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Survey on Knowledge Toward Diabetic Periodontal Condition and Oral Health Among Medical Staff and Patients

Jin-hua Luo[1#], Yan-Ling Li[2#], Yun Zhang[2], Ling Li[2], Miao Zhang[2], Ling-ling Li[2#*]

[1]Department of Integrated Traditional Chinese and Western Medicine, Affiliated Hospital of Hebei University, Baoding 071000, China

[2]Department of Tuberculosis, Affiliated Hospital of Hebei University, Baoding 071000, China

[#]These authors contributed equally to this work

Corresponding author: Ling-ling Li, 417597541@qq.com

Abstract: The study was conducted to understand the cognitive status of medical staff and patients on the status of periodontal disease and oral health care in patients with diabetes, and to provide reference for the implementation and improvement of diabetes management and health education. Using the Diabetes Periodontal Status and Oral Health Knowledge Questionnaire, 108 doctors, 190 nurses, and 212 inpatients were investigated. This study demonstrated that, the total scores of doctors, nurses, and patients with diabetes periodontal status and oral health knowledge were (31.18 ± 5.14), (28.58 ± 4.09) and (18.67 ± 3.45) points, respectively. The results of regression analysis showed that education level, department, and related training experience ($p < 0.05$, $p < 0.01$) were the influencing factors of the diabetic periodontal status and oral health knowledge level of the medical staff, meanwhile the monthly income, department, and relevant training experience ($p < 0.05$, $p < 0.01$) were the factors influencing the diabetic periodontal status and oral health care knowledge level of the patients. In summary, the cognitive level of diabetic periodontal status and oral health care knowledge of the medical staff and patients' needs to be improved. Medical staff should pay attention to the study of diabetic periodontal status and oral health care knowledge, further perform a good job in the relevant health education of patients, which is helpful to maintain good oral hygiene.

Keywords: Doctor; Nurse; Patient; Diabetes; Periodontal disease; Oral health knowledge; Cognitive status

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1. Introduction

With the development of society and the aging of the population, the prevalence of diabetes is increasing on a yearly basis, and at present it has become one of the public health problems worldwide that is seriously impacting human health [1]. Meanwhile, periodontal disease is considered to be the sixth major complication of diabetes. Patients with poor long-term blood sugar control, and poor oral hygiene are prone to develop severe periodontitis [2]. In this study, through a questionnaire survey, we were able to understand the current status of medical staff and patient's cognition of their periodontal health status, daily oral health care behavior, family history, and periodontal health care knowledge. This paper aims to provide a reference for the implementation and improvement of diabetes management and oral hygiene education, to reduce the complications of diabetes.

2. Research subject

Using convenience sampling method, a total of 510 doctors, nurses, and patients were selected from June to December, 2021 from different clinical departments of a tertiary grade to complete the questionnaire survey. The research subjects were selected from a general hospital in Baoding City, Hebei Province. The inclusion criteria for doctors and nurses are; (1) Obtained the professional qualifications of licensed doctors or nurses; (2) Have been engaged in clinical work in the hospital for > 1 year; and (3) Age range is ≥ 18 years old, while the inclusion criteria for patients are; (1) Hospitalization duration ≥ 7 days; and (2) The ability of listening, speaking, reading, and writing skills are normal. All the research subjects are agreed to participate in this study. Patients with a history of mental illness and cognitive impairment are not included in this study.

3. Methods

3.1. Survey tools

3.1.1. Questionnaire for general information of research subjects

The questionnaire was designed by the researchers themselves, for the questionnaire for medical staff, information such as demographic data of the medical staff, namely gender, age, professional title, marital status, education level, department, relevant education, training experience, and others were included. Meanwhile, the questionnaire for the patients containing the demographic data of patients, namely gender, age, education level, family location, monthly income, inpatient department, relevant education, training experience, and others.

3.1.2. Diabetic periodontal status and oral health knowledge questionnaire

After reviewing a large number of domestic and foreign related literature [3-5], we consulted the experts and designed the questionnaire by ourselves. It consists 40 items which can be divided into; (1) Basic knowledge of periodontal disease (8 items); (2) Relationship between periodontal disease and diabetes (4 items); (3) Preventive measures for periodontal disease (5 items); (4) Preventive measures for oral infection (8 items); (5) Oral health indicators (10 items); and (6) Health behavior guidance (5 items). The questionnaire is a combination of single-choice and multiple-choice questions, with 1 point for correct answer to one question, 0 points for wrong answers or unknown, thereby the total score is 0 to 40 points. The test-retest reliability coefficient was 0.823, the internal consistency Cronbach's a value was 0.821, the Cronbach's a value of 7 dimensions was 0.798-0.831, and the content validity CVI was 0.809.

3.2. Investigation method

The investigators who issued the questionnaires were 5 nursing staff, and a group training was conducted uniformly before the survey. Before issuing the questionnaires, the consent of the head of the hospital and the head nurse of the department was obtained. The purpose, meaning, and process of the research was explained to the respondents, and declare to protect their personal information. The respondents have the change to withdraw from the research at any time, and the survey is after the received the respondents informed consent. The time required to complete one questionnaire is about 10 minutes. A total of 550 questionnaires was distributed in this study, and 510 valid questionnaires were recovered, with an effective recovery rate of 92.73%. Among them; (1) Around 120 questionnaires were distributed to the doctors, 108 valid questionnaires were recovered, and the effective recovery rate was 90.00%; (2) Around 200 questionnaires were distributed to the nurses, 190 valid questionnaires were recovered, and the effective recovery rate was 95.00%; (3) Around 230 copies were distributed to patients, and 212 valid questionnaires were recovered, and the effective recovery rate was 92.17%.

3.3. Statistical analysis

SPSS 22.0 software was used for data analysis. Measurement data were represented by $\bar{x} \pm s$, t-test was used for comparison of two independent samples, variance analysis was used for univariate analysis, and multiple linear regression analysis was used for multivariate analysis. A p value less than 0.05 ($p < 0.05$) was considered statistically significant.

4. Results

4.1. Diabetic periodontal status and oral health knowledge scores of medical staff and patients

Among the 298 medical staff who involved in the survey, there were 108 males and 190 females; their age ranged are from 22 to 56 (34.81 ± 6.76) years; the total score of the medical staff's diabetes periodontal status and oral health knowledge was (29.88 ± 4.34) points. Meanwhile, among the 212 patients who involved in the survey, there were 102 males and 110 females; their age ranged are from 23 to 76 (43.86 ± 6.99) years; the total score of diabetic periodontal status and oral health knowledge was (18.67 ± 3.45) points.

4.2. Univariate analysis of diabetic periodontal status and oral health care knowledge

Diabetic periodontal status and oral health knowledge of the medical staff and patients were used as dependent variables, respectively.

The general data were independent variables for univariate analysis, a total of 6 variables had an impact on the medical staff's diabetic periodontal status and oral health knowledge scores; while 5 variables had an impact on the patients' diabetic periodontal status and oral health knowledge scores as shown in **Table 1** and **Table 2**.

Table 1. Univariate analysis of medical staff's diabetic periodontal status and oral health care knowledge

Items	n	Scores ($\bar{x} \pm s$)	t/F	*p*
Sex			2.897	0.005
Male	108	30.67 ± 3.10		
Female	190	28.87 ± 4.13		
Educational level			2.998	0.003
College and below	83	28.67 ± 4.50		
Undergraduate and above	215	30.98 ± 3.02		
Job title			4.132	0.001
Primary	105	28.69 ± 4.43		
Intermediate	155	30.07 ± 3.01		
Advanced	38	32.27 ± 2.87		
Department			11.654	0.000
neurosurgery	25	28.67 ± 4.70		
Orthopedics	29	28.69 ± 4.80		
Urology	26	27.87 ± 4.60		
Cardiac Surgery	27	28.96 ± 4.50		
Outpatient and emergency department	31	29.87 ± 4.10		
Gynecology and Pediatrics	31	28.61 ± 4.65		
Endocrinology	27	34.21 ± 2.10		
Gastroenterology	25	31.63 ± 3.10		

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Items	n	Scores ($\bar{x} \pm s$)	t/F	*p*
Neurology	29	29.99 ± 4.30		
Cardiology	28	30.67 ± 3.80		
Others (infection department, operating room)	20	30.12 ± 3.90		
Relevant education and training experience			12.680	0.000
Have	79	32.56 ± 3.10		
None	219	27.98 ± 4.58		
Profession			3.967	0.001
Doctor	108	31.87 ± 2.97		
Nurse	190	29.07 ± 3.86		

Table 2. Univariate analysis of periodontal status and oral health knowledge in patients with diabetes

Items	n	Scores ($\bar{x} \pm s$)	t/F	*p*
Department			10.651	0.000
Neurosurgery	18	17.68 ± 2.70		
Orthopedics	19	17.89 ± 2.80		
Urology	18	17.87 ± 2.60		
Cardiac Surgery	20	18.96 ± 2.30		
Outpatient And Emergency Department	15	19.37 ± 2.10		
Gynecology And Pediatrics	19	18.63 ± 2.35		
Endocrinology	21	22.21 ± 1.80		
Gastroenterology	23	21.63 ± 1.90		
Neurology	25	19.99 ± 2.30		
Cardiology	19	20.67 ± 1.80		
Others (Infection Department)	15	18.12 ± 2.23		
Relevant Education and Training Experience			16.612	0.000
Have	54	20.56 ± 1.87		
None	158	17.18 ± 2.52		
Home Location			5.967	0.002
Town	86	20.17 ± 1.97		
Rural	126	18.01 ± 2.86		
Monthly Income			3.231	0.005
≤ 3000 Yuan	74	18.22 ± 1.98		
> 3000 Yuan	138	20.00 ± 2.06		
Family History of Diabetes			6.679	0.001
Have	32	21.11 ± 2.17		
None	180	18.51 ± 2.56		

4.3. Multivariate analysis of periodontal status and oral health knowledge scores among medical staff and patients with diabetes mellitus

Taking the diabetic periodontal status and oral health knowledge score as dependent variables, and the variables with statistical significance in the univariate analysis were used as independent variables for multiple linear regression analysis, and the obtained results were: education level (assignment: junior college and below = 1, undergraduate and above = 2), department (non-endocrinology department = 0,

endocrinology department = 0)), relevant education and training experience (none=0, yes=1) were the influencing factors of the medical staff's diabetic periodontal status and oral health care knowledge as shown in **Table 3**. Meanwhile, department (non-endocrinology department = 0, endocrinology department = 1) and related education and training experience (none = 0, yes = 1) are the influencing factors of the patients' diabetic periodontal status and oral health care knowledge as shown in **Table 4**.

Table 3. Multiple linear regression analysis of medical staff's diabetic periodontal status and oral health care knowledge

Variable	*β*	*SE*	*β'*	*t*	*p*
Constant	38.113	1.223	–	31.009	0.000
Educational level	0.856	0.299	0.115	3.008	0.001
Department	0.599	0.459	0.228	4.186	0.000
Relevant education and training experience	1.487	0.399	0.201	3.782	0.000

Note: R^2=0.413, R^2=0.401, F=39.721, *p*=0.000

Table 4. Multiple linear regression analysis of diabetic periodontal status and oral health knowledge

Variable	*β*	*SE*	*β'*	*t*	*p*
Constant	13.562	1.326	–	10.998	0.000
Family history of diabetes	0.412	0.092	0.267	3.019	0.001
Department	1.301	1.099	0.518	3.819	0.000
Relevant education and training experience	1.599	1.338	0.288	4.997	0.000

Note: R^2=0.567, R^2=0.561, F=89.231, *p*=0.000

5. Discussion

5.1. Diabetic periodontal status and oral health knowledge of medical staff and patients need to be improved

Diabetes is a common clinical endocrine and metabolic disease. With the improvement of living standards and the prolongation of average life expectancy, the prevalence of diabetes is increasing year by year, especially type 2 diabetes [6]. Diabetic patients with low immune function are prone to periodontal tissue infection, leading to the occurrence of periodontal disease. According to the analysis of clinical reports, diabetes has a promoting effect on the development of periodontal disease, where periodontal disease is the sixth major complication of diabetes, and most the patients have insufficient understanding of the correlation between diabetes and periodontal disease [7]. At present, more than 50% of diabetic patients lack in the knowledge of periodontal disease prevention and treatment, and nearly 1/3 of diabetic patients have poor oral health knowledge and behavior. The oral health knowledge and behavior of diabetic patients affect the occurrence and development of periodontal disease; therefore, the development of oral health education can enable patients to master certain knowledge of periodontal disease and promote the change in patients' oral health concept, which may greatly improve the prevention and treatment of periodontal disease [8].

The results of this survey showed that the total scores of doctors, nurses, and patients on diabetic periodontal status and oral health care knowledge were (31.18±5.14), (28.58±4.09), and (18.67±3.45) points, respectively, and the score rates were 79.87%, 76.54%, 53.52%, respectively. Based on the results, the periodontal status and oral health knowledge level in doctors, nurses, patients with diabetes still need to be further improved. Although the knowledge of diabetic periodontal status and oral health care of

medical staff is higher than the patients, the knowledge possessed by medical staff is one of the sources of knowledge for the public and patients, and the mastery of relevant knowledge directly affects the cognition of patients. Therefore, the responsibility of health education should increase the importance of diabetes-related periodontal status and oral health care knowledge, pay attention to the study of theoretical knowledge, and strengthen knowledge reserve.

5.2. The influencing factors of diabetic periodontal status and oral health care knowledge among medical staff

The results of this study showed that the higher the education level, the higher the scores of the medical staff on diabetic periodontal status and oral health care knowledge, while the staff in the endocrinology department has significantly higher knowledge level than the non-endocrinology department, and lastly the medical staff who had received education and training related to the diabetic periodontal status and oral health care knowledge has a higher score. The reasons which may contribute to these results are; (1) Medical staff with high education level have relatively solid professional basic knowledge and strong self-learning ability, meaning that they have obvious advantages in terms of understanding channels, and understanding and acceptance of disease-related knowledge; (2) As a specialized department for the treatment of diabetes, the endocrinology department has more opportunities for professional knowledge training, thus has the highest cognitive score; (3) The knowledge level of diabetic periodontal status and oral health care among those who have received relevant education and training is higher than that of those who have not received training. Therefore, strengthen the professional training of non-endocrine professional medical staff is very important.

5.3. Influencing factors of periodontal status and oral health care knowledge in patients with diabetes

This study shows that, compared with patients without a family history of diabetes, patients with a family history of diabetes have higher scores on periodontal status and knowledge of oral health care. In addition, patients in the endocrinology department have significantly higher scores on periodontal status and knowledge of oral health care than other departments, and lastly patients who had received educational training, had a higher cognitive score compared to those who do not receive training. The reasons which may contribute to these results are as follows: (1) Previous study has shown that there is a two-way relationship between diabetes and periodontal disease, and they are high risk factors for each other [9]; and the prevalence of severe periodontitis in diabetic patients is higher, than in non-diabetic patients. In addition, the older the diabetic patients, the longer the course of disease, the higher the incidence of periodontitis. Therefore, patients with a family history of diabetes are more aware of the diabetic periodontal status and oral health knowledge; (2) The contents of health education receive by patients in the endocrinology department, which includes the diabetic periodontal status and oral health care knowledge, improves the patients' awareness; (3) The scores of diabetic periodontal status and oral health knowledge of the trained patients were high, showing that it is essential to carry out health education for the patients. In addition, only through the correct and reasonable health education of the medical staff, can improve the patient's cognitive situation significantly [10].

In summary, the knowledge of the periodontal status of diabetes and oral health care of doctors, nurses, and patients' needs to be improved. In particular, medical staff, as the main force of health education, should pay attention to the study of their own diabetic periodontal status and oral health care knowledge, and do a good job of health education for patients and the public, so as to improve the awareness of oral health care of diabetic patients and the public, and prevent or reduce dental health. Weekly disease and promote the recovery of diabetic patients.

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Disclosure statement

The authors declare no conflict of interest.

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