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**MICROSCOPIC FEATURES OF BUCCAL EPITHELIUM  
 IN SMOKING STUDENTS OF INDO-DRAVIDIAN RACE  
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**ABSTRACT.** We have studied the microscopic features of buccal epithelium in smoking students of Indo-Dravidian race. In the epithelial cells of the mucous cheek surface of smoking students we revealed the scored nuclei with tongue- and broken egg-type protrusions, micronuclei, cellular dimorphism, binuclear cells, as well as a significant decrease in nuclear-cytoplasmic ratio, as compared to the control, which may indicate the presence of local inflammation resulting from the toxic effects of smoking products on the oral mucosa.

**Keywords:** buccal epithelium; morphology; tobacco; a student.

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**МИКРОСКОПИЧЕСКИЕ ОСОБЕННОСТИ БУККАЛЬНОГО  
 ЭПИТЕЛИЯ У КУРЯЩИХ СТУДЕНТОВ ИНДО-ДРАВИДИЙСКОЙ  
 РАСЫ (ПО Э. ХУТОНУ)**

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**Аннотация.** Изучали микроскопические особенности буккального эпителия у курящих студентов индо-дравидийской. Выявили в эпителиоцитах слизистой оболочки щеки курящих студентов ядра с насечкой, протрузиями типа «язык» и «разбитое яйцо», микроядра, клеточный диморфизм, двуйдерные клетки, а также достоверное уменьшение ядерно-цитоплазматического отношения, по сравнению с контролем, что может свидетельствовать о наличии местного воспалительного процесса, возникшего в результате токсического воздействия продуктов курения на слизистую оболочку полости рта.

**Ключевые слова:** буккальный эпителий; морфология; табак; студент.

**Introduction.** Currently, tobacco smoking is common among young people, which is a major cause of morbidity and premature mortality, mainly by heart

diseases, stroke and brain tumors [6, 13, 14]. For biological indication and quantitative assessment of the toxic effects of tobacco smoke on the human body it is

preferably to use the method of analysis of chromosomal aberrations of human oral epithelial cells; at the same time, their morphological features remain poorly studied [1, 3, 4]. Buccal smears have several advantages for cytodagnosis of groups of people: firstly, they safely provide a sufficient number of cells and make it possible to perform re-analyses, and secondly, ensure evaluation of both the general and local action of pathogens [7, 8]. That is, the buccal epithelium is highly informative in the diagnosis of many diseases (bronchial asthma, ulcerative colitis, Crohn's disease, etc.), as well as metabolic disorders in general [12]. Accordingly, the objective of this paper is to study the microscopic features of buccal epithelium in smoking students of Indo-Dravidian race.

**Materials and methods.** The experiment involved 20 2nd year students of the Faculty of general medicine and pediatrics of Medical Institute, NRU «BSU» in Belgorod (Russian Federation), coming from the Republic of India, the middle-aged (18-21 years) [10], male, without concomitant somatic or mental disorders. All students were divided into 2 groups each of 10 people. The first group included students smoking 6-8 cigarettes per day with 2-3 years of smoking experience, and the second consisted of non-smokers. The material sampling was carried out at one and the same time of day. Using a spatula, the swab of buccal

epithelium was taken from the mucous surface of a cheek. The native preparation was prepared, and then stained with hematoxylin-eosin. The objects were studied on a microscope OLYMPUS CX21, with further photographing and imaging (Motic Images Plus 2.0). After that, a licensed program «LpSquare v5.0 for Windows» was used to measure the areas of both nucleus and cytoplasm of buccal epithelial cells with further determination of the nuclear-cytoplasmic ratio (NCR). Data with a significance level of  $p \leq 0.05$  were considered reliable as compared to control.

The research results revealed that the epithelial cells of non-smoking students are mainly located separately from each other. The spinous cells are of polygonal shape with rounded nuclei and a pale pink cytoplasm contains a moderate amount of granular inclusions. Horny scales are visible extremely rare.

The smear of the experimental group as compared with the control had tightly arranged groups of epithelial cells found, with multiple white blood cells therebetween. Also, the epithelial cells of smoking students have scored nuclei appearing, as well as with «tongue»- and «broken egg»-type protrusions, and some of them contain micronuclei. The cell dimorphism and dual-core cells are rarely revealed (Fig. 1 a-d).

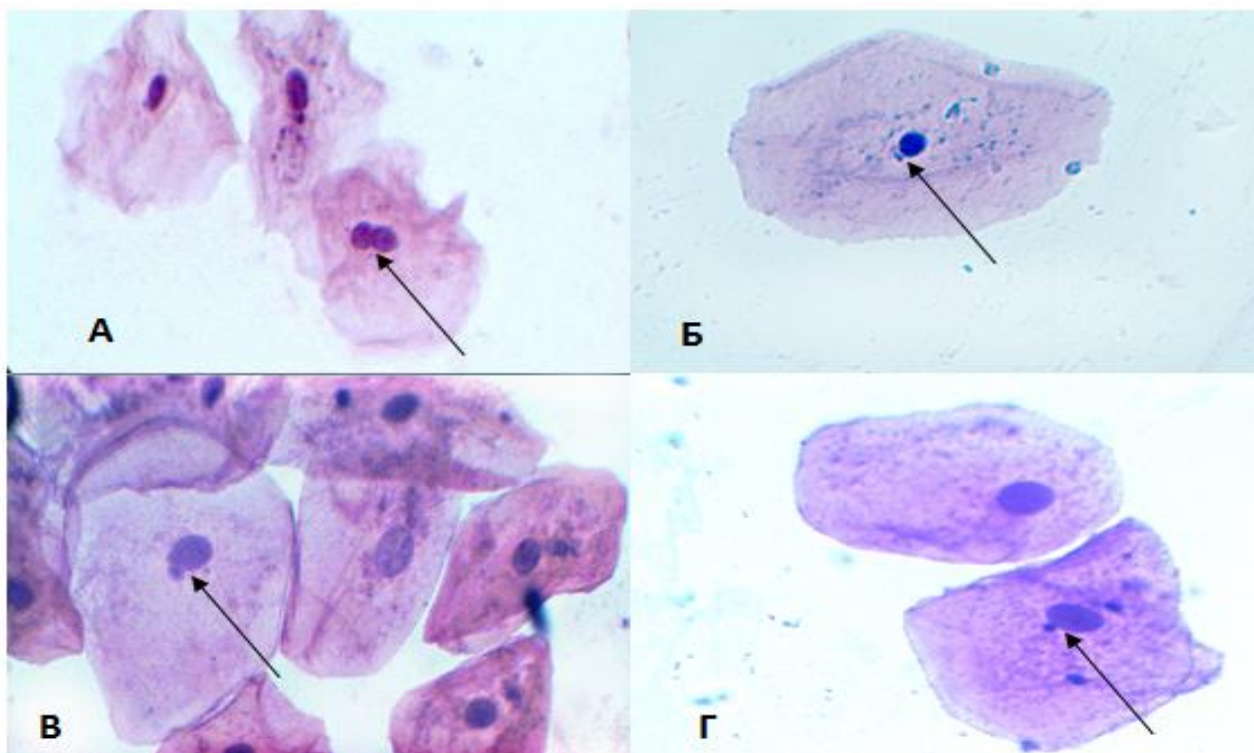


Fig. 1. Buccal epithelial cells of smoking students. Arrows indicate: a) binuclear cells; b) tongue-type protrusion; c) broken egg-type protrusion; and d) micronucleus. Haematoxylin and eosin stain. Magn. \*400

We also found that the area of the cytoplasm of buccal epithelial cells of the control students as

compared with the experimental ones was 35.00% more ( $p \leq 0.05$ ), and the nucleus area was 1756% less

( $p \leq 0.05$ ), respectively. At the same time, the smokers had nucleocytoplasmic ratio significantly increasing

by 47.98% ( $p \leq 0.05$ ) as compared to control (Table 1).

Table 1

**Morphological parameters of the buccal epithelium cells in smoking Indo-Dravidian students of NRU «BSU» as compared to the control (by E. Hooton)**

Morphometric parameters	Experimental group	Control group
Nucleus area, $\mu\text{m}^2$	77.315*	63.737
Cytoplasm area, $\mu\text{m}^2$	2392.110*	3681.820
Nucleus-to-cytoplasm ratio	0.038*	0.019

Note: \* – significant differences from the control parameters with a level of statistical significance  $p \leq 0.05$ .

**Results and discussion.** According to O.T. Efremov (2006), nuclear-cytoplasmic ratio is the most important morphometric parameter that allows assessing the metabolic level of a cell and identifying the manifestation of compensatory reactions, while changes in its value may serve as an indicator of inflammatory processes and certain forms of cancer [5]. M.A. Abadzhi, T.V. Makhrova, I.V. Maianskaia et al. (2003) consider that the increase in the size of the nucleus and the NCR value can indicate the influence of harmful environmental factors on the body, the stress factors and the presence of inflammation, in particular, in various forms of periodontal disease [2]. S.A. Semchenkova, T.F. Kruglikovskaia, and R.I. Iui (2009) attribute the appearance of the scored nuclei and with different protrusions with chromosomal rearrangements to the presence of somatic diseases (e.g., gastric or duodenum ulcer) [11]. At the same time, according to M.V. Lewinsky, V.N. Kalaev, and A.K. Butorina (2008), the frequency of these mutations depends on the state of the immune system, that is, the ability of immune cells to recognize and eliminate genetically damaged epithelial cells [9].

**Conclusion.** Based on the foregoing we may conclude that the appearance of nuclei with a notch, «tongue»- and «broken egg»-type protrusions, micronuclei, cellular dimorphism, binuclear cell in the epithelial cells of the mucous cheek surface of smoking students, as well as a significant decrease in nuclear-cytoplasmic ratio and the area of the cytoplasm of the epithelial cells, as compared to the control, may indicate the presence of local inflammation resulting from the toxic effects of smoking products on the oral mucosa.

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