Periodontal condition in patients with cardiovascular diseases

Gołębiewska M[1], Taraszkiewicz-Sulik K[1]*, Kuklińska A[2], Musiał WJ[2]

[1] Department of Prosthodontics, Medical University of Białystok, Poland
[2] Department of Cardiology, Medical University of Białystok, Poland

Abstract

The cardiovascular system diseases constitute a serious problem for modern medicine.

The aim: To investigate the potential risk and the connection of periodontal diseases and cardiovascular disorders.

Material: The examination was performed in the group of 104 patients of both sexes, aged 50-90 years. The patients were divided into two groups: group I – patients with hypertension (47 subjects), group II – patients with fresh myocardial infarction, treated with primary coronary angioplasty (57 subjects).

Methods: The OHI index, according to Greene and Vermillion, was used to assess the oral hygiene and periodontal clinical conditions were evaluated according to Russell's PI index, modified by Davies. CPI index was used to estimate the state of periodontium. Teeth loss was classified according to the Eichner's classification.

Results: The value of OHI index differs in both groups. Highest value was registered at 5 patients in the I group vs 2 in the II group. Lowest value was recorded in 11 patients in the I group and 4 in the II group. The value 0.0-0.2 PI was recorded at 14 persons in the I group and 11 in the II group. The value 1.6-3.8 of PI index was registered at 2 in the I group and 6 in the II group. Healthy periodontium was stated in 10 patients with hypertension and only 2 with myocardial infarction. The CPI=2 was shown in 12 patients with hypertension and 11 with myocardial infarction, CPI=3 was shown in 23 patients with myocardial infarction.

Conclusion: The studies revealed bad condition of the oral cavities of patients with hypertension, and specifically with fresh myocardial infarction.

Key words: periodontal disease, myocardial infarction, hypertension.

* CORRESPONDING AUTHOR:
Department of Prosthodontis
Medical University in Białystok
ul. M. Skłodowskiej-Curie 24A
15-276 Bialystok Poland
Tel. +48 085 746 83 49
e-mail: katarsul@op.pl (Katarzyna Taraszkiewicz-Sulik)

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Introduction

The cardiovascular system diseases constitute a serious problem for modern medicine. Despite common beliefs, it is the cardiovascular system pathology that is the most frequent cause of death in the industrial countries and not neoplastic diseases [1,2]. Improper nutritional habits, lack of physical activity, and stress lead to the increase in the risk of the cardiovascular system disorders, i.e. coronary heart disease and hypertension. Death of so-called "myocardial infarction" accompanies people just like loss of teeth. The mortality due to myocardial infarction is very high in Poland and is still increasing.

Cardiovascular diseases are characterized by intravascular and rich in fat deposits, that can induce vascular clots and lead to heart death [3-5].

Age, obesity, lipid disorders, hypertension, and diabetes mellitus are commonly accepted as the risk factors. The studies have been focused on the role of lipids, mainly cholesterol, accumulating on vascular walls and the results revealed inflammatory process activity occurrence, besides cholesterol accumulation. The inflammatory process, taking place in the atheromatous lamina causes its destabilization. The oral cavity infectious focuses can be the source of microorganism dissemination to the bloodstream. Bacterial pathogens from caries focuses of periodontium pass to the bloodstream and can induce changes, not only in the area of periodontium but also in large vessels. Bacteremia frequently leads to the damage of the valves, the layer lining the inside of the heart, and vessels [3,6,7].

Periodontium is a part of the masticatory organ, which is

Figure 1. **Division of patients regarding sex and the type of disorder**

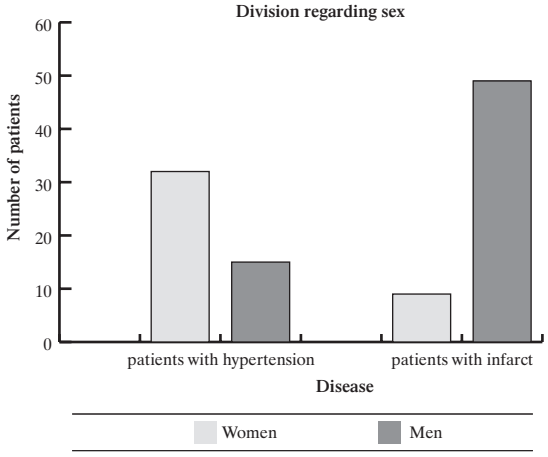
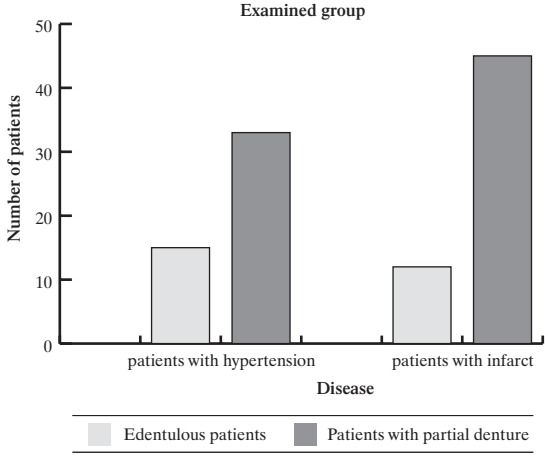


Figure 2. **Tooth loss occurrence in examined group**



composed of tissues that are in contact around the tooth neck, i.e. the gingiva, periodontium, periosteum, root cement, and the bone of the alveolar process. The epithelial attachment is the connection of the tooth and the gingiva at the neck. It plays a crucial role in periodontal physiology and pathology as it constitutes the gingival crevice floor, which normally is from 0.5 to 1.5 mm in depth.

A chronic inflammatory process, taking place in periodontium, causes the epithelial attachment damage. Reddening, oedema, and spontaneous bleeding or bleeding at probing are the symptoms of the inflammatory process in the clinical picture. The factor inducing the occurrence of the inflammatory process is dental plaque, which can cover both the surface of a tooth and the gingiva [8].

Thus, it is important to examine the masticatory organ condition in patients with cardiovascular diseases to determine the potential risk and the connection of periodontal diseases and cardiovascular disorders.

Material and methods

The examination was performed in the group of 104 patients of both sexes, aged 50-90 years. The patients were divided into two groups:

- group I – patients with hypertension (47 subjects)
- group II – patients with fresh myocardial infarction, treated with primary coronary angioplasty (57 subjects).

All patients were hospitalized and gave their written consent to the examination. The study was approved by the Bioethical Committee of the Medical University of Białystok.

A survey was prepared for the study and the information concerned demographic data and the kind of disease. The masticatory organ conditions were assessed in artificial light using a diagnostic set (the mirror and probe) and the periodontological probe.

The OHI index, according to Greene and Vermillion, was used to assess the oral hygiene and periodontal clinical conditions were evaluated according to Russell's PI index, modified by Davies.

CPI index, determining the parodontal condition with code values, was used for the assessment [8]. Teeth loss was classified according to the Eichner's classification.

Results

The examined group consisted of 104 patients, out of which 47 were hospitalized due to hypertension (group I) and 57 subjects – due to myocardial infarction (group II). Group I included 32 women and 15 men while in group II men outnumbered women (49 and 8, respectively) (*Fig. 1*). The majority of both groups showed partial teeth loss whereas the minority revealed total loss of teeth (*Fig. 2*).

The oral hygiene condition in the examined patients was presented in *Fig. 3*.

In 11 patients with hypertension, good oral hygiene was noticed (index=0), 16 patients revealed dental deposit or supergingival calculus covering 1/3 of the tooth surface (index=1), larger amounts of dental deposits (index=2 and 3) were observed in 5 and 2 patients, respectively. Only 4 patients with myocardial infarction showed satisfactory oral hygiene (index=0), 23 patients presented dental deposits or supergingival calculus covering 1/3 of the tooth surface (index=1), bad oral hygiene (index=2 and 3) was noticed in 13 and 5 patients, respectively.

Fig. 4 showed periodontal clinical condition in the patients. Clinically healthy periodontium (values 0.0-0.2) was observed in 14 patients with hypertension and 11 with myocardial infarction. Gingivitis (values 0.3-0.9) was stated in 16 individuals with hypertension and 22 with myocardial infarction. The beginning of periodontitis (values 0.7-1.9) occurred in 2 patients with hypertension and 6 with myocardial infarction whereas advanced periodontitis (values 1.6-3.8) was observed in 2 patients with hypertension and 6 with myocardial infarction.

Periodontal condition according to CPI index in the

Figure 3. **Oral hygiene condition in examined patients**

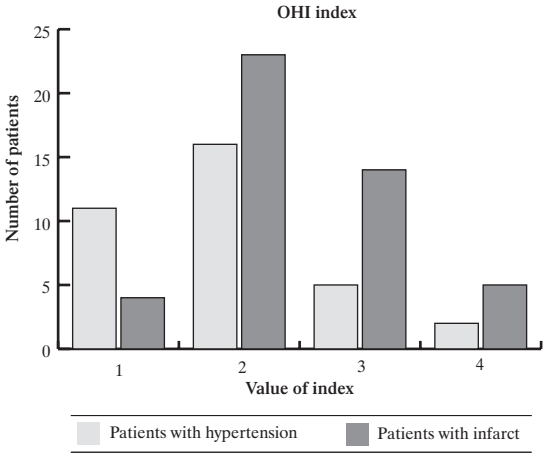


Figure 4. **Periodontal condition according to PI index in examined patients**

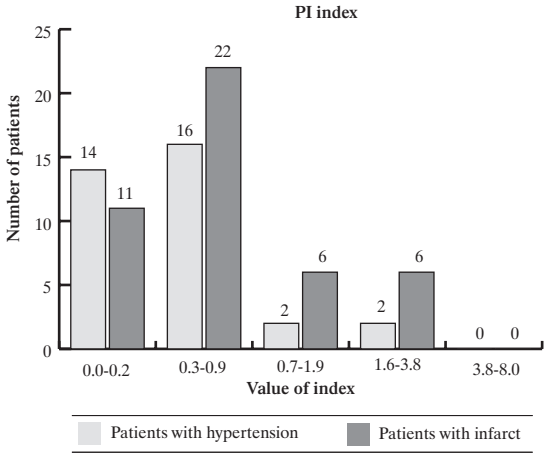
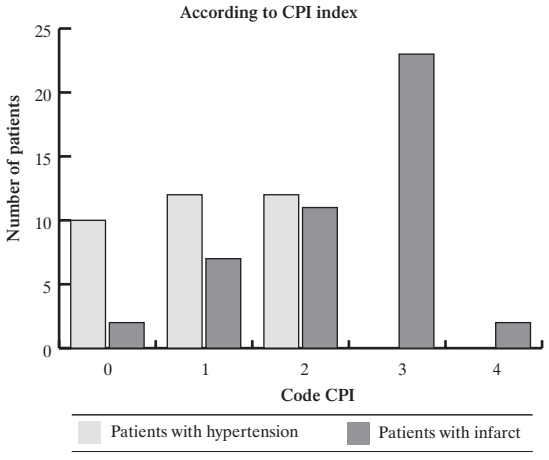


Figure 5. **Periodontal treatment needs in examined group**



examined group of patients was presented in *Fig. 5*. Healthy periodontium that did not require specialist treatment (CPI=0 code) was stated in 10 patients with hypertension and only 2 with myocardial infarction. Gingival bleeding after delicate probing (CPI=1) was noticed in 12 patients with hypertension and 7 with myocardial infarction; super- and subgingival dental calculus, overhanging edges of fillings and crowns (CPI=2) were shown in 12 patients with hypertension and 11 with myocardial infarction. Gingival pockets up to 5.5 mm (CPI=3) were observed in 23 patients with myocardial infarction while deep gingival pockets above 6 mm (CPI=4) were stated in 4 patients with myocardial infarction. Gingival pockets did not occur in patients with hypertension.

Discussion

The studies revealed definitely worse periodontal condition in patients hospitalized due to myocardial infarction than that in patients with hypertension. The majority of patients, specifically with fresh myocardial infarction showed marked periodontological treatment need. We also noticed definitely worse oral hygiene state in patients with fresh myocardial infarction as compared to hypertensive patients.

Many clinical studies point to the significance of the oral hygiene and the consequences of neglected caries and oral inflammatory condition treatment. Each carious defect or improper hygiene of the oral cavity is a potential source of bacteria that can induce infectious endocarditis, myocardial infarction, and cerebral stroke [4,5,7,9].

According to many scientists, long-term exposure to circulating microorganisms due to bacteremia occurring in natural conditions of everyday life, e.g. lack of the oral hygiene, has a crucial role. Therefore, lack of the oral hygiene and neglect of treatment of inflammatory changes are stressed to be more dangerous than the risk of bacteremia during dental procedures as nowadays, antibiotic prophylaxis is recommended as the standard procedure [4,7,9].

Infectious endocarditis is a serious, often fatal disease, with the complications such as the myocardial infarction, cerebral stroke, or circulatory failure. It happens when bacteria are transported to the bloodstream mainly from the oral cavity or other parts of the body [1,4,5].

Olczak et al. [5] stated that periodontal bacterial pathogens could be the cause of infectious endocarditis. A damaged gingival crevice epithelium or pathological pocket epithelium constitute a wide gate for bacteria and bacterial toxins invasion to the bloodstream. Katz et al. [10] in their study concerning patients after the myocardial infarction or diagnosed coronary heart disease observed more frequent, however, statistically insignificant, occurrence of parodontal diseases in over 10.5 thousand of Israeli soldiers. Janket et al. [11] stated, on the basis of epidemiological studies, the increase by 19% in the risk of coronary heart disease and cerebral stroke occurrence in patients with periodontal diseases. According to them, the risk was elevated to above 44% in patients after 65 year of age. Zaremba [7] in his studies revealed severe periodontal in patients with cardiovascular disorders, which occurred twice as frequently as in healthy subjects. Wiśniewska-Spychała et al.

[12] noticed periodontitis in all 107 patients with coronary heart disease qualified for by-pass operations.

Our studies confirmed that periodontal condition in patients with cardiovascular disorders, specifically with fresh myocardial infarction, was unsatisfactory. The marked loss of connective tissue attachment, deep pockets, and numerous dental deposits prove the active periodontal disease, which can have a connection with cardiovascular disorders.

Conclusions

1. The studies revealed bad condition of the oral cavities of patients with hypertension, and specifically with fresh myocardial infarction.

2. There is an urgent need to show the relationship between the oral condition and the cardiovascular system pathology.

3. The co-operation between general practitioners, cardiologists and dentists needs to be intensified.

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