

Cytomorphometric indicators of the gingiva epitheliocytes of patients with ischemic heart disease on the background of taking acetylsalicylic acid

Dmitry V. Emelyanov, Alexander A. Ponomarev*, Valery K. Leontiev, Sergey N. Gontarev, Irina V. Voytyatskaya

ABSTRACT

Aim: The aim is to study the cytological and morphometric characteristics of gingiva epitheliocytes in patients with IHD who are constantly taking ASA drugs. **Materials and Methods:** To determine the dental status, 92 patients aged 40–60 years who are on outpatient treatment of IHD were examined. All examined patients had received standard therapy for 1–3 years. **Result and Discussion:** For the purpose of conducting cytomorphometric studies, 56 patients were selected, who constituted the main group. For the purpose of conducting cytomorphometric studies, 56 patients who constituted the main group were selected. The control group included 20 somatically healthy individuals, representative by sex and age. Exclusion criteria from the study were the presence of acute inflammatory processes in the oral cavity, other concomitant somatic pathologies (endocrine diseases and pathology of the gastrointestinal tract), women in the post-menopausal period, as well as patients with tobacco addiction. **Conclusion:** Due to the high prevalence of periodontal disease in patients with cardiovascular disorders, an in-depth scientific study was conducted and the results of cytomorphometric indicators of the gingiva epitheliocytes of patients with ischemic heart disease, constantly taking acetylsalicylic acid drugs, were presented. The data presented by the authors of the study indicate reliable differences in these indicators in patients of the main group in comparison with the group of somatically healthy patients. The results of the study may be the basis for further in-depth study for early diagnosis of periodontal disease in this category of patients. The results of the study can be the basis for further in-depth study for the purpose of early diagnosis of periodontal disease in this category of patients.

KEY WORDS: Acetylsalicylic acid, Gingival epithelium, Morphometric analysis, Myocardial infarction

INTRODUCTION

The data of modern scientific studies indicate the presence of a close pathogenetic link between somatic pathology and diseases of the organs and tissues of the oral cavity.^[1,2] It is known that the oral mucosa (OM) not only performs the function of mechanical barrier on the way of pathogenic factors but also actively participates in the implementation of nonspecific and specific immunity reactions, contributing to the progression or stabilization of the inflammatory process under certain conditions.^[3,4]

A sufficient amount of studies confirms the pathogenetic interrelation between cardiovascular

pathology and periodontal tissue diseases.^[5] Ischemic heart disease (IHD), which is based on the atherogenic lesions of coronary vessels, is an evidential causal factor leading to the formation of pathology in the periodontal tissues.^[6,7] However, not only somatic pathology in general and IHD in particular belong to the risk factors for chronic periodontitis but also the action of medical products used for the treatment of diseases of the internal organs. Acetylsalicylic acid (ASA) drugs are prescribed as antiplatelets in IHD and can conduce to the lesions of both hard tooth tissues and OM.^[8] According to available research data, the mechanism of action of ASA is the inhibition of the synthesis of constitutive cyclooxygenase, which catalyzes the synthesis of physiologically important eicosanoids - prostaglandins.^[9] Reducing the synthesis of prostaglandins violates physiological cytoprotection, including in the OM, by decreasing the secretion of mucus and sodium bicarbonate,

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Department of Therapeutic Dentistry, National Medical Research University, Belgorod State University, 308000, Belgorod, Pobeda Street, 85, Russia

*Corresponding author: Alexander A. Ponomarev, National Medical Research University, Belgorod State University, 308000, Belgorod, Pobeda Street, 85, Russia. E-mail: ponomarev_aa@bsu.edu.ru

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and also conduces to the inhibition of endothelial proliferation. One of the clinical manifestations of ASA-induced disorders in periodontal tissues may be cytomorphometric deviations in gingiva epitheliocytes as a visually accessible structure of periodontal complex.^[10]

The Aim of the Study

The aim is to study the cytological and morphometric characteristics of gingiva epitheliocytes in patients with IHD who are constantly taking ASA drugs.

MATERIALS AND METHODS

To determine the dental status, 92 patients aged 40–60 years who are on outpatient treatment of IHD were examined. All examined patients had received standard therapy for 1–3 years. For the purpose of conducting cytomorphometric studies, 56 patients were selected, who constituted the main group. For the purpose of conducting cytomorphometric studies, 56 patients who constituted the main group were selected. The control group included 20 somatically healthy individuals, representative by sex and age. Exclusion criteria from the study were the presence of acute inflammatory processes in the oral cavity, other concomitant somatic pathologies (endocrine diseases and pathology of the gastrointestinal tract), women in the post-menopausal period, as well as patients with tobacco addiction.

Cytologic and morphometric studies were conducted on scrapes from an epithelium of the attached gingiva.^[11] After preliminary rinsing of the oral cavity with a physiological saline solution, with the help of light pressure, the contents of the gingiva surface were scraped off with a sterile dental spatula and were transferred onto the glass slide. Preparations were stained with Azure-eosin. Observation and evaluation of the preparations were performed by light microscope Micros (Austria). Microphotographs of epithelial cells were made using a digital camera CAM 2800 with light microscopy (lens '40, eyepiece '10). Morphometric parameters of epitheliocytes in cytological preparations were performed using a computer program BioVision.

Statistical data processing was performed using computer programs "SPSS 13"; Shapiro–Wilk test was used to check the distribution for compliance with the normal law. To identify the significance of the difference between average quantities, the Student's *t*-distribution was determined.

RESULTS

During the examination of periodontal tissues, there were no pronounced clinical changes in patients

of the main group, which was confirmed by index indicators. Only 30% of the examined patients of the main group had definitive changes in chronic periodontitis hyperemia and gingival edema, bleeding during periodontal probing, and periodontal pockets. However, the data of the subsequent cytomorphometric

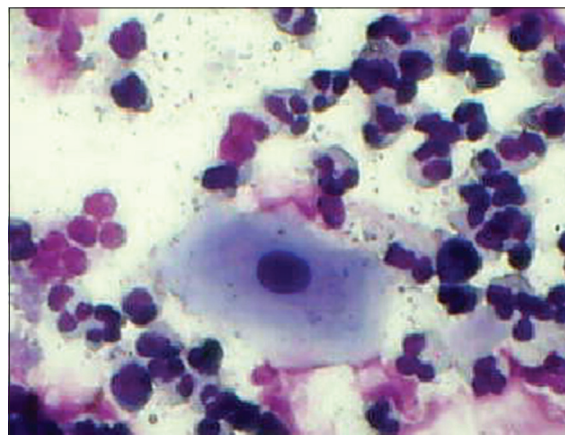


Figure 1: Epitheliocytes of the gingival mucosa of patients of the main group, surrounded by polymorphonuclear leukocytes. Staining with Azur-eosin $\times 400$

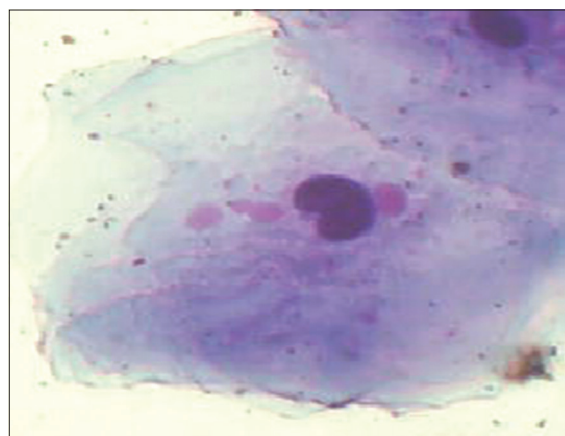


Figure 2: Signs of epithelial karyopycnosis (nuclear shrinkage). Staining with Azur-eosin $\times 400$

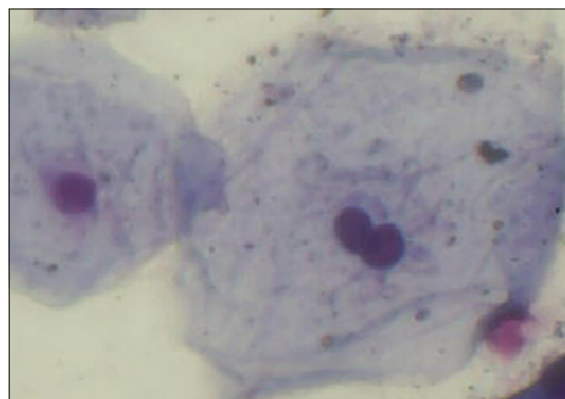


Figure 3: Dual-core epitheliocyte. Preparations of scrapings of the gingival mucosa of the main group. Staining with Azur-eosin $\times 400$

Table 1: Comparison of morphometric parameters of the gingiva epitheliocytes in patientSSs of the main and control groups (M±m)

Morphometric parameters	Main group	Control
Cell perimeter, micron	173.62±1.75	173.11±2.92
Core perimeter, microns	35.56±0.80	31.10±1.25
Ratio CellP/CoreP	0.216±0.06*	0.181±0.10
Cell area, μm^2	1750.85±5.08	1761.82±8.52
Core area, mkm^2	73.73±1.14	60.36±1.73
Area of cytoplasm, μm^2	1677.12±4.99	1701.46±8.40
Nuclear-cytoplasmic ratio	0.057±0.03*	0.035±0.04

*The difference between the indicators is significant ($P < 0.05$)

study of scrapes from the mucous membrane of the attached gingiva showed changes of epitheliocytes in 95% of the surveyed.

In cytological preparations of patients of the main group, there was a severe leukocyte infiltration [Figure 1]. An increase in the number of nuclear-free cells and cells with large, unevenly stained nuclei were also found, while the nuclei of cells of somatically healthy individuals in the control group were small and compact.

In addition, in the preparations of the main group, binuclear cells and cells with a nuclear pathology such as karyorrhexis and karyolysis were observed [Figures 2 and 3].

The analysis of morphometric parameters showed a significant decrease in the nuclear-cytoplasmic ratio due to an increase in the area of epithelial nuclei ($P < 0.05$) [Table 1].

DISCUSSION

Thus, epitheliocytes are able to change the functional state, due to their effector potential, under the influence of risk factors, in the form of somatic pathology and medication, being involved in the formation and maintenance of chronic pathology of periodontal tissues. An increase in the size of the nucleus of epitheliocytes in the main group can be explained by the influence of IHD, which may lead to a restriction of the production of young cells; therefore, mature epithelial cells are more pronounced.

Due to simple and noninvasive methods of exfoliative cytology, there is a possibility of earlier diagnosis of pathological changes in periodontal tissues in patients with cardiovascular pathology in the form of IHD, which manifest initially at the cellular level in the absence of a visible clinical picture.

CONCLUSION

1. In the cytological preparations of scrapings from the gingival mucosa in the main group, pronounced leukocyte infiltration was determined, as well as epitheliocytes with manifestations of cytopathology – an increase in the number of binuclear cells and cells with signs of karyorrhexis and karyolysis.
2. The performed morphometric analysis revealed a significant decrease in the nuclear-cytoplasmic ratio in the main group due to an increase in the area of the nucleus of epitheliocytes ($P < 0.05$) against the background of the absence of significant changes in the area of the cytoplasm.
3. The revealed violations of epitheliocytes can be caused not only by the presence of IHD but also by the mechanism of action of ASA.
4. The presence of cytomorphometric changes may be the earliest indicator of the manifestation of pathology in periodontal tissues in IHD in the absence of a visible clinical picture, which is necessary both for early diagnosis and for assessing the correctness of treatment of periodontal pathology.

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