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Oral hygiene as a cardiovascular risk factor - review of the literature

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Abstract

Introduction and Objective. Cardiovascular diseases are the main cause of death in Poland and around the world. An important aspect of managing patients with cardiovascular diseases is their proper diagnosis and treatment. An important element is also the prevention of cardiovascular diseases. Prevention of the occurrence of cardiovascular diseases mentioned above consists of the elimination of so-called cardiovascular risk factors. A relatively unknown risk factor for cardiovascular disease is the lack of oral hygiene. The authors of the work analyze what elements are related to the lack of oral hygiene affect the cardiovascular risk and try to present the mechanisms of the oral cavity condition that may affect the cardiovascular system.

Review Methods. A review of the recent literature was conducted using PubMed, Google Scholar databases.

Brief description of the state of knowledge. The oral cavity is a site colonised by many species of microorganisms. Bacteria from periodontal pockets can travel to other systems as well as enter the bloodstream, and that way to distant organs. A normal endocardial endothelium provides a barrier for bacteria and prevents colonisation and the development of inflammation. However, in cases where it is damaged, it can provide a gateway for microorganisms to infect the valve, which may lead to the development of infective endocarditis.

Summary. In case of periodontitis in patient with ischemic heart disease, myocardial infarction or stroke, active dental or periodontal treatment should be undertaken. Bacteria from periodontal pockets can travel to other systems causing pathological changes in them.

Key words: Oral hygiene, periodontitis, infective endocarditis

INTRODUCTION AND OBJECTIVES

Known risk factors for cardiovascular disease include diabetes mellitus, obesity, smoking, dyslipidaemia, hypertension, lack of regular physical activity, male sex, advanced age and a family burden. Furthermore, lack of oral hygiene is considered a cardiovascular risk factor [1, 2, 3, 4, 5, 6, 7, 8, 9].

Millions of bacteria are swept through the oral cavity when breathing, swallowing saliva and eating. Some of them live in micro food debris deposited on the gums, teeth and tongue, while others penetrate damaged parts of the tooth, leading to decay.

It is enough to brush your teeth less thoroughly than usual for two days or in the absence of a toothbrush, to rinse them only with liquid so that bacterial plaque mineralises and begins to turn into tartar, which is a dream habitat for bacteria. They can also multiply unhindered and produce toxins that penetrate periodontal pockets, causing their inflammation [10].

REVIEW METHODS

Key words “oral hygiene”, “periodontitis” and “infective endocarditis” were search in literature from the last 18 years, using PubMed and Google Scholar databases.

DESCRIPTION OF THE STATE OF KNOWLEDGE

Caries and periodontal disease are not only an oral health problem. Disease-affected teeth and gums have an adverse effect on the entire body. The study, which involved 120,000 Polish people, conducted by periodontists in 6 Polish cities, indicate that as many as 17 percent of those studied have advanced periodontal disease and require immediate specialized treatment [11].

Periodontal disease and deep periodontal pockets are a storehouse for the same bacteria that colonise the oral cavity and locate in atherosclerotic plaques. Thus, they contribute to bacterial enzyme endotoxin seeding, and consequently to the formation of inflammatory mediators of macrophages. It is this first element that initiates the inflammatory process of atherosclerosis. Bacteria from periodontal pockets can activate inflammatory cells

by stimulating them to produce the cytokines IL-1, IL-6 and TNF α , which initiates a cascade of reactions leading to destabilisation of the atherosclerotic plaque [2, 4, 5, 8, 12].

The cytokines IL-1, IL-6 and TNF α , produced in the periodontal tissues, enter the bloodstream, causing an immunoinflammatory response that leads to damage in the vasculature and, consequently, to destabilisation of the atherosclerotic plaque, which can result in acute coronary syndrome [2, 7]. These cytokines not only play an important role in initiating the processes leading to atherosclerotic plaque formation, but are also linked to the coagulation and fibrinolysis system [2, 13]. Numerous studies indicate that high C-reactive protein levels are associated with periodontal disease [14, 15, 16, 17, 18, 19, 20]. Active inflammation can affect the development of atherosclerotic plaque and increases the risk of plaque detachment and coronary vessel occlusion, leading to myocardial infarction [7, 21].

At the expert meeting, bringing together representatives of 2 communities: general medical and dental, as well as basic sciences, it was recommended that every patient with newly diagnosed ischemic heart disease, myocardial infarction and stroke should be referred for a dental consultation to assess the condition of the oral cavity and possible periodontal disease. Active dental and periodontal treatment should be undertaken when periodontal disease is diagnosed in a person with ischemic heart disease and/or past myocardial infarction and stroke, possibly translating into an improved prognosis [13].

The oral cavity is a site colonised by about 700 species of microorganisms that, under physiological equilibrium conditions, are not a threat to health and life. Diseases of the oral cavity disturb the balance in the biological flora, leading to an excessive proliferation of microorganisms of single species while inhibiting others. Changing the microflora can create a favourable environment for invasion by organisms not physiologically present in the oral cavity [22].

Bacteria from periodontal pockets can travel to other systems via the oral and inhalation routes, as well as enter the bloodstream (some dental procedures, which cause bacteria to enter the bloodstream) and to distant organs through this route (heart, brain, kidneys, liver, eyes or reproductive organs in women), causing pathological changes in them [1, 2, 23, 24, 25, 26, 27, 28].

A normal endocardial endothelium provides a barrier for bacteria and prevents colonisation and the development of inflammation. However, in cases where it is damaged, it can provide a gateway for microorganisms to infect the valve, possibly leading to the development of infective endocarditis (IE).

IE is a disease caused by endocardial infection. The inflammatory process most often involves the valves, but it can also involve the atrial and ventricular endocardial surfaces or "foreign bodies in the heart," such as cardiostimulator leads [29, 30, 31, 32, 33].

IE can be caused by microorganisms such as bacteria, fungi, chlamydia, mycoplasmas. Nevertheless, it is most often caused by bacteria: streptococci, staphylococci, enterococci and Gram-negative bacteria. IE is preceded by bacterial presence in the blood [32, 34, 35].

Patients with the highest risk of IE include those with an artificial heart valve or with artificial material used for valve repair surgery. The second group consists of patients with a history of IE who have a higher risk of recurrence. Furthermore, its course tends to be more severe then, being characterised by more complications and a higher mortality rate. Another group consists of patients with congenital heart disease, especially those with a cyanotic defect. Patients with acquired valvular defects (e.g. caused by a history of rheumatic fever) are at moderate risk of developing IE. Patients with mitral leaflet prolapse and valve regurgitation and those with bicuspid aortic valves are also predisposed [31, 34, 36, 37, 38].

SUMMARY

Caries and periodontal disease are not only an oral health problem, but have an adverse effect on the entire body. In case of periodontitis in patient with newly diagnosed ischemic heart disease, myocardial infarction and stroke, active dental and periodontal treatment should be undertaken, possibly translating into an improved prognosis [13]. Bacteria from periodontal pockets can travel to other systems, causing pathological changes in them [1, 2, 23, 24, 25, 26, 27, 28]. A normal endocardial endothelium provides a barrier for bacteria and prevents colonisation and the development of inflammation. In cases where it is damaged, it can provide a gateway for microorganisms to infect the valve, possibly leading to the development of infective endocarditis (IE).

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