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# MICROBIOLOGICAL CHARACTERISTICS OF THE ORAL MUCOSAIN PATIENTS WITH LICHEN PLANUS ERYTHEMATOSUS

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## INTRODUCTION

Lichen planus is a multifactorial disease that involves immune, neuroendocrine, microbiological, and other metabolic processes associated with skin and mucosal damage.

The microflora of the oral cavity in CPL SOPR was studied by E. S. Leontieva etal., 2014, the microbiocenosis of various biotopes of the oral cavity in patients with CPL SOPR was studied. The study involved 95 patients with CPL SOPR, who underwent hygienic, periodontal and microbiological research methods. The results of the degree of bacterial contamination indicate a more pronounced colonization of foci of CPL lesion by representatives of the coccoid flora: Streptococcus salivares and Streptococcus mutans, but there is no correlation between them. Isolated Streptococcus Sanguis colonies were observed in 55% of patients. In addition, fungi of the genus Candida albicans were detected in 50%, the average level of adhesion of Candida albicans strains in patients with CPL was 16.78±1.64%. The frequency of detection of fungi of the genus Candida albicans in foci of CPL lesion correlates (r=0.79) with the activity of the disease course. The significance of Candida albicans contamination is determined not so much by the degree of contamination of the lesion foci, but by such pathogenic properties of Candida albicansas the level of adhesion and the activity of germination tubes formation [1,2,3,6,11,2,3,6,11].

Authors Chuikin S. V., Akmalova G. M., Chernysheva N. D., 2014, analyzed the qualitative and quantitative microbiocenosis of the oral cavity in patients with CPL. The study included 145 patients with CPL aged 21 to 76 years, of whom 5% were men and 95% were women. The predominant form of CPL was erosive-ulcerative form (33.1%), the lowest frequency was observed in 2% of patients with bullous form. The results of the study showed that dysbiotic changes were observed with a predominance of candida infection and were found in 57.2% of the examined patients, which are observed more often in erosive-ulcerative and bullous forms of CPL. The results of the study showed that all the examined patients had microbiocenosis disorders of varying severity from dysbiotic shift to IYgrade IY dysbiosis and high sensitivity to bacteriophages was revealed. It should be noted that high sensitivity of pathogenic and opportunistic microorganisms sown in дисбактериозахoral dysbiosis was detected to цефалоспориногоcephalosporin antibiotics (100%), oxacillin (79%), gentamicin (76%), lincomycin (73%). [5,7,9,12].

A number of foreign authors Villa (TG, Sá ncheznchez-Pérez rez Á, Sieiro C., 2021) believe that microbial infection triggers an autoimmune response. Withdysbiosisof the intestinal microbiota, there is a violationof the integrity of the intestinal barrier, followed by an increase in intestinal permeability, and the penetration микроорганизмof microorganisms and their toxinов into the circulatory system. Current knowledge about this disease requires the inclusion of this disease in the list of autoimmune diseases, since the progression of CPL involves colonization of locally affected areas by bacteria, fungi or viruses that occur after damage to the oral mucosa and skin. The process of healing the disease should include eliminating microbial dysbiosis and restoring the normal microbiota of the oral mucosa, skin, and intestines. [4,6,8,10,13,14].

**KEY WORDS:** lichen planus, microbiocenosis,

In this regard, the aim of this study was to study the microflora of the oral mucosa in patients with CPL.

## MATERIALS AND METHODS

The object of the study was 62 patients with typical (30) and erosive-ulcerative (32) forms of lichen planus of the oral mucosa, who applied to the Department of therapeutic dentistry of the clinic of the Tashkent State Dental Institute for the period from23 2023 to 202424 г, who were divided into comparison groups and patients of the main group.

Of the 62 patients, 21 (33.8%) were men and 41 (66.1%) were women, aged от20-69 до 6years. The compared groups of patients with CPL COPD were randomized by gender and age, which ensured the representativeness of the data obtained (Figure 1). The diagnosis of CPL SOPR was made on the basis of the classification of Novik I. O. the following forms of CPL SOPR are distinguished: hyperkeratous (typical), erosive, pemphigoid, ulcerative, warty.

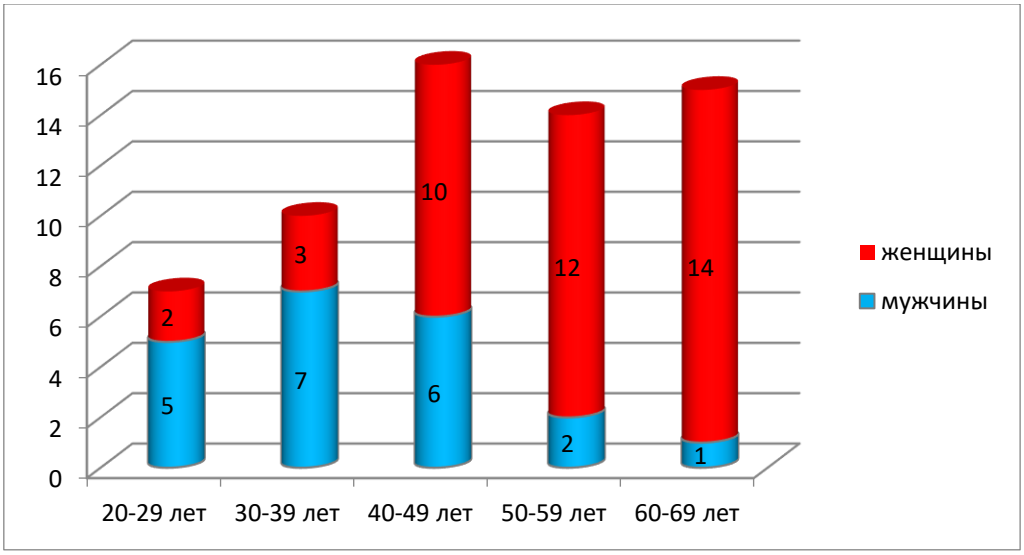


***Figure 1*** *(Gender-age study of patients with CPL.)*

The criteria for inclusion of patients in the main group and the comparison group were identical: informed consent of the patient to participate in the study; age of patients-at least 18 years; diagnosis of lichen planus confirmed by a dermatologist (lesion of the oral mucosa and кожных skin).

The clinical examination included: a survey, anamnesis collection, examination, palpation of regional lymph nodes, examination of dentition rows, as well as considering the duration of prosthetics, type of material, shelf life and the presence of allergic reactions.

To determine the state of the oral microbiocenosis полости были рта были проведены, qualitative and quantitative studiesof opportunistic and pathogenic microorganisms in the oral fluid were carried out according to the method of Efimovich O. I, 2002 [19], followed by seedingнием on dense and semi - liquid nutrient media for the cultivation of microorganisms in aerobic and anaerobic conditions. Identification of microorganisms was carried out by morphological, biological and biochemical properties.

Quantitative indicators микроof the microflora of the cavity based on dilutions were expressed in logorithms Lg CFU / ml: K=Ax200cR (CFU/ml) where, K is the number of microbes of a certain type;A is the number of colonies on the plate in the last dilution, where there is microbial growth ; 200 is коэффthe coefficientleading to loop seeding in accordance with 1 ml; P – the degree of dilution.

The analysis of the obtained materials was carried out using the application software package using the Microsoft Office Excel-2016 software package, including the use of built-in statistical processing functions, the methoda of variational parametric and nonparametric statistics with the calculation of the arithmetic mean of the studied indicator (M), the mean square deviation (M), the standard error of the average (m), relative values (frequency, %). The statistical significance of the obtained measurements when comparing the average values was determined by Student's t-test (t) with the calculation of the error probability (P) when checking the normality of the distribution (using the kurtosis criterion) and the equality of general variances (Fisher's F – test). A confidence level of $P<0.05$ was taken as statistically significant changes. Statistical significance for qualitative values was calculated using the $\chi 2$ criterion (chi-square) and the z-criterion (Glantz S., 1998; Aviva Petri, Caroline Sabin, 2009) by the formula.

## RESULTS AND DISCUSSION

As a result of the clinical study, it was found that 51.4,4% of patients had pain, discomfort, burning and tightness. Complaintsы of pain were when eating food, especially spicy, sour and salty. The onset of the diseasee was associated with prosthetics or trauma, but more often with the presence of stress. So, in 20.9% were dentures; in the second place among local factors are sharp edges of teeth -19.3%; dissimilar metals-17.7%; poor-quality fillings, bad habits - biting the cheeks, lips and smoking is 41.9,9%. 35.5% of patients complained of erosions and ulcers in the oral cavity пациентов.

In the analysis, concomitant diseases of CPL are endocrine diseases (20.9%), diseases of the cardiovascular system (17.7%), gastrointestinal tract (49.5%), and urinary system (11.7%). All patients were examined by a dermatologist. The average CP values were 19.22 in the main group and 18.48 in the comparison group.

We studiedcolonization resistance in various areas of the oral mucosa, such as the gums, tongue, cheeks, and palate in healthy individuals of the control group and patients of the main group and the comparison group with lichen planus of the oral mucosa (SOPR).

Microbiological studies have shown that in the control group in healthy patients, colonization resistance on the gum was maximum (4.0±0.3 CFU/cm2), and the minimum (1.110±0.1 CFU/cm2) is located on the palate mucosa (Table 1).

***Table 1*** *(The state of microbial colonization resistance in various areas of SOPR in healthy individuals of the control group (M±m KOE/cm2))*

| Group of microbes | Niche of the oral cavity | | | |
|---|---|---|---|---|
| | **gums** | **tongue** | **cheek** | **palate** |
| Lactobacillus | 4,75±0,3 | 1,80±0,1 | 1,25±0,1 | 1,220±0,1 |
| Streptococcus salivarius | 4,0±0,3 | 2,85±0,1 | 1,40±0,1 | 1,10±0,1 |
| Streptococcus mutans | 1,6±0,1 | 2,0±0,1 | 1,1±0,1 | 1,0±0,1 |
| Streptococcus mitis | 2.30±0.2 | 2.10±0.1 | 1.15±0.1 | 1.3±0.1 |
| Staphylococcus epidermalis | 3,60±0,2 | 2,30±0,1 | 2,0±0,1 | 1,15±0,1 |
| Escherichia coli | 0 | 1.0±0.1 | 0 | 0 |
| *Klebsiella* | 0 | 0 | 0 | 0 |
| Candida albicans | 1.15±0.1 | 2.0±0.1 | 0 | 0 |

In a healthy person, the main part of the microflora in the oral cavity consists of gram-positive flora-Streptococcus, especially Streptococcus salivarius (4.0±0.1010 CFU/cm2), otherwise "salivary", most pronounced on the gums, less-on the mucousmembranes ofthe palate (1.30±0.1 CFU/cm2). Another gram-positive oral flora is Staphylococcus, which is most pronounced on the gums and tongue (3.60±0.20 and 2.30±0.1 KOE/cm2). Escherichia coli and Klebsiella have a weak colonization abilityKlebsiella, normally these microorganisms do not occur on the gums, cheek and palate. Fungi ofthe способностью genus Candida albicans have the strongest colonization ability only of the gingival and tongue mucosa обладают грибы рода Candida albicans (Table 1).
Lactobacillus is a gram-positive anaerobic bacterium thatstimulates the body'sdefense mechanisms, activates phagocytosis, synthesis of lysozyme, interferon and cytokines. This is a normal microflora, starting from the oral cavity and ending with the colon. Lactobacillus normally predominate among all microorganisms of the oral mucosa.

***Table 2*** *(State of microbial colonization resistance in various biotopes of patients with CPL COPD of the main group (M±m), KOE/cm22)*

| Group of microbes | Niche Oral cavity niche | | | |
|---|---|---|---|---|
| | **gum** | **tongue** | **cheek** | **palate** |
| Lactobacillus | 1.10±0.1 | 0.75±0.1 | 0 | 0 |
| Streptococcus salivarius | 2,10±0,1 | 1,25±0,1 | 0,95±0,1 | 0 |
| Streptococcus mutans | 2,40±0,1 | 2,70±0,1 | 2,10±0,1 | 1,60±0,1 |
| Streptococcus mitis | 2,10±0,1 | 1,25±0,1 | 1,40±0,1 | 1,10±0,1 |
| Staphylococcus epidermalis | 4,40±0,3 | 3,70±0,2 | 2,95±0,1 | 2,15±0,1 |
| Escherichia coli | 3,11±0,2 | 3,10±0,2 | 2,20±0,1 | 1,10±0,1 |
| *Klebsiella* | 2,10±0,1 | 1,90±0,1 | 1,40±0,1 | 1,55±0,1 |
| Candida albicans | 4,70±0,4 | 3,85±0,3 | 3,55±0,3 | 3,15±0,2 |

Table 2 shows the state of colonization resistance of microbes in various biotopes of the oral mucosa in patients with CPL SOPR. Thus, in these patients, the frequency of colonization of all biotopes of the oral mucosa increases, i.e. the indicators of Streptococcus salivarius decreased (100%), Str.mutans (60%), Str.mitis (80%) and Staphylococcus epidermalis strains (45%) increased more than 2-3 times. The density of colonization by yeast-like fungi of the genus Candida albicans is especially activated by more than 3-5 times, depending on the biotope. In contrast to the indicators of healthy individuals, in patients with CPL SOPR, the colonization activity of microbes with the greatest intensity is carried out by fungi

of the genus Candida albicans, they colonized the mucous membranes of the gums and tongue, the number of which exceeded the indicators on the surface of the cheek and palate (Table 2).

Thus, the conducted studies of colonization resistance of the oral microflora indicate that patients with CPL SOPR have a syndrome of microbial overgrowth. At the same time, if streptococci and lactobacilli occupy the dominant position in healthy individuals of the control groupлактобактерии, then in patients with CPL SOPR, the microbiological picture changes and is represented by staphylococci and fungi of the genus Candida albicans, against this background, a decrease in the number of Lactobacillus and streptococci is observed.

We studied the quantitative and qualitative indicators of microbes in healthy individuals of the control group and patients with CPL SOPR. The data obtained are shown in Table 3.

***Table 3*** *(Oral fluid microflora in patients with CPL SOPR (lgM±mKOE/ml))*

| Group of microbes | **Number of microbes in 1 ml of saliva** | |
|---|---|---|
| | Control group | **Main group CPL SOPR** |
| Total number of anaerobes | 5.80±0.4 | 3.55±0.3 |
| Lactobacillus | 4.75±0.3 | 2.10±0.1 |
| Peptostreptococcus | 3.90±0.3 | 3.70±0.2 |
| Total number of aerobes | 5.55±0.4 | 7.40±0.5 |
| Staphylococcus aureus | 0 | 2.40±0.2 |
| Staphylococcus epidermalis | 4.40±0.3 | 3.70±0.3 |
| Streptococcus salivarius | 4.70±0.4 | 3.20±0.2 |
| Streptococcus mutans | 2.40±0.2 | 4.25±0.4 |
| Streptococcus mitis | 2.80±0.2 | 3.70±0.4 |
| Streptococcus hemolytical | 0 | 5.30±0.20 |
| Escherichia coli | 0 | 2.25±0.2 |
| Protey | 1.45±0.1 | 3.45±0.3 |
| *Klebsiella* | 1.0±0.01 | 2.10±0.1 |
| Candida albicans | 2.15±0.1 | 5.70±0.5 |

The microflora of the oral cavity is characterized by the presence of an association of various microorganisms – pathogenic and conditionally pathogenic. Staphylococcus aureus and hemolytic streptococci were detected in the highest titers of microorganisms in patients with CPL SOPR, and other opportunistic pathogens were detected less frequently, against the background of a significant decrease in the detection level of normoflora.

As can be seen from Table 3, the oral microflora in the control group is represented by a variety of microflora, the predominant of which is Lactobacillus (4.75±0.3). However, in the main group, a decrease in lactobacilli was noted and amounted to (2.10±0.1). The facultative microflora is represented by streptococci and staphylococci, with Streptococcus salivarius occupying the highest level (4.70±0.4). However, in the group of patients with CPL, the total number of anaerobes (3.55±0.3) and lactobacilli (2.10±0.1) was reduced by more than 2 times compared to the control group in healthy individuals. Thus, patients with CPL SOPR of the main group developed Staphylococcus aureus and Streptococcus hemolytical, which are not inherent in the normal microflora of the oral cavity. Thus, the average titers of Staphylococcus aureus ranged at the level of (2.40±0.2), the average titers of hemolytic streptococcus were at the level of (5.30±0.20). In addition, the indicators of opportunistic

microorganisms of Escherichia coli LP and LN in titers are increased: Escherichia coli (2.70±0.2) and (2.25±0.2). The detection rate ofproteus increased slightly to (3.45±0.3) with normal values of 1.45±0.1 LGCU/ml, and the level of Klebsiella increasedc 2-fold (2.10±0.1). Fungi of the genus Candida albicans with a large set of pathogenicity enzymes increased 2.6 times and reached a value of 5.70±0.55 lgCFU/ml with a norm of -2.15±0.1 lg CFU/ml.

***Table 4*** *(State микробиоценозаof oral microbiocenosis in patients with CPL SOPR (M±m))*

| Dysbiosis | Contra.group<br>n=18 | Main group<br>n=32 | Comparison group<br>n=30 |
|---|---|---|---|
| Normocenosis | 2/11, 11±2.52 | -- | - |
| Shift | 1/5,53±5,04• | 3/10,00±6,2 | 3/9,57±5,8 |
| I-II degrees | 9/50,01±9,6• | 16/50,00±9,4 | 14/46,66±9,7 |
| III - degrees | 6/33,18±6,02 | 13/43,33±9,8 | 13/40,62±9,5 |
| IV-degree | - | - | - |

*Note: in the numerator –the number of patients; in the denominator - in % of the number of patients; • - P<0.05 in relation to the value before treatment; º -P<0.05 in relation to the control.*

Table 4shows that the combination of pathogenic hemolytic streptococcus and staphylococcus aureus with fungi of the genus Candida in CPL SOPR is an extremely unfavorable factor. In this regard, the persistence of bacterial pathogens forms dysbiosis of the oral cavity. Clinical and microbiological manifestations of dysbiosis in the compared groups were homogeneous and in 9.57 -10.00% of cases corresponded to a dysbiotic shift; in 46.66 -50.00% of patients, changes in microbiocenosis were assessed as dysbiosis of I-II degree and in 40.62 -43.33% - as dysbiosis of III degree.

It should be noted that in the compared groups there were no patients with normocenosis, at the same time there were no patients with severe manifestations of dysbiosis of the IV degree.

Thus, our microbiologicalиstudyя of the oral mucosa in lichen planus продемонстрировали, что erythematosus demonstrated that при развитии КПЛ СОПР являются fungi of the genus Candida albicans, StafilococcStafilo us aureus, выступающиwhich in some cases act as carcinogenic provocateurs, are a predisposing factor in the development of CPL COPD. The results of our study are confirmed by the data of a number of foreign authors. So, Baek K, Choi Y., 2018 and 2020 conducted a correlation between CPL and microbial dysbiosis, the authors described that betta-diverse microbiomes vary in different clinical forms and indicate that microbiomes can be unique and different in two manifestations of the disease -erosive and non-erosive. Wang K, Miao T.. 2015, conducted a preliminary analysis микробиомыof the salivary microbiome and its involvement in the development of CPL, which is the cause of its development. Villa TG, Sá ncheznchez-Pérez rez Á, Sieiro C., 2021; Bombeccari GP, Gianni AB, Spadari F., 2017; Alberto Rodriguez-Archilla1and Silvia Fernandez-Torralbo, 2022 observed Candida colonization in the oral cavity in lichen planus erythematosus.

In addition oto the newly listedx etiologically significantx microorganismsof the oral mucosa in patients with CPL, there are conditionally pathogenic enterobacteria, that colonizeт in stable associations of microorganisms in patients. The presence of the fungus Candida albicans and Stafilowithoccus aureus усугубляю worsened the course of CPL SOPR, which contributesto the appearance в of new symptoms and elements of malignancy in the clinical picture.

## CONCLUSION

Thus, thequalitative and quantitative composition of the microflora of the oral mucosa in patients with lichen planus erythematosus depends on the form of the disease. It should be noted that in the compared groups, the persistence of bacterial pathogensis noted, which forms dysbiosis
I-II and III degrees. Theresults of the study obtained by us indicate a high degree of microbial contamination of lesions in patients with lichen planus of the oral mucosa, which playsa key role in theactivation and weighting ofthe inflammatory and destructive process of the oral mucosa in lichen planus and contributes to the development of dysbiosis and the appearance of malignancy elements.

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