

Research Article

# Assessment of Periodontal Tissue Status in Patients with Generalized Periodontitis and Essential Hypertension

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## Abstract

Vascular disorders play a significant role in the development of dystrophic inflammatory process. There is a direct correlation between the degree of damage to blood vessels in the jaw and a depth of the destructive process in periodontal tissue. A certain role is played by endogenous factors, such as: age, vitamin deficiency, diabetes mellitus, essential hypertension and others. Clinical and epidemiological studies using pathological techniques showed significant changes in vascular wall of the artery in the periodontium, the interdental artery in particular. Atherosclerosis, essential hypertension and periodontal pathology were proven to occur in individuals older than 40 years.

**The objective** of the research was to determine periodontal tissue status in patients with stage II hypertension and generalized periodontitis of II degree of severity.

**Materials and methods.** The study involved 36 patients with stage II hypertension and generalized periodontitis of II degree of severity (the main group). The patients' age ranged from 35 to 54 years. The control group included 10 patients of corresponding age without generalized periodontitis and somatic pathology. To assess the status of periodontal tissues, we applied the Papillary-Marginal-Attached Index and the Community Periodontal Index of Treatment Needs. When diagnosing periodontal disease, the classification of M.F. Danilevskyi was used.

**Results.** The analysis of the indicators of the Community Periodontal Index of Treatment Needs index showed the following results: in patients of the main group, the index was  $2.38 \pm 0.07$  points ( $p < 0.001$ ) pointing out a need for a course of professional oral hygiene. In patients of the control group, the index was  $0.5 \pm 0.17$  points indicating that there was no need for treatment, however, there was a need for improving oral hygiene. The indicators of the Papillary-Marginal-Attached Index in the main group were  $55.49 \pm 1.96$  points pointing out a severe degree of gingivitis.

**Conclusions.** According to the analysis of the indicators of the Community Periodontal Index of Treatment Needs index ( $2.38 \pm 0.07$ ), the patients of the main group had low hygiene level requiring a course of professional oral hygiene.

## Keywords

generalized periodontitis; hypertension; CPITN; PMA

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## Problem statement and analysis of the recent research

Premature vascular ageing is considered to play a key role in the formation of an unfavorable prognostic profile in patients with arterial hypertension. Vascular ageing is a physiological process when changes which gradually occur in vessels correspond to the person's age. However, when risk factors are present (smoking, dyslipidemia, hyperglycemia, etc.), structural and functional changes in the arterial wall develop earlier and more rapidly, vascular function becomes abnormal. These premature changes in the structure and function of blood vessels can provoke high blood pressure and complicate its control.

Physiological ageing of blood vessels due to arterial hypertension manifests itself as the same changes at the artery level [5, 8]. The earliest morphological manifestation of vascular

ageing is an increase in vascular stiffness due to fragmentation, a reduction in elastin amount and an increase in collagen levels with formation of strong bridges between the fibers.

Vascular disorders play a significant role in the development of dystrophic inflammatory process. A direct correlation between the degree of damage to blood vessels in the jaw and a depth of the destructive process in periodontal tissue was proven. A certain role is played by endogenous factors, such as: age, vitamin deficiency, diabetes mellitus, essential hypertension and others [1, 11]. Clinical and epidemiological studies, using pathological techniques, showed significant changes in vascular wall of the artery in the periodontium, the interdental artery in particular (perivascular sclerosis, vascular thickening, calcination) [2]. This creates optimal conditions for the increase in the degree of pathogenicity of periodontal pocket microflora and enzyme activity changes. Atherosclerosis, essential hypertension and periodontal pathology were

proven to occur in individuals older than 40 years [11].

The endothelium of blood vessels acting in an auto- and paracrine manner is a kind of dispersed endocrine organ which forms homeostasis affecting the status of all body organs and systems [2, 4, 7, 12, 13, 14]. The endothelium is of fundamental importance in the modulation of vascular tone and maintenance of vascular wall structure. Under physiological conditions, the endothelium provides platelet adhesion and activation as well as blood coagulation activity, inhibits the growth of smooth muscle cells, prevents the inflammatory processes which are based on the activation and adhesion of leukocytes. The endothelium is a final link of multifunctional neuroendocrine and cardiovascular systems (the tone and structure of blood vessels) [6, 9, 10, 12, 13, 14]. Microstructure abnormalities and disorders in secretory function of endothelial cells cause endothelial dysfunction the most frequent manifestations of which include increased permeability of the endothelial lining for plasma and blood cells, vasoconstriction and reduced vascular relaxation, increased adhesion and aggregation of platelets and monocytes to the endothelium, reduced endothelial regeneration and apoptosis, reduced antithrombotic properties of endothelial lining [3, 7, 11, 12].

**The objective** of the research was to determine periodontal tissue status in patients with stage II hypertension and generalized periodontitis of II degree of severity.

## 1. Materials and methods

The study involved 36 patients with stage II hypertension and generalized periodontitis of II degree of severity (the main group). The patients' age ranged from 35 to 54 years. The control group included 10 patients of corresponding age without generalized periodontitis and somatic pathology. The diagnosis of periodontal disease was made on the basis of past medical history, dental examination and the data of traditional examination methods. To assess the status of periodontal tissues, we applied the Papillary-Marginal-Attached (PMA) Index and the Community Periodontal Index of Treatment Needs (CPITN) index. When diagnosing periodontal disease, the classification of M.F. Danilevskyi was used.

The obtained results were statistically processed using statistical package Stat Soft 6.0, traditional methods of variation statistics applying averages and the estimation of their statistical significance.

## 2. Results and discussion

To determine the need for periodontal treatment, the CPITN index is used. To assess the index three factors are considered: bleeding gums, supragingival or subgingival calculus, periodontal pockets. The analysis of the indicators of the CPITN index showed the following results: in patients of the main group, the index was  $2.38 \pm 0.07$  points ( $p < 0.001$ ) pointing out a need for a course of professional oral hygiene. In patients of the control group, the index was  $0.5 \pm 0.17$  points

indicating that there was no need for treatment, however, there was a need for improving oral hygiene.

The PMA index is used for assessing gum inflammation. It is known that in gum inflammation, there is a limited supply of oxygen and substrates to tissues resulting in the affection of tissue respiration, the increase in anaerobic glycolysis and occurrence of acidosis causing the appearance of inflammatory mediators. The indicators of the PMA index in the main group were  $55.49 \pm 1.96$  points indicating a severe degree of gingivitis.

## 3. Conclusions

According to the analysis of the indicators of the CPITN index ( $2.38 \pm 0.07$ ), the patients of the main group had low hygiene level requiring a course of professional oral hygiene.

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