



Knowledge Levels and Attitudes of Internists about the Relationship between Periodontal Disease and Diabetes[#]

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Research Article

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ABSTRACT

Aims: Periodontitis is a multifactorial, chronic inflammatory disease that can cause irreversible damage to the supporting tissues surrounding the teeth and consequently tooth loss if left untreated, and has been listed as the sixth major complication of diabetic patients. The aim of our study was to evaluate the knowledge levels and attitudes of internists about the relationship between periodontal disease and diabetes.

Methods: In our study, our questionnaire with 22 questions was applied to internists via whatsapp®, e-mail and directly. Participants were asked about specific periodontal complications that they believed patients diagnosed with diabetes were more susceptible to, and their awareness of the bidirectional relationship between diabetes and periodontal diseases was evaluated. 112 internists answered (45% male, 55% female) our questionnaire. The obtained data were analyzed using IBM SPSS programme.

Results: 70% of the internists participating in our survey are between the ages of 25-35. 92.7% of internists know that the department that diagnoses and treats gingival diseases is the periodontology clinic. Despite this, only 72.7% refer their patients with gingival bleeding to the periodontology clinic. 58.4% of internists reported that they did not learn about the relationship between periodontal disease and systemic health during medical school education, and 89% stated that the effect of periodontal disease on systemic health should be explained in medical school education.

Conclusions: Periodontal disease and diabetes are thought to share a common pathogenesis that includes increased inflammatory response at local and systemic levels, and it is known that there is a bidirectional relationship. Therefore, successful treatment of both will affect each other positively. It has been observed that internists have knowledge about diabetes and periodontal disease in Turkey, but it is thought that it would be beneficial to consider the relationship between diabetes and periodontal disease in more detail within the education program of the medical faculty.

Keywords: Diabetes Mellitus, Periodontal Disease, Medical Education, Knowledge.

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Introduction

Periodontal diseases are potentially progressive bacterial infections that result in the destruction of tooth-supporting tissues.¹ Diabetes mellitus is a chronic metabolic disorder and it is associated periodontitis through three possible mechanisms as cytokines/adipokins production, alteration of cell-mediated immunity and hyperglycemia.² As a result of population aging, urbanization and associated lifestyle changes, the global prevalence of periodontal diseases and diabetes mellitus is rapidly increasing and they have a high prevalence in the worldwide population.

Periodontitis has been defined as the sixth complication of diabetes mellitus. A bidirectional interaction was demonstrated: Patients affected by type 1 and type 2 diabetes have a higher prevalence of periodontitis than the general population, due to several metabolic factors (e.g. chronic hyperglycemia, autoimmunity, dietary and life-style factors); similarly, periodontitis predisposes to type 2 diabetes mellitus mainly via the increase of systemic cytokines release.

Conversely, improvement of metabolic control of diabetic patients hold up the progression of periodontitis as well as periodontitis treatment decreases glycosylated hemoglobin levels in blood. An epidemiology study conducted on adults with poorly controlled diabetes mellitus in the USA found that there was a 2.9 increased risk of having periodontal diseases compared to non-diabetes individuals.³ Due to the bidirectional causal interaction between periodontitis and diabetes mellitus, a close collaboration among dentists and endocrinology specialists is required and strongly recommended.² The number of individuals with diabetes mellitus in Turkey between 1997 and 2025 years will be expected to rise from 2.193.508 (7.5%) to 16.143.941 (31.5%).⁴

Oral health is a complementary part of general health. Medical and dental health care providers should work together to improve the general health condition of diabetes. Furthermore, it can help to reduce complications related to periodontal diseases and is an

important step forward of decreasing systemic inflammatory problems that may in turn, enhance the control of diabetes.⁵⁻⁷ Advancing the knowledge and awareness of medical and dental health care providers, about the relationship between periodontal diseases and diabetes mellitus will enhance better collaborative relations, make quality health care provisions and help exterminate oral health complications associated with diabetes. There have been numerous studies that have assessed the knowledge, opinions, views, and attitude of health care providers on periodontal diseases and diabetes mellitus.⁸⁻¹¹ The findings of these surveys found that they had some knowledge about both diseases and considered oral health and periodontal health important.⁸⁻¹² However, they were not confident enough mainly due to insufficient knowledge regarding the oral-systemic interactions and oral health disparities conducted during their training years. To our knowledge, there has been no study conducted on medical doctors especially internists assessing the level of knowledge and awareness on the relationship between periodontal diseases and diabetes mellitus in Turkey. The aim of our study is to evaluate the knowledge levels and attitudes of internists about the relationship between periodontal disease and diabetes.

Methods

In our study, our questionnaire consisting of 22 questions was applied by Whatsapp®, e-mail and face-to-face reviews. The study proposal was reviewed and approved by the Ethical Committee of the Faculty of Medicine, Sivas Cumhuriyet University, on February 2020 (2020-02/15). Participants were asked about specific periodontal complications that they believed patients diagnosed with diabetes were more susceptible to, and their awareness of the bidirectional relationship between diabetes and periodontal diseases was evaluated.

112 internists answered (45% male, 55% female). 70% of the internists participating in our survey are between the ages of 25-35. The internists were informed that the participation in this study was voluntary base.

The first part of the questionnaire recorded the demographic characteristics of participants including age, sex, and years in practice. Participants were then asked to which of the following periodontal complications they believed patients diagnosed with diabetes were more susceptible: gingival inflammation, gingival bleeding, alveolar bone resorption, tooth loss, tooth mobility, and periodontal abscess. The knowledge about specific periodontal complications associated with diabetes was measured by marking correct or incorrect on the questionnaire. Finally, all participants were asked to report whether they believed that diabetes affects periodontal health, whether a periodontal condition might affect the metabolic control of diabetes, and whether a bidirectional association exists between periodontal health and diabetes. For lots of these

questions, participants were given the choice of “yes”, “no”, “correct” or “incorrect”.

The questionnaire was comprised of questions prepared with respect to previously published questionnaires.¹³⁻¹⁵ The questions were initially translated to Turkish by three lecturers with fluent English language skills. These translated questions were backtranslated to English by a native English speaker, and the translations which were more consistent with the original version were determined. These steps were taken by the method described by Beaton *et al.*¹⁶ The obtained data were analyzed using SPSS version 23 (SPSS, Chicago, USA). Data were described using frequency counts and percentages, and comparisons were made using the Chi-square analysis for different independent samples. The significance level was set as 0.05.

Results

In this study, more than half of the participant doctors (70.9%) were 25-35 years old and 20% of participants were in the age range of 36-45. The remaining participants were 46 years and older. When we divided participants into groups according to age, no statistically significant difference was observed in the answers given to the questions ($p>0.05$). 55% of the doctors who answered our questionnaire are female. When we divided the groups according to gender, a significant difference was observed in only one question ($p<0.05$). This question is ‘Do you get advice/reference from dentists in systemic diseases?’. While 53.3% of female physicians said ‘yes’, 30% of men physicians answered ‘yes’ ($p=0.01$). 79% of the doctors participating in our study have been at most 15 years since graduated from medical faculty. 17.3% of the doctors participating in our study have been 15-30 years since graduated from medical faculty.

All of the participating doctors are specialist of internal medicine, 13.1% of them has a subspecialty. Endocrinology has the highest rate of subspecialty among internists. In addition, nephrology, hematology, gastroenterology specialists participated.

72.7% of the doctors participating in our survey would refer periodontology to direct their patients with severe gingival bleeding. 20% of the participants would refer dentist to direct their patients with severe gingival bleeding.

About 43.6% of the participant doctors reported that they learned the relationship between periodontal disease and systemic health in medical faculty and great majority of the participant doctors (89%) reported that the effects of periodontal disease on systemic health should taught in medical education. 84.5% of the participants had thought that they need additional information about the relationship between periodontal diseases and diabetes

Nearly half (48.6%) of the participant doctors answered ‘no’ to the question which asked that they can evaluate their patient in terms of periodontal health.

80.9% of the participant doctors noticed that the patients diagnosed with diabetes were prone to gum diseases.

All of the participant doctors reported that they knew periodontal disease markers as gingival inflammation, tooth mobility, tooth loss, gingival bleeding, periodontal abscess, bone destruction. and all of them choosed 'correct' for the expression 'Periodontal disease risk and severity are increased in patients with diabetes'. Again all of the participants noticed that controlling blood glucose level positively affects periodontium health.

Nearly all of the participant doctors 96.3% noticed that periodontal disease can change systemic inflammatory markers. 83.6% of the participant doctors choosed 'correct' for the expression of 'Periodontal disease markers correlate with serum levels' and 89.1% of the participant doctors choosed 'correct' for the expression of 'Treatment of periodontal disease contributes to the control of blood glucose level'. Nearly all of the participant doctors (97.2%) choosed 'correct' for the expression of 'Hematological disorders related to leukocyte function are associated with periodontal health.'

Discussion

In the direction diabetes mellitus-periodontitis, hyperglycemia and poor metabolic control are associated with an increased risk of onset and periodontitis severity and to worse clinical outcomes after periodontal therapy.⁶ The increase in the number of patients with diabetes causes an economic burden, which requires a multidisciplinary approach that can help prevent, diagnose, and manage complications related to diabetes mellitus and it was suggested that an oral evaluation for signs of periodontal diseases be performed during an yearly checkup of subjects with diabetes mellitus as both diseases shared same risk factors.¹⁷ Moreover, it was recommended that screening for diabetes mellitus status should be considered as part of a standard periodontal examination.¹⁸

Notably, limited studies have been conducted on medical students or physicians. Majority of the studies have assessed the knowledge, behaviour, attitudes, and awareness of medical and paramedical health care professionals on the relationship between periodontal diseases and diabetes.^{8,9,13,19,20} One such survey was conducted on internal medicine trainees at a single urban teaching hospital in New York city. The findings noted that internal medicine trainees had inadequate knowledge regarding periodontal disease and that they were generally uncomfortable performing a simple periodontal examination.²¹ Similarly, another study conducted between endocrinologists and dentists in China found that they were not equally equipped with the knowledge about the relationship between both diseases and that there was a wide gap between their practice and the current evidence, especially for the endocrinologists.²² Then again, a comparative study conducted on resident doctors undergoing postgraduate

training in medicine and dentistry at a Nigerian teaching hospital in Nigeria. They found that a major gap existed among them on the knowledge that linked oral diseases and they were found to have a poor commendation of collaborative management of diabetes mellitus patients.¹⁹ In 2016, a questionnaire study conducted in Kuwait analysed 1799 students of medical, dental, pharmacological and health science on their knowledge of the relationship between oral health, diabetes, body mass index and lifestyle. This study observed that they all had insufficient knowledge especially on the relationship between oral health and diabetes mellitus.²³ A comparative study was conducted by Sede and Ehizele on 100 resident doctors undergoing postgraduate training. The results found that more dental practitioners compared to medical practitioners were aware of the link between oral diseases and diabetes mellitus.¹⁹ Obulareddy *et al.* conducted a questionnaire survey study on 66 medical specialist in India. Although the medical specialists were aware about the relationship between diabetes and periodontitis, the endocrinologists group compared to the diabetologists and general medical doctors had better knowledge.²⁴ The findings of these surveys revealed that they had some knowledge about both diseases and considered oral health and periodontal health important.⁸⁻¹² However, they were not confident enough mainly due to insufficient knowledge with regard to the oral-systemic interactions and oral health disparities conducted during their training years. In our study, all of the participating doctors are specialist of internal medicine, 13.1% of them have a subspeciality. Endocrinology has the highest rate of subspeciality among internists. When we reviewed the literature, this study is the first to investigate periodontal health among internists in Turkey. Other available studies have mostly been done among intern doctors.

The fact that our study coincided with the COVID-19 period partially prevented the manual surveys. It can be thought that the interest of the physicians, whose workload increased, to the questionnaires sent via e-mail and whatsapp decreased. In this study, more than half of the participant internists (70.9%) were 25-35 years old. We can associate this result with the fact that young individuals are more inclined to work online and use the internet more. 80% of the doctors participating in our study have been at most 15 years since graduated from medical school. The fact that most of our participants were young and not many years have passed since their graduation makes us think that we can see the reflections of the current system in medical education more.

In a survey study conducted with medical and dentistry students in Turkey, 133 medical faculty students and 114 dentistry faculty students participated. The rate of correct answers to questions about oral and dental health of medical faculty students is 4.5%-66.9%. This rate is 29.8-97.4% for students of the faculty of dentistry, and there is a significant difference between students in terms of knowledge level. They reported that it would be beneficial

to add oral and dental health issues to the medical faculty education and our results also support this.²⁵ Previous studies reported that physicians from America and Jordan were more familiar with the possible connection between health of teeth and diabetes.^{8,9} In our survey, more than 50% of the participants stated that they did not receive medical training on the relationship of periodontal disease with systemic health. However, from the answers to the questions, we can conclude that they learned the information about periodontal disease during their residency.

A survey similar to our study conducted on medical doctors at Erciyes University in 2014. In the aforementioned study, the questionnaire was applied to interns, general practitioners and specialist medical doctors. In the survey study in which 1766 answers were received, 90.8% of the participants agreed that there is a relationship between periodontal disease and systemic health. 56.5% of the participants stated that they referred their patients to a periodontists.²⁰ However, in ours as a more recent study 72.7% of the doctors participating would refer periodontists to direct their patients with severe gingival bleeding. 20% of the participants would refer dentist to direct their patients with severe gingival bleeding. We conclude that almost all of the participants know the branch of dentistry that diagnoses and treats gingival diseases. Internists have general knowledge of periodontology, but their referral to the periodontologist is limited.

According to a 50-question survey conducted with 110 interns at Adnan Menderes University Faculty of Medicine, it was determined that the participants did not have sufficient knowledge about oral and dental health. According to this study, in order to increase the knowledge level of physicians about oral and dental health, periodontal disease and its effects on systemic health; It was concluded that oral and dental health issues should be included in the medical school curriculum.²⁶ In our survey study, 89% of the internists agreed that the effect of periodontal disease on systemic health in medical faculties should be explained. The rate of physicians who want to learn more about the relationship between periodontal disease and diabetes is quite high in our study. About 43.6 % of the participant doctors reported that they learned the relationship between periodontal disease and systemic health in medical school in our study. Considering the importance of the relationship between general health and oral health, this rate is quite low.

All of the participant doctors reported that they knew periodontal disease markers as gingival inflammation, tooth mobility, tooth loss, gingival bleeding, periodontal abscess, bone destruction. This rate 87% in an another study which was done in Turkey.²⁰ In our study all of them choosed 'correct' for the expression 'Periodontal disease risk and severity are increased in patients with diabetes'. Again all of the participants noticed that controlling blood glucose level positively affects periodontium health. 80.9% of the participant doctors

noticed that the patients diagnosed with diabetes were prone to gum diseases. Systemic levels of inflammatory mediators, including CRP, TNF- α and IL-6, which are elevated in periodontal disease may represent the key point between diabetes and periodontitis.^{27,28}

The consequences of periodontal diseases and subsequent tooth loss is not only critical for life quality but may also affect the overall health of patients by compromising their ability to uphold a healthy diet and proper glycemic control. In our study, all of the participant internists agreed with periodontal disease markers as gingival bleeding. Similar results(87.4%) were found among the physicians in France.¹⁰ However, lower percentage results (47%) were also found among physicians in Kuwait.¹³ Cohen *et al.* found a similar result on tooth mobility(59%) and alveolar bone destruction (47%) among physicians in France but reported low result on tooth loss(21%).¹⁰ Al_Khabbaz *et al.* reported low percentages on tooth mobility (45%), alveolar bone destruction (39%) and tooth loss (49%) among Kuwaitian physicians.⁸ In our study nearly all of the participant doctors 96.3% noticed that periodontal disease can change systemic inflammatory markers. 83.6% of the participant doctors choosed 'correct' for the expression of 'Periodontal disease markers correlate with serum levels' and 89.1% of the participant doctors choosed 'correct' for the expression of 'Treatment of periodontal disease contributes to the control of blood glucose level'. Nearly all of the participant doctors (97.2%) choosed 'correct' for the expression of 'Hematological disorders related to leukocyte function are associated with periodontal health.' These findings show that internists in this study in Turkey have an acceptable knowledge of periodontal diseases. All of these questions are the main results that can be seen in the course of diabetes and periodontal disease in general, and majority of our participating doctors have this general information.

In our study, 57.3% of the respondents answered "no" to the question 'Do you get references from dentists in systemic diseases?'. Considering the relationship between general health and oral health, a treatment plan should be created for patients with a holistic approach. On the other hand, Lin *et al.* reported that physicians with years of experience have a more positive attitude towards P.Ds. and D.M. which is mainly due to their clinical years of experience.²² Similarly, Al-Habashneh *et al.* found that physicians reported having advised their diabetic patients to visit the dentist more often compared to the general health practitioners.⁸ Our findings propose that more appropriate knowledge and perceptions should be considered while observing the dental needs of D.M. patients. Educational processes should involve a learning environment that promotes collaborative learning where diagnosing, maintaining and referring of patients with oral diseases is encouraged.²⁹ Additionally, an introduction of inter-professional educational programs in dental and medical education will help promote quality care for the most vulnerable of patients in societies.^{29,30}

In our study, all of the internists agreed that controlling blood glucose level positively affects periodontium health. A lower percentages (49%, 78%, respectively) was noted among American physicians and Jordanian physicians.^{8,9} However, a very low percentage (2.6%) was observed within the Nigerian medical students who agreed with this statement.¹¹ This will in the future have a profound negative effect on their oral screening, preventive interventions, patient counseling, dental referral and collaboration behavior.

Conclusions

In our study, it was found that internists had general knowledge about diabetes and periodontal disease, but it was concluded that it would be beneficial to discuss the relationship between diabetes and periodontal disease in more detail in the medical faculty education program. Early detection and carefully managed therapeutics with the medical and dental practitioners working hand-in-hand may prove beneficial to the patient's general health and quality of life. The inter-societies consensus proposes specific flow-diagrams to improve the treatment of patients and management of the general population regarding the issue of periodontitis and diabetes.

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