

МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ:  
ТЕОРИЯ И ПРАКТИКА

Researchbib Impact factor: 11.79/2023

SJIF 2024 = 5.444

Том 2, Выпуск 2, 29 Февраль

STUDY OF THE FEATURES OF THE MUCOUS MEMBRANES OF THE  
UPPER RESPIRATORY TRACT IN SMOKING STUDENTS OF THE  
TERMEZ BRANCH OF THE TASHKENT MEDICAL ACADEMY

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**Annotation:** The relevance and necessity of conducting a study of the cytomorphological and functional characteristics of the mucous membranes of the upper respiratory tract as a tissue, which is the most important element of the body's first line of defense against the effects of adverse factors. These tissues accumulate the most (nicotine, pollutants, dust, microorganisms) and have a negative impact on the normal condition of the upper respiratory tract. However, the issue of the damaging effects of cigarette smoke components on the cytogram of the epithelium of the upper respiratory tract and the processes of proliferation and differentiation of its epithelial cells is still controversial and not fully understood.

**Key words:** mucous membranes, nicotine, pollutants, dust, microorganisms.

**Introduction.** The health of the upper respiratory tract is a marker of the condition of the entire organism as a whole. Very often, it is in the cavity of the upper respiratory tract that signs of certain diseases can be found. An attentive doctor may suspect a patient has problems with the respiratory system. When examining a patient, a doctor can also identify bad habits, such as smoking. It is very important to tell the patient in detail about the dangers of smoking, the consequences for the body, and the diseases that are associated with smoking. The scientific literature contains a lot of data on the effects of smoking on human health [1,2,3, 6, 7].

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Many works are devoted to studying the condition of the upper respiratory tract [5,4]. When smoking, the composition and properties of mucus and epithelial fluid surfaces change, and changes appear in the mucous membrane of the upper respiratory tract [3]. Mucus is an important indicator of upper respiratory tract health. Predisposition to upper respiratory tract diseases depends on the quality and composition of mucus. Tobacco smoke contains more than 5,000 chemical compounds, and all of them have one or another effect on the human body. Cigarette smoke primarily affects the mucous membrane of the upper respiratory tract and oral cavity. The substances contained in it enter the upper respiratory tract and affect the condition of the respiratory system as a whole.

**Purpose of the study.** The purpose of our work was to study the cytomorphological and functional characteristics of the mucous membranes of the upper respiratory tract in smoking students of the Termez branch of the Tashkent Medical Academy.

**Material and research methods.** The object of the study was the effects of smoking on the characteristics of epithelial cells of the upper respiratory tract using biomaterial from 30 student volunteers aged 18 to 22 years. Biomaterial from 10 non-smoking student volunteers of the same age and without somatic diseases was used as a control. 2nd group - smokers with a smoking experience of 6 months to 2 years, without somatic diseases, 3rd group - smoking students with a smoking experience of 2 - 4 years, without somatic diseases. The material was collected at 8.00-8.30 am.

Naturally separated cells were transferred to adhesive glass slides and thin smears were made. The prepared smears were dried, fixed in alcohol-acetone (1:1) for 5 minutes and stained with methylene blue according to May-Grunwald (15 minutes) and azure-eosin according to Romanovsky-Giemsa (30 minutes) [7].

The research materials were processed by mathematical and statistical methods using statistical data processing programs Statistica 10.0. Methods were used to assess the significance of differences using Student's t-test. The value for two unrelated groups ( $p < 0.05$ ) was chosen as a criterion for statistical reliability. Objects were studied using an MT 5300L microscope, followed by photography and image acquisition using a camera (Digital camera A594910).

**Research results and discussion.** The results of the study show that smoking causes an increase in the number of pathological mitoses, invasion of leukocytes into

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epithelial cells, hydropic degeneration and contamination of epithelial cells of the upper respiratory tract.

The values of differentiation and keratinization indices of epithelial cells of the upper respiratory tract increase significantly. These changes are detected after the first year of smoking when smoking from 4 to 8 cigarettes per day.

The most pronounced changes were found in those who smoked for more than 3 years and smoked more than 8 cigarettes per day. Cells with an atypical nuclear shape were found in the biomaterial of smokers three times more often than in non-smokers.

Among the indicators of nuclear destruction, it should be noted the high statistical significance of the increase in the number of cells with all types of nuclear destruction in smokers. The smallest difference in nuclear destruction rates was noted in the number of cells with chromatin condensation. The process of chromatin condensation is considered a step preceding the process of karyorrhexis, in which the nucleus disintegrates into chromatin conglomerations, followed by natural death by apoptosis. When comparing the frequency of occurrence of cells with signs of karyorrhexis, a significant increase in the proportion of such cells in smokers was revealed by 2.6 times. This may indicate a violation of the natural stimulation of apoptosis of epithelial cells of the upper respiratory tract through exposure to cytotoxic and genotoxic exogenous factors (tobacco smoke). Among the indicators of nuclear destruction, the signs of cell necrosis turned out to be statistically significant - perinuclear vacuole (2.3 times more often in smokers) and nuclear vacuolization (3.3 times more often in smokers). The identified forms of cell necrosis indicate destructive changes in the nuclear membrane and disruption of its barrier and transport functions. Signs of the necrotic path of destruction of the upper respiratory tract of epithelial cells were also identified in studies of the consequences of exposure to tobacco smoke. The result of the necrotic process of cellular destruction is karyolysis, which is preceded by the appearance of a perinuclear vacuole and/or vacuolization of the nucleus. We did not find statistically significant differences in the frequency of cells with signs of karyolysis in smokers and non-smokers. However, a statistically significant increase in the proportion of cells with initial signs of the necrotic path of destruction in smokers (perinuclear vacuole and nuclear vacuolization) indirectly confirms the pathological role of smoking.

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Smokers develop symptoms of hyperkeratosis, which intensify due to the length of time and intensity of smoking. They are caused by the toxic effect of tobacco products on the mucous membrane of the upper respiratory tract, which leads to a significant increase in the indices of differentiation and keratinization of its epithelium, as well as to intracellular structural and cytofunctional changes in epithelial cells.

**Conclusions.** The results obtained allow us to recommend a cytological method for assessing the level of toxic effects of tobacco smoking on the epithelium of the mucous membrane of the upper respiratory tract when analyzing its cytogram in smoking patients with local and systemic diseases in order to develop measures for their primary prevention and evaluate their effectiveness.

Components of tobacco smoke have a negative impact on the condition of the upper respiratory tract, and some authors consider the resulting morpho-functional changes. However, the issue of the damaging effects of tobacco smoke components on the cytogram of the epithelium of the upper respiratory tract and the processes of proliferation and differentiation of its epithelial cells in smokers is still controversial and not fully studied. Knowledge of these indicators will allow us to assess early changes in the epithelium of the upper respiratory tract and the degree of toxic effects of tobacco smoke on the epithelium of the upper respiratory tract, depending on smoking experience and gender.

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