,22.4%). Most of the cases with more than 10 years of experience had positive attitudes (42, 55.3%), while most cases with less than 5 years had negative attitudes (11, 68.8%).

There was a statistically significant relation between attitude and basic demographic characteristics of the studied group ($P < 0.05$)

Table 5: Association between attitude and demographic characteristics of the studied group

Variable	Attitude						Total	X ² p-value
	Positive		Neutral		Negative			
	N	%	N	%	N	%		
Gender								
Female	57	75	28	93.3	8	50	93	10.9
Male	19	25	2	6.7	8	50	29	0.004*
Working unit								
Diabetic unit	60	78.9	15	50	2	12.5	77	12.8
Other units	16	21.1	15	50	14	87.5	45	0.002*
Specialization								
Senior house officer	34	44.7	24	80	15	93.8	73	18.2
Specialist	25	32.9	6	20	1	6.3	32	0.001*
Consultant	17	22.4	0	0	0	0	17	
Years of experience								
Less than 5 years	14	18.4	16	53.3	11	68.8	41	16.8
5-10 years	20	26.3	10	33.3	5	31.3	35	0.001*
More than 10 years	42	55.3	4	13.3	0	0	46	
Total	76		30		16		122	

DISCUSSION

It is well known that DM is significantly associated with an increased incidence and severity of PD, which can result in tooth loss. Because primary care physicians and specialists play a crucial role in the management of DM, it is important to assess their knowledge and attitude. Since improving periodontal knowledge can play an important role in the prevention of periodontal diseases.¹⁹ The present study evaluated the knowledge and attitude towards understanding the significance of periodontal disease in primary and specialty clinics in Benghazi, Libya.

Our data shows gaps in physician's knowledge when it comes to understanding the differences between gingivitis and periodontitis. In our current study only (33%) acknowledged knowing the difference between the two. In a recent systematic review by Siddiqi et al. 2020, they showed medical professional knowledge of oral health and periodontal disease was only (55%).²⁰ In fact, some studies found medical professional knowledge that gingival bleeding was associated with the first signs of the disease process was as low as

(16.5%) Umeizudike et al. 2015,¹⁹ while in other studies it was as high as (87%) Tasdemir and Alkan, 2015.²¹

Because physicians routinely interact with their patients more frequently than patients interact with their dentist, improving the existing knowledge base for periodontal awareness in this group could be a great starting point for re-education to help reduce gingivitis and periodontitis. The physicians in our study were aware (90%) that PD and DM are linked, which is much higher than what is reported in the literature for physicians understanding the interrelationship between the two diseases where it is estimated to be about (50-56%).^{20,22-24} In a previous study, (56.7%) of the medical professionals were aware of the bidirectional relationship between systemic and periodontal diseases, while (38.6%) of them were aware of the relationship in one of either direction only.²⁵

The awareness of the Libyan physicians' understanding that PD can affect glycemic control was over (70%) and equivalent to what is reported in the literature for other healthcare professionals which ranges between (65-76%).²⁶⁻²⁸ In fact, (80%) of the physicians report seeing

patients with dental complaints and 84% refer their patients to dental services, but only (40%) refer to a dental specialist trained to treat PD. This rate of referral was substantially higher than what has been reported in a study by Umeizudike and colleagues.¹⁹ In their study, the medical professionals only referred their patients to the dentist (33%) of the time. Even though the Libyan physicians had a high competence in oral health knowledge and confidence, it was not reflected in their clinical practice, where less than half of the physicians evaluated their patients for PD.

The current study results show a similar trend that has been found by other researchers, where the length of training and specialty have the most knowledge about PD. Researchers reported a higher understanding of senior-level physicians and specialists about the adverse effects of PD on systemic health.²⁹ The current study also evaluated the knowledge and attitudes of female and male physicians and found female physicians had better knowledge than males. A similar trend was also reported by Taani and colleagues.³⁰

Although the current study offers foundational data for future research, it does have certain limitations that warrant discussion. Specifically, relying on a self-reported questionnaire could introduce social desirability and recall bias, despite the respondents' confidentiality assurances and the absence of personal identifiers. Also, the study was conducted in some clinics in the city of Benghazi and hence may not reflect the whole population in Benghazi.

CONCLUSION

This study showed that doctors who had just graduated had inadequate knowledge and attitudes about PD and how it implicated DM. Indeed, very few participants were aware that PD is one of the six problems that diabetic patients encounter. Therefore, we strongly recommend an interdisciplinary approach including dentistry experts, diabetes mellitus care specialists, and health workers to promote the health of diabetic patients.

ACKNOWLEDGMENTS

The authors express their gratitude to Dr. Salma Mahfoud, Professor in the Department of Periodontics at the University of Benghazi Dental College, and Dr. Michelle Tucci, Professor in the Department of Anesthesiology at the University of Mississippi, for their unwavering guidance and support. Additionally, this study has received support from the staff at the Diabetic Center Seidi-Hussein.

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APPENDIX**Questionnaire parts:****Section 1: Demographic personal data:****Gender:** Female / Male**Working unit:** diabetic unit**Specialization:** Senior House officer/specialist/consultant.**Years of experience:** Less than 5 years / 5-10 years / > 10 years.**Section 2: Knowledge related questions:**

Have you heard of the terms gingivitis and periodontitis?

If yes do you know what's the difference between them?

Are you aware of the specialties in dentistry?

Periodontal disease is caused by Plaque/ hereditary factors, both, don't know?

Do you know what dental plaque is?

Do you know what is the dental calculus?

Do you know the most common signs/symptoms of PD?

If yes mention: Bleeding, Redness, Mobility, bad breath and Change in the contour and size.

Do you think bad oral hygiene affects gum health?

10- Does smoking affect periodontal tissues?

11- Do you think periodontal diseases are more prevalent in diabetic patients?

12- Do you know that diabetes and periodontal disease are bidirectional way?

13- Do you think the modifiable risk factors for periodontitis are: diabetes mellitus (DM), smoking and stress?

14- Do you think that treatment of periodontal disease improves glycemic control?

15- Do you know that periodontal diseases have implications for certain systemic diseases/conditions like cardiovascular diseases, Pregnancy, low birth weight babies, and diabetes?

16- Do you think periodontal diseases are preventable?

17- Do you agree that oral health is an integral part of general health?

18- What are the complications of diabetes?

Last section: Attitude related questions:

Do you think it is important to know about periodontal diseases and oral hygiene?

Have you ever seen patients with dental complaints, gum lesions or other conditions?

Do you refer your patients to a dentist according to his/her oral evaluation?

Do you screen your patients for periodontal disease?

Do you refer your patient to a general dentistry practitioner, or to a periodontist?

Do you prescribe to your patient a mouthwash if he/she complains of bleeding or swollen gum?

Do you think lower socioeconomic status causes more prevalence of gum disease?

Do you agree that treatment of gum disease is included as a part of the general health assessment of the patient to improve overall health?

Do you accept to gain knowledge regarding periodontal diseases and implement health education regarding periodontal diseases in your practice and career?