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Correlations between oral microbial diversity and salivary pH value revealed by microscopic examination

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ABSTRACT: In oral disorders, bacterial flora is the main determinant, and intrinsic factors related to the host's genetic predisposition as well as those related to the oral environment, together with extrinsic factors, are considered to be favourable factors. Under conditions of dysbiosis, opportunistic microbial flora may become pathogenic depending on variations in the local host immune response. By suppressing pathogenic microbial flora, improvement or even cure of oral diseases can be achieved. The aim of this paper is to highlight the correlation between microbial composition in patients with different oral diseases and salivary pH value using light microscopy technique. Microbiological tests are the most accessible for detecting different pathologies and instituting appropriate treatment based on them. The study was conducted on pathological products collected from patients who presented to the dental clinic D. V., IAS, Romania. Microscopic examination of Gram-stained smears revealed the presence of germs, so that the ratio of gram-positive to gram-negative bacteria in the oral condition could be established. Also, by using pH indicator paper, a correlation was established between the severity of the conditions and the salivary pH value. Managing information about the composition of the oral microflora and salivary pH can be used to develop effective prevention and monitoring strategies in oral disease therapy.

KEYWORDS: Oral Flora, Salivary pH, Microscopic Examination, Oral Diseases.

I. INTRODUCTION

In oral diseases, microbial flora is the main determinant, and intrinsic factors related to the genetic composition of the host as well as those related to the oral environment, together with extrinsic factors, are considered to be favorable [1-5].

Under conditions of dysbiosis, opportunistic microbial flora can become pathogenic depending on variations in the host's local immune response [6-9].

By suppressing the pathogenic microbial flora, improvement or even cure of oral diseases can be achieved [10-14].

The composition of the resident oral microflora shows local variations in composition on distinct surfaces [15, 16].

Due to environmental differences, certain microbial flora may be compatible with a state of periodontal health, and variations in oral flora are associated with different degrees of periodontal disease [17-20].

The aim of this paper is to highlight the correlation between microbial composition in patients with different oral diseases and salivary pH value using light microscopy technique.

II. MATERIAL AND METHODS

Selection of the patient group

The study was conducted on a group of 12 patients, male and female, of different ages, from urban and rural areas.

Materials

The following instruments and materials were required for sampling and smear preparation:

- calibrated loops
- degreased slides
- Bunsen burner
- alcohol-acetone
- consultation kit
- optical microscope
- cedar oil

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- sterile cotton wool rolls
- mouth aspirator
- Gram staining kit
- pH indicator chart
- Apple iPhone SE (2020) camera

Method

Collection of pathological products was carried out before and after brushing, starting with the measurement of salivary pH, using the pH indicator paper, by inserting and holding the strip for 15 seconds in the oral cavity.

After salivary pH measurement, saliva samples were collected from the gingival sulcus, using the disposable periodontal probe, avoiding contamination by touching other surfaces

After making the smears, they were stained by Gram staining technique and examined under the light microscope, within the Microbiology Department of the Faculty of Dentistry of the "Carol Davila" University of Medicine and Pharmacy in Bucharest.

III. RESULTS AND DISCUSSION

Two types of periodontal disease were identified in the group of patients selected for this study: chronic superficial marginal periodontitis (CSMP) and chronic simple gingivitis (CSG).

Following examination of the samples collected, before and after tooth brushing, using the smear technique to study morpho-tinctorial variation, the ratio of gram-positive to gram-negative flora was established.

In patients with CSMP, a predominance of gram-negative bacteria was found, compared to gram-positive bacteria, the ratio of which was the same both before and after brushing.

For clinical forms of CSG, a predominance of gram-negative flora was also found both before and after brushing.

In patients with CSG, a change in the ratio was observed after brushing, moving closer to an equilibrium of the microbial flora (Fig. 1).

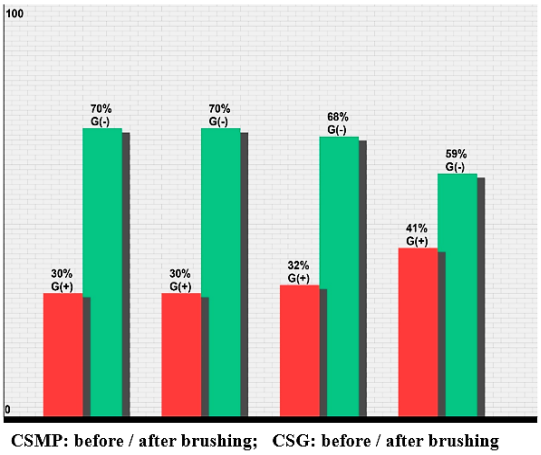

Figure 1. Correlation between gram-positive and gram-negative bacteria, oral diseases, and brushing

IV. CONCLUSION

Following collection and examination of samples, both before and after brushing, the predominant microbial flora was found to be Gram-negative

Evaluating information from patients with CSMP and CSG, it was found that the ratio of Gram-positive to Gram-negative bacteria can vary, before and after brushing.

In the majority of patients with CSG, an increase in salivary pH value and a decreased presence of microbial flora was observed after brushing.

In 3/4 of the patients with CSMP, an increase in salivary pH was observed and in 1/4 of them, the salivary pH remained the same after brushing.

Comprehensive and miniaturized methods based on traditional microbiological test kits could help to identify pathogens even by beginners with a basic knowledge of microbiology.

Advances in oral microbiology will continue to provide a thorough understanding of the ecological balance between indigenous microbial flora and cariogenic, periodontal pathogens, becoming a reference point leading to specific and proactive therapeutic approaches to combat periodontal and dental diseases.

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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Statement of informed consent
Informed consent was obtained from the patients included in the study.

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