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Evaluation of Syrian Diabetics' Knowledge Regarding the Two-Way Relationship Between Periodontitis and Diabetes Mellitus, And Oral Care Practice

Jawich K[1], Dannan A[2*], Al-Kaed M[3] and Talas N[4]

[1]Department of Biochemistry, Lecturer, Faculty of Pharmacy, The International University for Science and Technology (IUST), Damascus, Syrian Arab Republic

[2]Department of Periodontology, Lecturer, Faculty of Dentistry, The International University for Science and Technology (IUST), Damascus, Syrian Arab Republic

[3]General dentist, Damascus, Syrian Arab Republic

[4]Pharmacist, Damascus, Syrian Arab Republic

***Corresponding author:**

Aous Dannan,
Department of Periodontology, Faculty of Dentistry, The International University for Science and Technology (IUST), Damascus,
Syrian Arab Republic, Tel: 00963 933300485;
E-mail: aousdannan@yahoo.com

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1. Abstract

1.1. Statement of the Problem: Periodontal disease is considered as a serious complication of Diabetes Mellitus. Both diseases have a bidirectional adverse association. Patient's self-care of oral hygiene and awareness of periodontal complications of diabetes is an important factor in controlling complications of diabetes.

1.2. Purpose: To evaluate awareness among Syrian diabetics about both of periodontal manifestation of Diabetes Mellitus and the effect of periodontitis on glucose control in addition to investigate the practice of oral care procedures and source of education presented to them.

1.3. Materials and Method: This questionnaire-based study sample included 200 diabetics in Damascus/ Syria who used to visit two of the centers of the Syrian Association of Diabetics for regular checkup. A self-designed and previously validated 13-question questionnaire was employed to collect information and evaluate awareness regarding Diabetes, periodontal diseases, and their relationship. A statistical software (IBM: SPSS, version 21) was used to analyze data.

1.4. Results: 51.5% of participants were females, 27% aged between 51-60 years old 24.5% had secondary school education, 57.5% of patients did not know about the effect of diabetes mellitus on periodontists and the 61% did not know about the effect of periodontitis on glucose control. Thirty-nine percent of participants brushed once daily, 45% did not use auxiliary tools for oral hygiene, and medical care providers were the best source of education for most patients. Participants aged (20-30 years old) formed the least knowledgeable group that did not know about the two-way relationship between Diabetes Mellitus and periodontal complications.

1.5. Conclusion: There was a significant lack of knowledge regarding the bidirectional relation between Diabetes Mellitus and periodontitis. Older patients had more knowledge compared to younger ones, personal oral care practice was moderate, and oral health providers were the preferred source of knowledge. A serious promotion of the reciprocal relationship between Diabetes Mellitus and periodontitis in Syria is needed.

2. Introduction

Periodontitis is a chronic complex infectious disease with several etiologic and contributory factors [1]. It presents an irreversible

tissue destruction of tooth supporting structures which results in breakdown of collagen fibers of the periodontal ligament which may lead to tooth losing [2]. Clinical manifestation of periodontitis includes alveolar bone loss, clinical attachment loss, periodontal pocket formation and recession of the gingiva, increase tooth mobility, drifting, and even tooth exfoliation [1].

Periodontitis is an inflammatory chronic reaction to the biofilm accumulated around the tooth surfaces in the absence of proper oral hygiene in an especially susceptible host.

Investigations have demonstrated associations between periodontitis and various systemic diseases like respiratory diseases, osteoporosis, cardiovascular disorders, immune deficiencies, steroid hormones variations, nutritional deficiency and Diabetes Mellitus (DM) [3].

Diabetes Mellitus is a metabolic disorder characterized by the presence of chronic hyperglycemia. It has become a global epidemic disease, the complications of which significantly have impact on the quality of life and longevity of patients, as well as a burden of healthcare costs [4].

Prevalence of DM among adults over 18 years of age has increased from 4.7% in 1980 to 8.5% in 2014, and the World Health Organization (WHO) predicts this will increase to 439 million, almost 10% of adults in 2030 [5]. accumulated over time has been associated with insulin resistance and worse glycaemic control in patients with. The chronic state of the infection and inflammation accumulated over time has been associated with insulin resistance and worse glycaemic control in patients with.

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The chronic state of inflammation and infection accumulated over time has been associated with impaired insulin signaling, insulin resistance and worse glycemic control [2].

Whereas Diabetes increases the deposition of Advanced Glycation End-Products (AGEs) in the periodontal tissues which interacts with their receptor (RAGE) leading to increased secretion of interleukin-1β (IL-1β), Tumor Necrosis Factor-α (TNF-α), and IL-6, which favors alveolar bone resorption, periodontal connective tissue damage, thus exacerbation of periodontitis.

Diabetics need to be educated about the fact that DM with poor glycemic control is a risk factor for severe periodontitis and the direct impact of periodontal disease on glucose control. Therefore, effective behaviors to prevent and control periodontal disease must be adapted on daily basis, which include dental hygiene, flossing, regular tooth brushing and reducing tobacco smoking. besides routine visits to dentists [6, 7].

According to the WHO, cases of DM increased in Syria is between 1980 and 2014 from 5% to 15% with 1% proportional mortality of total deaths in all ages [8].

Currently, because of crisis in Syria diabetics are facing several difficulties like displacement, lack of medical follow-up, high cost and shortage in medications. Therefore, raising awareness about diabetic's personal care and emphasis on patient's adherence to prophylactic measures could have an impact on limiting complication, improving quality of life and eventually reducing costs. The aim of the current study was to evaluate the awareness of Syrian Diabetes patients toward the two-way relationship between diabetes and periodontitis, the sources of education they prefer, in order to facilitate a consequent development of tailored educational strategies to enhance the oral healthcare practice of diabetics to improve managements of the disease.

3. Materials and Method

This cross-sectional survey study took place in the period between November 2018 to May 2019 in Damascus/ Syria. A total of 200 diabetic patients, who used to visit two of the centers of the Syrian Association of Diabetics for regular checkup, were enrolled in the study. All participants were informed about the purpose of the study and ensured for anonymous and confidentiality of information. They gave their oral consents to participation, and the approval of ethical committee of the International University for Science and Technology was obtained.

A self-designed questionnaire was used in this study and presented to each participant by the investigators through several visits to the centers, and requested to be filled up the questionnaire.

The questionnaire comprised of 4 main categories; namely:

1- Patient's general and demographical information (i.e. name, gender, age, education)

2- Awareness of two-way relationship between periodontal and diabetes besides awareness of general complications of DM (5 questions),

3- Basic information regarding oral health care practice (3 questions),

4- one critical questions regarding preferred sources of medical knowledge.

Collected data were coded and tabulated, and thereafter analyzed by applying descriptive and inferential statistical analysis using specialized software (IBM: SPSS package, version 21).

A pilot study was conducted prior to the current one on 20% of the total sample size to check the feasibility, construct, content validity, and reliability of the study (data not published).

4. Results

4.1. Descriptive Results

The sample of the study included 97 males (48.5%) and 103 females (51.5%). The largest group of patients (27%) were those who were between 51 and 60 years, (24.5%) of patients finished

the secondary school whereas only 2.5% of them finished higher studies (postgraduate studies) Table (1).

About 57.5% of patients did not know that DM affects periodontal tissues, 61% of patients did not know about the effect of periodontists on glucose control, 66% never knew about the renal complications of DM, while 41% did not know about the ophthalmic complications, 56.5% did not know about foot necrosis (Table 2).

Chi-square test was used to compare the percentages on 95% level of significance.

Participants were asked about the daily Practice of oral hygiene Only1% of participants brushed after each meal, 21.5% brushed once a day, 32% of participants brushed twice a day, while 39%of participants did not have regular brushing, 45% of participants never use auxiliary hygiene tool besides tooth brush, 14% use wooden tooth, 16% use Siwak, 25% use dental floss strings. When asked about the frequency of dentists visits 37.5% of participants used to visit dentist only on emergencies, 9% visited every 6 months, 28.5%visited once a year (Tables 3).

When asked to refer to the best source of education, medical workers were chosen by majority of participants (39.5%) as the preferred source of education, television was chosen by 23% of participants, while internet was chosen by only 7% and health care education seminars was chosen by only 1.5% of participants (Figure 1).

4.2. Analytical Results

The relationship between age and knowledge

Chi-square test results showed a significant relationship between age and knowledge (P<0.05), However, using Bonferroni correction to compare percentages vertically, it was shown that patients aged (51-60 years old) (31.8%) were the most knowledgeable group about the association between DM and periodontitis, however, with no statistical significance, while those who aged (20-30 years old) formed the least knowledgeable group about this association (28.7%) (Figure 2).

Table 1: Description of patients according to personal information

		Frequency	Percent
Gender	Male	97	48.5
	Female	103	51.5
	Total	200	100
Age groups	20-30	41	20.5
	31-40	15	7.5
	41-50	37	18.5
	51-60	54	27
	Over 60 years old	32	16
	Less than 20 years old	21	10.5
	Total	200	100
Education status	Illiterate	7	3.5
	Primary school	46	23
	Preparatory school	48	24
	Secondary school	49	24.5
	High school	45	22.5
	Post graduate	5	2.5
	Total	200	100

Table 2: Awareness of periodontal and general complications of DM

		Answers (percentage/frequency)		Comparison of percentages (Chi-Square Test)
		YES	NO	
1	Did you that DM could lead to gum disease	42.5%(85)	57.5(115)	Significant (P=0.034)
2	Did you know that gum disease could affect Glucose control	39%(78)	61%(122)	Significant (P=0.034)
3	Did you know that DM could lead to eye complications?	59%(118)	41%(82)	Significant (P=0.034)
4	Did you know that DM could lead to renal complications?	34% (68)	66%(132)	Significance(P=0.034)
5	Did you know that DM could lead to foot necrosis?	43.5%(87)	56.5%(113)	

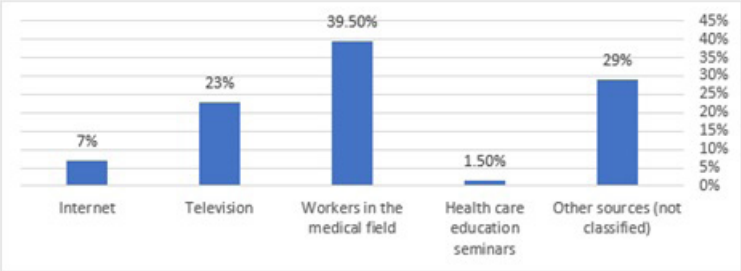

Figure 1: The best source of Knowledge for participants

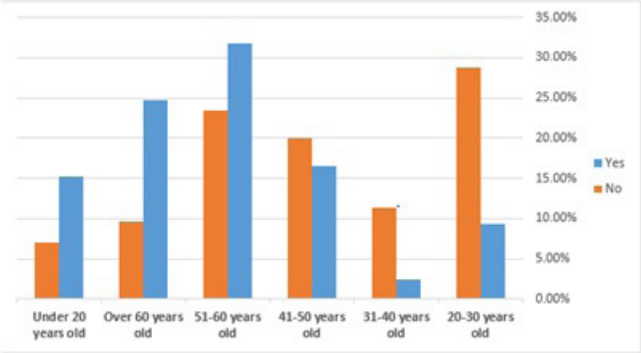

Figure 2: Relation between knowledge and age

Table 3: Diabetics' practice of oral hygiene

How often do you brush your teeth?	**After every meal**	**Once a day**	**Twice a day**	**Not regularly**	**Never**
	4 (2%)	78 (39%)	43 (21.5%)	62 (31%)	13(6.5%)
What is the auxiliary method do you use beside tooth brush?	**Wooden tooth picks**	**Siwak**	**Dental floss string**	**None**	
	28(14%)	32(16%)	50(25%)	90(45%)	
How often do you visit your dentist?	**Every 6 months**	**Once a year**	**Only on emergencies**	**Never**	
	18 (9%)	57(28.5%)	75 37.5%)	50(25%)	

5. Discussion

Awareness of periodontal complications of Diabetes Mellitus and the personal practice for a good glucose control are important for the disease management.

Raising diabetic's awareness of the bidirectional link between DM and periodontal lead to adherence of a good self-care practice which will reduce complications consequently, this was proven by a resent clinical trial where educated patients had better hygiene practice and less complications eventually [9].

The current study aimed to investigate the level of awareness regarding bidirectional relationship between periodontitis and DM in a sample of Syrian diabetics.

The distribution of patients between male and female groups was almost the same. Most of patients ranged between 51-60 years of age. Significantly, only about 42% patients knew that DM affects periodontal tissue, and 39% of patients knew that periodontal disease affects glucose control this results are in accordance with the findings of a recent systematic review [2] which analyzed 28 publications from 14 country found that majority of the studies reported that more than half of people with diabetes were unaware of the link between diabetes and oral health and their increased risk for various oral health complications including periodontal disease.

For example, Al Habashneh et al. [6] found that 48% of diabetics were aware that DM patients are more prone to "gum" diseases and oral health complications and the result of Bahmaman et al. [7] who found that 21.8% of participants knew that Gum disease makes it harder to control diabetes: also Aleen et al [10] reported that less than a half of participants were aware of their risk for periodontal disease.

The poor knowledge in the current study could be a result of the absence of educational content presented to the patient about the association between periodontitis and Diabetes Mellitus. Among the complication of diabetics, patients were significantly aware of ophthalmic complications of DM the most. This could be due to the general knowledge in the society which points at vision prob-

lems when affected by DM, or because such complications affect a more critical function in the human body and quality of life. These result was similar to that found by Hamzeh A et al. in 2019 in Syrian society [11], in which almost all patients (93.8%) thought that DM could affect the eye and 67.3% believed that it could cause blindness.

Regarding practice of oral care, our results showed that 39% of patients brushed once a day and 21.5% brushed twice a day and only 6.5% of patients never brushed. Such results indicate an acceptable degree of awareness toward the importance of tooth brushing as an important health habit, this is similar to what was found by Al Darrat et al [12] who reported that 50% of participants brushed once and 31% participants brushed twice daily, while Al Habashneh et al. [6] found that 28% of participants brushed twice or more and 27.7% brushed once, the rates where different in other studies, it was found that those who brushed once were much higher than the recent study like V. Bowyer et al. in 2011 [13], in which it was shown that 67% of patients brushed once a day and 30% brushed twice and Bahammam et al. [7] who found that 22.2% of patients brushed twice daily while 65% brushed once.

When asked about auxiliary dental hygiene tools besides tooth brush, it was shown that 45% never use dental hygiene tools only 14% answered they use the tooth picks, this result was lower than other studies Çankaya H et al. [14] who found that 65% of patients used toothpick for interproximal cleaning, while in Al Habashneh study [6] 45% of participants used tooth picks.

When asked about dentist visits only 28.5% visit once a year while 37.5% visited the dentists only on emergencies, while in UK according to V Boyer [13] 54.5% visited the dentist twice a year, 26% visited the dentist once, this differences could be because of cost of dentist visits and absences of assurance coverage for the population of our study.

In the current study 39.5% of participants had chosen the medical workers as source of education, internet, television, and health care seminars were not significant sources for medical knowledge to the DM patients. This reveals a weak role of media in spreading the required health care information and promoting the health education, also in Çankaya et al. [14] dentists were chosen as the best source of information, while in the study of Almassi et al. [15] only 29% considered dentists as a source of education,31% consider media the best source of education, in Al Habashneh study [6] about (50%) indicated that television and internet were useful in learning about diabetes and oral health.

Regarding the relationship between age and knowledge of periodontal complications in DM, it was shown the younger patients (i.e. 20-30 years old) had insufficient knowledge compared to older ones (i.e. 51-60 years old), while both Almassi et al. [15] and Alderrat et al. [12] found no difference in knowledge according to age. This may reflect a weak education provided to newly diagnosed cases especially young ages in the population studied, Nevertheless, older patients seem to form their knowledge through experience as time passes rather than direct education.

According to the result of the current study, diabetics have limited oral health knowledge and poor oral health behaviors, because of the situation in Syria it is more required from all involved health care providers to empower awareness and educate patients about their increased risk of oral health problems to limit complications, motivate them for good oral health behaviors and facilitate access to dental care and reduce costs of dental checkup.

Patients should be educated that simple, daily care of oral hygiene could prevent serious, expensive and invasive measures, therefore they should be encouraged to seek regular oral health examinations to achieve more efficient and effective care. This could be accomplished through an easy and accurate educational material about the two-way relation between diabetes and periodontitis ,which could be presented via lectures, seminars, and above all media and social networks which are an effective and tangible mean that must be employed and enforced in our society to deliver education and guidelines to general population and diabetics in particular, especially after the fundamental role it has played recently in awareness against COVID -19 pandemic and previous pandemics like Ebola and N1H1 [16, 17].

6. Conclusion

There was a significant lack of knowledge regarding bidirectional relation between periodontitis and DM. Older patients had more knowledge compared to younger ones, dentist was the source of education preferred by most of the patients therefore collaboration among medical and dental professionals for the management of affected individuals became increasingly important in addition to enhancing the role of social networks in education.

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