

THE MICROBIAL "LANDSCAPE" OF THE DENTURE-BEARING AREA MUCOSA BEFORE AND AFTER THE PLACEMENT OF COMPLETE REMOVABLE DENTURES AND THE LOCAL IMMUNITY

Hazratqulov Asrbek Ulugbek

Clinical Resident, Department of Pediatric Dentistry

Rahimberdiyev Rustam Abdunosirovich

PhD, Department of Pediatric dentistry

Samarkand State Medical University

Changes in Oral Microbiome and Local Immunity in Edentulous Patients Before and After Complete Denture Prosthodontics

Background

One of the main etiological factors affecting the oral ecosystem is the existence of teeth, whether whole or partial [1]. Specific habitats for microbial development and activity are found in dental fissures, carious cavities, root canals, gingival sulci, and dental plaque. The environmental circumstances for the oral microbiota undergo major modifications after partial or complete tooth loss and the subsequent installation of dental prosthesis [2]. The purpose of this study is to examine the oral microbiota of edentulous individuals both before to and six months after the implantation of full removable dentures.

Materials and Methods

The research assessed the qualitative and quantitative makeup of the oral microbiota in 12 edentulous individuals before to prosthodontic therapy and in 14 patients six months post-insertion of full dentures. The mean age of the patients was 71.6 pm 5.2 years.

Thirteen age-matched volunteers served as the control group. Prior to sampling, the pH of combined saliva was assessed. The Ambjrnsen index was used to analyse plaque buildup on different denture surfaces to establish hygiene levels. Microorganisms were

investigated by light microscopy after mucosal swabbing. Microbiota density was categorised as sparse, substantial, or abundant based on visual fields [3].

Quantitative analysis was conducted using Polymerase Chain Reaction (PCR), where $<10^2$ CFU/mL was deemed sparse, 10^2 – 10^3 CFU/mL significant, and $>10^5$ CFU/mL abundant. Local immunity was measured using NETosis (the production of Neutrophil Extracellular Traps—NETs). Biomaterial was stained using the Feulgen reaction with Schiff reagent for DNA detection and preserved with a 95% ethanol solution to confirm the existence of NETs. Statistical analysis was performed using IBM SPSS Statistics v.27.0 and the Mann-Whitney U-test. The significance level was set at $p < 0.05$ (shown by).

Results

The oral pH remained steady following complete tooth loss (7.2 pm 0.6) compared to the control group (7.3 pm 0.4). High amounts of mixed, coccal, and fungal flora were identified in both control participants and edentulous patients. However, in the edentulous condition, rod-shaped flora (*Enterobacteriaceae* and *Eubacterium* spp.) expanded to substantial levels, whereas fungal flora fell to scanty levels.

Six months following denture implantation, fungal colonies considerably increased; *Eubacterium* spp. fell to scarce levels, whereas *Leptotrichia* spp. and *Fusobacterium* spp. reached considerable concentrations. A tendency toward increasing *Peptostreptococcus* spp. was also detected.

Regarding local immunity, the mucosal surface of edentulous individuals demonstrated dispersed neutrophils undergoing NETosis and expressing NETs. However, neutrophils were missing on the mucosal surface six months following denture wear. This shows that the prosthesis functions as a mechanical barrier restricting neutrophil migration to the mucosal surface, hence reducing NETosis and affecting this particular local immunological function. Consequently, injured mucosal cells and bacterial triggers may not be eliminated adequately.

Conclusions

Total edentulism does not disturb the oral acid-base balance but modifies the microbial

composition toward increased rod-shaped flora and reduced fungal abundance. Six months of total denture use leads to a return of fungal colonies and a reduction in rod-shaped flora with an increase in mixed microbiota.

Edentulism first triggers local immune responses (NETosis). However, the presence of a fully removable denture seems to dampen these local immune responses on the supporting tissues.

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