Baranowski Mateusz, Wójtowicz Agnieszka, Wysokińska-Miszczuk Joanna, Klempka Justyna, Kubiszyn Michał. Diabetes in dental practice - review of literature. Journal of Education, Health and Sport. 2019;9(2):264-274. eISNN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.2564551
http://ojs.ukw.edu.pl/index.php/johs/article/view/6596

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 30.01.2019. Revised: 30.01.2019. Accepted: 14.02.2019.

Diabetes in dental practice - review of literature

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Abstract characters:1555
Word count: 2834
Abstract word count: 222
Number of Tables: 0
Number of Figures: 0

Key words: diabetes, diabetes periodontitis, diabetes oral health, diabetes dental treatment

Abstract:

Introduction: Diabetes belongs to the group of metabolic disorders and is characterized by chronic hyperglycemia resulting from abnormal secretion of insulin and / or tissue resistance

to its action. The association of elevated glycemia with periodontal disease and oral cavity is clear and proven in many scientific publications.

Purpose of work: The aim of the study was to characterize the oral cavity of a patient with diabetes, its diagnosis and treatment based on a review of English-language literature from 2014-2018, and an attempt to answer some questions and problems raised by practicing physicians who want to effectively help those who report to them patients with the above disease.

Material and methods: The PubMed database was analyzed using the keywords: "diabetes", "diabetes periodontitis", "diabetes oral health", "diabetes dental treatment". 23 English-language works were qualified for the review.

Results: the patient with diabetes should be made aware by the dentist, understand the impact of his disease on the body, especially the tissues of the parodontium and the oral mucosa, regularly report on the check-up visit

Summary: The dentist is the first to see signs of failure to diagnose chronic hyperglycaemia. He should be vigilant, because such persons are patients at high risk of complications after dental treatment. The basis for maintaining oral health is, above all, the permanent maintenance of impeccable, basic oral hygiene.

In connection with the sedentary lifestyle, reduced physical activity and the consumption of excess highly processed food, with a high content of simple sugars, more and more patients suffer from type II diabetes. High frequency and a relationship with a culturally-established lifestyle mean that we include diabetes in the so-called civilization diseases. But what is this disease in principle? It belongs to the group of metabolic disorders and is characterized by chronic hyperglycemia resulting from abnormal secretion of insulin and / or tissue resistance to its action. At first, running asymptomatically, can silently cause havoc in many human body systems and be a direct or indirect cause, among others stroke, chronic renal failure,

peripheral neuropathy, skin ulcer, including open long-healing wounds and periodontitis. And the latter are the subject of this study. Observing the progress of gum disease and / or periodontium, the dentist is the first to see signals that no chronic hyperglycaemia has been diagnosed. It is worth to be aware that an early detected illness can protect the patient against very serious health consequences, and the only thing that is enough to do this is to conduct an accurate interview and examination of the patient. The dentist should remain vigilant as such persons are patients at high risk of complications after dental treatment. Probably the fear of many dentists from running such a patient. So what should you pay attention to, what treatment to include and how to reduce the risk of complications?

The association of elevated glycemia with periodontal disease is so pronounced that it is called the sixth complication of diabetes. Meta-analyzes show that diabetes increases the risk of developing or progressing periodontitis by 86% and that the incidence increases even more in case of uncontrolled glycemia (1). That is why it is so important from the patient's and dentist's point of view to cooperate with the doctor who conducts the patient. Research indicates the legitimacy of screening for diabetes, also in a dental office. The results of such attempts indicate that they are effective and that patients and service providers are willing to carry them out, although this is considered to be a sensation rather than routinely implemented (2). However, it seems justified, but neglected, to raise awareness of the relationship between oral health and systemic health, both during the education of doctors and dentists. Although the survey, conducted anonymously, among physicians, on the subject of knowledge and attitude in the relationship between diabetes and periodontal disease, showed that all participants (100%) were aware that there was (some) a relationship between oral health and general health, however, only 17.8% of the surveyed physicians - participants would refer their patients to the dentists in order to prevent the development of periodontitis (3). Ideally, dentists, family physicians and other primary care physicians would work together to establish communication to maximize patient benefits (4). At the moment, this is only wishful thinking, and everyone manages to their own abilities, using only sometimes one or two doctors to consult a separate specialty.

So what should you pay special attention to? To safely perform outpatient procedures, a diabetic patient should have so-called "Balanced diabetes" - which means that the result of the glycated hemoglobin test - HbA1C - (indicating how the level of glucose in the blood was

formed for 3 months from the day of the test) should be below 7%. Treatments from the so-called phase of non-surgical treatment, especially in the area of hygienization, such as scaling, root-planning, polishing, maintaining proper plaque control, seem to have a decisive influence on health and HbA1C levels. If necessary, one should also not neglect the surgery phase, which includes curettes, extractions and treatments from the area of osteoporosis and arthroplasty. The bi-directional relationship between periodontal disease and diabetes has been proven. Diabetes affects the state of periodontium, but also the state of periodontitis affects the value of glycated hemoglobin in untreated diabetes (5) (6). Interestingly, research suggests that periodontal disease is also associated with a statistically significant increase in the risk of gestational diabetes compared to women without prior periodontitis (7). So let's prepare patients (and patients) in advance. The first symptom that should draw our attention during the study is xerostomia (8) - a common symptom in patients with diabetes - a reduction in the salivation that causes dryness of the oral mucosa and cracking of the mouth angles. The surface of the tongue is then eroded, which is called a geographical language that can be covered with a sticky coating. Disturbances in microbial balance are shifting in favor of pathogenic microorganisms such as C.albicans and S. mutans. No answer of the salivary flow and / or its reduced quality affects more frequent fungal infections and oral cavity burning. As a consequence, erythema and inflammation of the lips may occur. The quality of life of patients decreases as a consequence of disorders of salivary secretion, there are difficulties in swallowing, speech and taste disturbances or difficulties in using prosthetic restorations. However, the most common dental problem in diabetic patients is gingivitis and periodontitis, caused by changes at the immune level

Local changes in periodontal tissues are characterized by hyper active inflammatory response, intense interactions between leukocytes and endothelial cells and altered leukocyte functions, leading to increased levels of reactive oxygen species and proinflammatory cytokines IL-1, IL-6 and TNF alpha. These local changes are amplified by the increased accumulation of advanced glycation end products and their interaction with mucosal receptors (9). Difficulty in healing in diabetic patients hinders non-surgical and surgical treatment of periodontal diseases by increased fibroblast apoptosis. Due to the altered immune response, functions such as phagocytosis and neutrophil chemotaxis are compromised, which may predispose patients with diabetes to a more severe course and recurrence of the disease, previously mastered (5). There are disorders of angiogenesis, i.e. the formation of new blood

vessels. This mechanism, which in the physiological process of wound healing is based on a delicate balance between promoting the growth and vascular proliferation, and promoting the maturation and resting of vessels, is shaken. Diabetic disease can significantly impair proper wound healing, tissue regeneration and prevent the restoration of a healthy vascular system, which is associated with impaired vascular integrity. Insufficient angiogenesis plays a significant role in the pathogenesis of diabetic wound healing and microvascular and macrovascular dysfunction. Although diabetic wounds have an angiogenic deficit, diabetes can lead to an increased or decreased number of blood vessels depending on the location and level of the pathological process. For example, diabetic retinopathy (DR) leads to excessive expansion of blood vessels, leading to pathologies characterized by microtraumas, haemorrhages, vascular edema, leading to visual disturbances (10). If you already know what diabetes is, it is worth finding out how you can help in treating her from the position of a dentist?

It should be stressed right away that the research is inconsistent with the impact of dental treatment on the general disease and that the designation of one treatment plan can be considered controversial in the light of the current research due to different results. The studies that test the effect of periodontal treatment on diabetes are bipolar: In one of the studies - periodontitis in diabetes, improved oral hygiene has improved the rates of periodontal disease after 3-4 and 6 months (bleeding during periodontal pocket (BOP) , clinical level of connective tissue attachment (CAL), gingival index (GI), bacterial plaque index (PI) and pocket probing depth (PPD)). In patients with T2DM (type II diabetes), non-surgical periodontal treatment improved the systemic balance of oxidative stress and QOL (quality of life), but did not lower HbA1c levels after 3 months of observation (11). In another study, where patients were divided into treatment and control groups, the group treated for periodontal disease, received non-surgical periodontal treatment, including scaling and root planing, and oral hygiene instructions, followed by adjunctive therapy for 3 and 6 months. However, the control group received only oral hygiene instructions without treatment during the experimental period. Changes in HbA1c levels did not differ significantly after 3 and 6 months, however, HbA1c decreased in both groups. Only the systematic balance of oxidative stress and QOL significantly improved in the periodontological treatment group compared to the control group after 3 months (11). This does not give any definite answers as to how much the effect of treatment on the general disease is. Other researchers decided to check the

pharmacotherapy used in periodontics to improve diabetes treatment results: in a 6-month dosing study of 400 mg propolis once a day, it was shown to be a potentially effective addition to SRP (scaling and root planing), which significantly reduces the level of HbA1c, fasting plasma glucose and carboxymethyl lysine. It improves the results of periodontal therapy in people with type II diabetes and chronic periodontitis. In other studies, the group with the addition of propolis to SRP showed a much greater reduction in PD depth and CAL increase compared to the control group after 3 and 6 months, however, the results of lowering of diabetic parameters did not turn out so much spectacular (12).

A relatively new trend in periodontics is laser assistive therapy. In one study, researchers wanted to check the potential benefits for diabetic patients with this type of treatment. However, taking into account the effect of antimicrobial therapy with photodynamic therapy (aPDT) - as an additional therapy - compared to scaling and root planning on clinical symptoms of chronic periodontitis in patients with type 2 diabetes, no difference could be observed for the assessed parameters of bleeding during probing, depth of the pocket and blood glucose levels, aPDT did not provide additional benefits in the treatment of chronic periodontitis in patients with diabetes (13) (14). Also controversial is Laser Inheritance In: Ga: Al: P (indium - gallium - aluminum - phosphate) or Nd: YAG as an additive to SRP and SRP itself in improving clinical periodontitis and glycemic control. In the light of these data, laser therapy was not recommended more than standard hygiene procedures (15).

The test that gave some hope was to carry out scaling and root planning supported by mouth rinse with a lotion based on essential oils (EO). As has been shown, it is more effective in the treatment of periodontitis in patients with type II diabetes than SRP alone. The study proceeded as follows: Patients, one group, were instructed to rinse the oral cavity twice daily with an EO-based formulation for 30 days after the SRP, while the other group was recommended to rinse the mouth twice daily with water - for 30 days. Patients in the first group showed improvement in periodontal parameters (platelet index (PI), bleed during probing (BOP) and pocket probing depth (PPD) ≥ 4 mm) and reduction of glycosylated hemoglobin (HbA1c) 90 days after the start of therapy (16).

Another aspect of the research is the use of antibiotics adjunctively. The use of systemic antibiotics has also not shown satisfactory results in adjuvant therapy. The current meta-analyzes revealed that supportive systemic antibiotic therapy with doxycycline does not

improve the effectiveness of SRP in terms of CAL reduction, PI reduction and BOP (17). However, other meta-analyzes showed a statistically significant improvement in PD reduction, favoring supportive therapy - on the SRP itself. A meta-analysis of systemic administration of amoxicillin (AMX) and metronidazole (MTZ) in 2-year treatment after treatment with the antibiotic-receiving group had a lower average proportion of the red pathogen complex than the control group. Proportions of Actinomyces species remained stable in the group of antibiotics, but therapies showed a statistically significant reduction in the control group from 1 to 2 years in people with a clinical low risk profile for future disease progression. The results of this study showed that the supportive use of MTZ + AMX improves microbiological and clinical results of SRP in the treatment of patients with generalized chronic periodontitis with type 2 diabetes up to 2 years after therapy (18). Ancillary use of systemic antibiotics associated with inoperable periodontal treatment did not, however, provide additional HbA1c benefit to patients with diabetes. Of course, systemic therapy should be considered on a case-by-case basis, and the benefits should outweigh the risks (19). In patients with diabetes and chronic periodontitis, the use of topical antimicrobials as an additive to SRP may provide additional benefits compared to SRP alone in reducing PD and increasing CAL, especially in well-controlled patients and deep pockets over 5 mm (20).

How then, in the multitude of these often conflicting studies, comprehensively guide a dental patient with diabetes? First, perform a patient examination and identify treatment needs. Ordinary, non-intrusive treatments can be carried out without any major anxiety. It should be remembered that a visit to the dentist alone may cause stress to the patient. Therefore, it is necessary to take care of the patient's comfort, visit should take place as early as possible in the morning, the patient should normally take medications as indicated by the diabetologist and pre-meal before the procedure. Moderate hyperglycaemia, especially during surgical procedures, is safe. Hypoglycaemia should be avoided (<70 mg / dl) and a reduction below 55 mg / dl is considered a life-threatening condition. A glucometer for monitoring the patient will be useful in the case of the procedure. It is also worth asking the patient for the HbA1c test result to check the alignment of the diabetic disease. In the event of deviations, please refer to the attending physician. It is worth to educate the patient regarding the bi-directional impact of diabetes and periodontal disease and motivate to cooperate with the dentist. In the case of dry mouth and related discomfort, pharmacological or non-pharmacological therapy may be proposed. At prtaking the systemic drugs associated with the underlying disease, you can ask

your doctor to change them. It is also possible to introduce local pharmacological treatment in the form of lubricating agents containing, among others, glycerin and xylitol, which will moisturize the mucosa or salivary substitutes in the form of lozenges or dissolving tablets, sprays, solutions or gel. Pharmacological agents that act systemically and stimulate saliva production include pilocarpine or betanechol. Non-pharmacological action is based on proper nutritional habits, i.e. proper hydration - it is often drinking small sips of water or sucking ice cubes, avoiding salty, acidic and spicy foods, limiting alcohol consumption and smoking. Mineral deficiency can significantly worsen the symptoms of periodontitis. Low levels of zinc and iron in the blood serum increase the likelihood of developing diabetes with periodontitis (21). Patients who have lost their teeth often report difficulties in using prosthetic restorations, irritation and erosion of the mucous membrane. The best choice for filling missing teeth will then be implants. According to studies, the number of implant failures does not differ between people with and without diabetes (22). However, the risk of periimplantitis was found to be about 50% higher in diabetic patients than in non-diabetic subjects, but the relationship between diabetes and peri-implant mucositis was not statistically significant (23). It follows that implants have a significant advantage over mobile supplements, both by protective action on the bone matrix and by only a slight change in the delicate microbial balance. Therefore, if the economic situation permits, implantation should be recommended as the method of choice in patients with this disorder

In conclusion, a patient with diabetes should be made aware by the dentist, understand the impact of his disease on the body, especially the tissues of the periodontium and oral mucosa, regularly report for control visits, both to the diabetologist and dentist, and at home, in addition to taking regular medicines, First and foremost, make sure that you maintain impeccable, basic oral hygiene.

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