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Research Article

Periodontitis for Dental health

Awareness of the Association between Periodontal Health and Diabetes Mellitus among Middle-Aged Population in Burridah, Saudi Arabia

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Abstract: The link between diabetes mellitus and periodontal diseases has been well-established. But there is a lack of awareness in comparison with other systemic complications. This study aims to assess the awareness of the association between diabetes mellitus and periodontal diseases in a high risk group of population and to identify the important factors which influence this knowledge. The study was a cross sectional survey, which selected 248 individuals. The inclusion criteria were the attendants of Outpatients clinic who were aged = 40 years old, while patients with mental illness were excluded. Data were collected by interviewing patients using a questionnaire with closed-ended questions in three sections. The first section contained questions about characteristics of the study respondents; the second section had questions on clinical examination, and the third section contained questions about knowledge of the effect of diabetes on periodontal health. For sections 1 and 2 of the questionnaire, the descriptive statistics of frequencies and percentages was calculated and presented in frequency distribution tables. The associations between certain demographic and clinical characteristics were presented in crosstabs and the significant differences were detected using chi-square test at 0.05 alpha level of significance. Out of 284 periodontal patients recruited in this study, 67.3% was female and 32.7% was male with majority of the respondents (about 64%) aged 40-50 years old. About 55% had diabetes mellitus and about 66% of them had a family member diagnosed with diabetic mellitus. About 46% of the respondents were aware of the relation between diabetes and gum health. A half of the respondents reported the escalating risk of periodontal diseases among diabetic patients. This awareness was found significantly associated with women of high educational level, positive familial history of diabetes, and number of physician visits. There is lack of awareness of the impact of diabetes on periodontium health in high risk and middle-aged group of general population.

Keywords: Diabetes, Periodontitis, Gingiva, Hyperglycemia

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1. INTRODUCTION

Diabetes mellitus is a syndrome with relative or absolute deficiency in insulin secretion that results in hyperglycemia[1]. It is associated with long-term complications in different body organs such as kidney, eye, peripheral nerve and blood vessels[2]. The accumulated scientific evidence and mechanisms of biological plausibility indicated a strong association between diabetes mellitus and periodontal diseases[3-5]. It has been suggested that periodontitis should be listed with other typical complications of diabetes along with retinopathy, nephropathy, and neuropathy, delayed healing of wounds and vascular conditions[6]. Despite the onslaught of *Capnocytophaga* species in the micro flora of diabetic patients, the composition of oral micro flora was found quite similar to that in non-diabetic individuals[7]. Thus, the mechanisms by which diabetes increases the risk of periodontal diseases were attributed to the host-response factors rather than to microorganisms' related factors[8-9]. Although the connection between diabetes mellitus and periodontal diseases has been well-established[10-11], the awareness of periodontal outcomes of diabetes was found low in comparison with awareness of other systemic complications[12-13]. In Saudi Arabia, an overall prevalence of diabetes mellitus was 23% among Saudi community[14]. In a study conducted among outpatients' attendants in Saudi Arabia, the majority of diabetic patients lack the knowledge about the relation between diabetes and periodontal diseases, while most of them were aware of other systemic complications of diabetes[15]. The factors influencing this knowledge were not fully explored and so this knowledge gap hinders a proper planning of educational campaigns aiming to improve the level of awareness. This study aims to evaluate the level of knowledge about the association between diabetes mellitus and periodontal diseases in a high‐risk group of population and to identify the important factors which influence this knowledge.

2. METHODS

This study was a cross sectional survey study which selected 248 attendants of patients visiting Outpatient's Department of Qassim Private Colleges, Burridah, Saudi Arabia. A total of 248 of the attendants were selected randomly using systematic random sampling from records of outpatient's reception during the period December 2017-February 2018. The sample size was determined by G*power software (version 3)[10] which calculated a priori sample size for a given power of 0.90, error probability of 0.05, effect size of 0.25 and 3 degrees of freedom. The initially calculated sample size was 227 study participants, to which 10% was added to compensate for non-respondents rate. Thus, 248 participants were predetermined as the required minimum sample size to detect significant differences between the levels of awareness and respondent's characteristics. The attendant of outpatients' clinic who aged ≥ 40 years old was included, while patients with clear physical or mental illnesses were excluded. Data were collected by interviewing patients using a questionnaire with closed-ended questions composed of three sections. At the end of the interview, patients were educated on the effect of diabetes mellitus using an education material. A written consent was obtained from the study respondents at the outset. The study was ethically approved by committee of research ethics (EAC 310/2017) in Qassim Private Colleges, Burridah, Saudi Arabia.

3. STATISTICAL ANALYSIS

The answers were coded and fed into computers in excel sheets and then imported to Statistical Package of Social Science (SPSS), USA, version 20. For sections 1 and 2 of the questionnaire, the descriptive statistics of frequencies and percentages were calculated and presented in frequency distribution tables. The associations between certain demographic and clinical characteristics were presented in crosstabs and the significant differences were detected using chi-square test at 0.05 alpha level of significance.

4. RESULTS

Out of 284 periodontal patients recruited in this study, 67.3% was reported female and 32.7% male. The majority of the respondents (about 64%) aged 40-50 years old, while only 1.6% were >60 years old. The majority of the respondents (74.6%) had an educational background of a secondary school or less, while no patient was a postgraduate. About 84% of the respondents were residents of Saudi and 15.7% were non-Residents of Saudi (table 1). Regarding clinical characteristics of the respondents, more than half of them reported that they had diabetes mellitus and about 66% of them had a family member diagnosed with diabetic mellitus. Among diabetic patients, 43.1% had type II diabetes mellitus and 67.2% undergo medications for the treatment of diabetes mellitus. Approximately, 60% of the respondents said they visited the physician regularly, however only 3.2% of them visited the physician on a monthly basis. On the other hand, 40.3% of the respondents said they have made their first visit to the dentist. Regarding oral health practices, 61.7% of the respondents brush their teeth once a day (table 2). The knowledge factor regarding the relation between diabetes mellitus and periodontal diseases is demonstrated in table 3. About 46% of the respondents knew about the relation between diabetes and gum health. A half of the respondents reported the risk of developing periodontal diseases among diabetics. Regarding knowledge about the effect of smoking, 67.7% of the respondents knew that smoking elevates the risk of gum problems in diabetic patients. Among those who identified the relation between diabetes mellitus and periodontal diseases, 36.5% reported television as a source of information and the same percentage identified friends or family members as a source of information, while only 20.9% reported health care providers as a source of information. Associations between respondents' characteristics and knowledge about the relation between diabetes mellitus and periodontal diseases were tested using chi-square test. Gender was significantly associated with this knowledge since 52.1% of female knew the relation between diabetes mellitus and periodontal diseases in comparison to only 34.6% of male (p= 0.009). Furthermore, educational level was found to be significantly related to awareness of the relation between diabetes mellitus and gum diseases. Concerning educational background, a significantly higher proportion of participants with high school or university degree had knowledge of the association between diabetes mellitus and gum diseases compared to those with elementary or intermediate educational level. Similarly, a significant higher percentage of those who had a familial history of diabetes mellitus were aware about the relation between diabetes mellitus and periodontal health than those without familial history (p=0.040). In addition, 48.5% of those who aged 40-60 years old were aware about this relation in comparison to only

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17.6% of those who aged >60 years old (0.015=4). Conversely, being a diabetic patient or taking medications for diabetic mellitus was not significantly associated with knowledge about the relation between diabetes mellitus and periodontal diseases (p= 0.095 and 0.151 respectively). The percentage of knowledgeable respondents was significantly higher among those who visited physician than among those who never visited physician (table 4).

Table 1. Demographic characteristics of the respondents, (n = 248)

Variables	Frequency	Percent (%)
Gender		
Male	81	32.7
Female	167	67.3
Age		
40-45	101	40.7
46-50	57	23.0
51-55	34	13.7
56-60	39	15.7
61-65	13	5.2
66-70	4	1.6
Educational level		
Primary school or less	67	27.0
Intermediate school	27	10.9
Secondary school	91	36.7
Bachelor degree	63	25.4
Nationality		
Saudi	209	84.3
Non-Saudi	39	15.7

Table 2. Distribution of the clinical characteristics of the respondents

Variables	Frequency	Percent (%)
Diabetes Mellitus (n=248)		
Yes	137	55.2
No	111	44.8
Type of diabetes mellitus (n=137)		
Type I	42	30.7
Type II	59	43.1
I don't know	36	26.3
Are in medication of diabetes mellitus? (n=137)		
Yes	92	67.2
No	45	32.8
Does anyone in your family have diabetes? (n=248)		
Yes	138	55.6
No	110	44.4
How frequently do you visit your physician? (n=248)		
Never	101	40.7
Every month	8	3.2
Every 2- 3 months	16	6.5
Every 4- 6 months	47	19.0
Every 7-12 months	76	30.6
How frequent do you visit your dentist? (n=248)		
Never	100	40.3
Every month	5	2.0
Every 2- 3 months	13	5.2
Every 4- 6 months	43	17.3
Every 7-12 months	87	35.1
How many times do you brush your teeth in a day? (n=248)		
once per day or less	153	61.7
twice per day	83	33.5
More than Twice in a day	12	4.8

Table 3. Knowledge of the respondents regarding relation between diabetes mellitus and periodontal diseases

Variables	Frequency	Percent (%)
Do you know that there is a relation between diabetes and gum health? (n=248)		
Yes	115	46.4
No	133	53.6
Does being a diabetic patient increase the risk of developing gum-related problems? (n=248)		
Yes	124	50.0
No	17	6.9
I don't know	107	43.1
Does smoking increases the risk of gum disease in diabetic patients? (n=248)		
Yes	168	67.7
No	9	3.6
I don't know	71	28.6
Source of information for those who knew the relation between diabetes mellitus and gum diseases (n=115)		
Friends or family	42	36.5
Health care provider	24	20.9
Newspapers, magazines, or book	7	6.1
Television	42	36.5

Table 4. Association between respondents' characteristics and knowledge about the relation between diabetes mellitus and periodontal health

Variables	Knowledge about the relation between diabetes mellitus and periodontal health		Chi-square	P value
	Yes	No knowledge		
Gender				
Male	28	53	6.74	0.009*
	34.6%	65.4%		
Female	87	80		
	52.1%	47.9%		
Education				
Primary school	23	44	9.71	0.021*
	34.3%	65.7%		
Intermediate school	9	18		
	33.3%	66.7%		
Secondary school	47	44		
	51.6%	48.4%		
Bachelor degree	36	27		
	57.1%	42.9%		
Diabetes mellitus				
Yes	57	80	2.79	0.095
	41.6%	58.4%		
No	58	53		
	52.3%	47.7%		
Are in medication for diabetes mellitus				
Yes	41	51	3.78	0.151
	44.6%	55.4%		
No	16	29		
	35.6%	64.4%		
Does anyone in your family have diabetes?				
Yes	72	66	4.21	0.040*
	52.2%	47.8%		
No	43	67		
	39.1%	60.9%		
Age				
40-60 years old	112	119	6.06	0.014*
	48.5%	51.5%		
>60 years old	3	14		
	17.6%	82.4%		
How frequently do you visit your physician?				
Never	39	62	4.12	0.042
	38.6%	61.4%		
Once or more	76	71		
	51.7%	48.3%		

How frequently do you visit your dentist?				
Never	44	56	0.38	0.538
	44.0%	56.0%		
Once or more	71	77		
	48.0%	52.0%		

5. DISCUSSION

This study aimed to evaluate the level of knowledge about the association between diabetes mellitus and periodontal diseases in a high risk group of population and to identify the important factors which influence this knowledge. The results of this study will facilitate planning of oral health educational campaigns by provision of required baseline data. The present study found that only 46% of the respondents knew the link between diabetes mellitus and periodontal health, while the other half of the respondents reported that being a diabetic patient elevates the chance of developing periodontal diseases. Similar findings reported by Ismail and Ali when 46.4% of the diabetic patients expressed their knowledge of how diabetes mellitus affects gingiva[15]. They included different age groups in their study; even children less than 15 years old were included, and however all the participants were diabetic patients recruited from primary health centers in Abha, Saudi Arabia[15]. Furthermore, Bahammam found only 46.7% of the diabetic patients were aware of the fact that diabetic patients can be associated with more gum problems if blood sugar was not properly controlled[16]. This consistent poor level of knowledge was reported by many studies either in Saudi Arabia or other developing countries[17-19]. In other groups of Saudi population, such as University students, a very low level of knowledge was reported in first-year students when only 19% of them reported diabetes is a risk factor of periodontal diseases[20]. About 68% of our respondents were aware that smoking can exacerbate the risk of gum disease among diabetic patients. This was in agreement with Bahammam who found 67.2% of the diabetic patients were aware of how diabetics may have more gum diseases in smokers than non-smokers[16]. Ismail and Ali found that 84% of the diabetic patients thought smoking is more hazardous to the gingiva of diabetic patients than non-diabetics. The diabetic patients included in a study conducted by Ismail and Ali were more aware about sequelae of diabetes than our respondents were only 55.2% were diabetics[9]. Diabetes patients are expected to have more awareness due to routine doctor consultations and a higher exposure to educational materials. In our study, we found this level of awareness significantly associated with frequency of doctor visits. Moreover, the comparable level of awareness in our participants may be attributed to the presence of familial history of diabetes in more than half of them. This can be more elaborated by the reporting of 40.3% of our respondents who said they have never visited the dentist, while only 7.8% of the diabetic patients never visited the dentist in a study of Ismail Ali[15]. Further, Bahammam reported that all diabetic patients visited the dentist but only 12.6% visited dentists on a regular basis[16]. In our study, both of familial history and frequency of physician visiting were found significantly associated with level of knowledge about relation of diabetes with gum diseases. Conversely, Bahammam found frequency of dental visits was associated with knowledge about relation of diabetes with periodontal diseases[16]. We found 60% of the respondents confirmed their routine visits to the physician, however only 3.2% of them were visiting physician in a monthly basis. Bahammam reported that 80.2% of the studied diabetic patients visited physician in the last year[16]. In the current study, 61.7% of the respondents reported brushing their teeth once per day or at less frequency. A slightly lower percentage found by Ismail and Ali as 57.6% of the diabetic patients practiced teeth brushing at least once per day[15], however a higher percentage was found by Bahammam among diabetic patients from Jeddah city, where 73.2%[16]. The present study showed that among those who identified the effect of diabetes on periodontal diseases, 36.5% reported friends or family members as a source of information, while a higher percentage of 55.3% reported that in a study conducted by Bahmmam[16]. Our findings revealed that 20.9% identified health care providers as a source of information about diabetes and periodontal diseases, while 50.9% reported the same source of information in Bahammam's study[16]. These differences can be attributed to different population characteristics because our study restricted to high-risk age group of the general population, while Bhamma's study recruited only diabetic patients from different age groups. This study found the educational level to be significantly related to awareness regarding association between diabetes mellitus and periodontal diseases. A significantly higher percentage of respondents with secondary school or bachelor degree had knowledge compared to those with primary or intermediate school. Similarly, significant difference was reported between diabetic patients with school level and those with a college or postgraduate level in Jeddah city[16]. In addition, we found 48.5% of those who aged 40-60 years old were aware about this relation in comparison to only 17.6% of those who aged >60 years old. It may be a confounding effect of the educational level which was significantly associated with younger age group, those who aged 40-60 years, rather than older age group.

6. CONCLUSION

We found that there is a lack of awareness about the effect of diabetes on periodontal health among high risk and middle-aged group of general population. This awareness was found significantly associated with female gender, high educational level, positive familial history of diabetes, and frequency of physician visits. Thus, the planning of educational campaigns by dental health specialists should focused on individuals who are male, had low educational level, no familial history of diabetes, or those who never visited physicians.

7. AUTHORS CONTRIBUTION STATEMENT

Dr. Alanood formulated the proposal of the study, collected and analyzed the data, and writing of the manuscript. Dr. Fares, Dr. Sumona, and Dr. Vivak supervised all phases of this study and contributed significantly to the manuscript.

8. CONFLICTS OF INTEREST

Conflict of interest declared none.

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