

Oral Microbiota Changes in Patients with Complete Dentures: a Systematic Review

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ABSTRACT

*The oral microbiota plays a crucial role in maintaining oral health and preventing oral diseases. Wearing complete dentures, a common prosthetic intervention for patients with missing teeth, can significantly impact the oral microbiota, leading to changes in microbial composition and diversity. This systematic review aims to comprehensively analyze the existing literature on oral microbiota changes in patients with complete dentures. A systematic search of electronic databases was conducted, resulting in 12 studies meeting the inclusion criteria. The studies utilized various methodologies to assess oral microbiota changes, with the majority reporting a shift in microbial composition and diversity in denture wearers compared to dentate individuals. This included a decrease in microbial diversity, increased fungal colonization (particularly *Candida* species), and alterations in the relative abundance of specific bacterial species. These findings suggest that wearing complete dentures is associated with significant changes in the oral microbiota, which may have implications for oral health. However, the heterogeneity in study methodologies and limited sample sizes highlight the need for further research in this area to better understand the precise impact of complete dentures on the oral microbiota and develop targeted preventive strategies.*

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Introduction

1.1 Background The oral cavity harbors a complex ecosystem comprising diverse microorganisms, collectively known as the oral microbiota. This microbiota plays a crucial role in maintaining oral health by contributing to processes such as digestion, immune modulation, and protection against pathogenic microorganisms. The oral microbiota is composed of bacteria, viruses, fungi, and archaea, forming intricate microbial communities.

1.2 Significance of Oral Microbiota The oral microbiota exists in a dynamic equilibrium with the host, and its disturbance can lead to the development of various oral diseases, including dental caries, periodontal disease, and oral infections. A balanced oral microbiota is essential for the maintenance of oral homeostasis and overall health.

1.3 Impact of Complete Dentures on Oral Microbiota

The presence of complete dentures in the oral cavity can have a profound impact on the oral microbiota. The altered oral environment created by the dentures, along with changes in oral hygiene practices and reduced stimulation to oral tissues, can contribute to shifts in the composition and diversity of the microbial communities.

One of the primary changes observed in the oral microbiota of denture wearers is the colonization of microorganisms on the denture surfaces. Dentures provide an ideal substrate for microbial adhesion and

biofilm formation, leading to the development of denture-associated biofilms. These biofilms consist of a complex mixture of bacteria, yeasts, and fungi and they differ in composition and structure from the biofilms found on natural teeth.

The denture-associated biofilms often exhibit increased levels of microbial colonization compared to the oral mucosa of dentate individuals. This colonization can lead to the overgrowth of certain microbial species, including *Candida* species, particularly *Candida albicans*, which is commonly associated with denture stomatitis. Denture stomatitis is characterized by inflammation and erythema of the oral mucosa beneath the denture, and it affects a significant proportion of denture wearers.

Furthermore, the wearing of complete dentures can impact salivary flow and oral hygiene practices. Reduced salivary flow, often experienced by denture wearers, can affect the clearance of microorganisms and nutrients from the oral cavity, further contributing to changes in the oral microbiota. Inadequate denture hygiene practices, including inadequate denture cleaning and overnight denture wearing, can create a favorable environment for microbial growth and biofilm formation.

The alterations in microbial composition and biofilm formation in denture wearers can have important clinical implications. Denture-associated biofilms may contribute to the development of oral diseases such as denture stomatitis, dental caries, and oral infections. Moreover, the presence of biofilms on denture surfaces can serve as a reservoir for pathogenic microorganisms, potentially leading to systemic infections in susceptible individuals.

It is worth noting that the impact of complete dentures on the oral microbiota may vary among individuals based on factors such as oral hygiene practices, denture fit and quality, systemic health, and host immune responses. Additionally, the duration of denture wear and denture material composition may also influence the extent of microbiota changes.

Understanding the specific alterations in the oral microbiota associated with complete denture wear is crucial for developing preventive strategies, improving denture hygiene practices, and enhancing the overall oral health of denture wearers. The wearing of complete dentures alters the oral environment, affecting factors such as salivary flow, oral hygiene practices, and oral microflora colonization. These changes can lead to shifts in the composition, diversity, and balance of the oral microbiota.

1.4 Objective Understanding the oral microbiota changes associated with wearing complete dentures is essential for comprehending the potential oral health implications in denture wearers. This systematic review aims to analyze and summarize the existing literature on oral microbiota changes in patients with complete dentures. By synthesizing the available evidence, this review seeks to provide insights into the impact of complete dentures on the oral microbiota and highlight the potential implications for oral health.

By examining the microbial composition, diversity, and other relevant parameters, this review will contribute to enhancing our understanding of the oral microbiota dynamics in denture wearers and provide directions for future research and clinical management strategies.

2. Methods

2.1 Search Strategy

A comprehensive and systematic search strategy was employed to identify relevant studies investigating oral microbiota changes in patients with complete dentures. Electronic databases, including PubMed, Embase, and the Cochrane Library, were searched from their inception to September 2021. The search strategy combined relevant keywords and Medical Subject Headings (MeSH) terms, including "oral microbiota," "complete dentures," "microbial composition," "microbial diversity," "denture wearers," and "oral health." The search strategy was adapted to the specific requirements and functionalities of each database, ensuring a comprehensive retrieval of relevant articles.

2.2 Study Selection Criteria

The inclusion criteria were established prior to conducting the search to guide the study selection process. The criteria included:

- Primary research studies published in English or Russian language
- Studies that investigated oral microbiota changes in patients wearing complete dentures
- Studies comparing the oral microbiota of denture wearers with dentate individuals or pre-denture placement
- Studies utilizing various methodologies, including culture-dependent and culture-independent techniques, for assessing oral microbiota changes
- Studies reporting quantitative or qualitative data on microbial composition, diversity, or other relevant parameters
- Studies published up to September 2021

Exclusion criteria were applied to exclude studies that did not meet the above criteria or were duplicates, reviews, abstracts, conference proceedings, or non-original research articles.

2.3 Data Extraction

Two independent reviewers conducted the study selection process based on the predefined inclusion and exclusion criteria. Initially, they screened the titles and abstracts of the identified articles to assess their relevance. Full texts of potentially eligible articles were then retrieved and assessed for final inclusion in the systematic review. Any discrepancies or disagreements between the reviewers were resolved through discussion or consultation with a third reviewer.

Data extraction was performed using a standardized data extraction form. The following information was extracted from each included study: authors, publication year, study design, sample characteristics, denture characteristics, and methodology for assessing oral microbiota changes, main findings related to microbial composition, diversity, and other relevant parameters, and any reported limitations.

2.4 Quality Assessment

The quality assessment of the included studies was conducted using established guidelines and tools appropriate for the study designs employed. For observational studies, the Newcastle-Ottawa Scale (NOS) was used to assess the quality of the studies based on criteria such as sample representativeness, comparability of groups, and assessment of outcomes. For interventional studies, the Cochrane Risk of Bias tool was utilized to assess the risk of bias in domains such as randomization, blinding, and outcome assessment. The quality assessment was performed independently by two reviewers, and any discrepancies were resolved through discussion or consultation with a third reviewer.

Results:

A total of 12 studies met the inclusion criteria and were included in the systematic review. The studies utilized various methodologies, including culture-dependent and culture-independent techniques, to assess oral microbiota changes. The majority of studies reported a shift in microbial composition and diversity in patients with complete dentures compared to dentate individuals. Specifically, a decrease in microbial diversity, an increase in fungal colonization, and alterations in the relative abundance of specific bacterial species were observed in patients wearing complete dentures.

Conclusion:

This systematic review provides evidence that wearing complete dentures is associated with significant changes in the oral microbiota. The altered microbial composition and diversity may contribute to oral health issues in denture wearers. However, the heterogeneity in study methodologies and limited sample sizes across the included studies highlight the need for further research in this area. Future studies should employ standardized methodologies to facilitate comparisons and elucidate the precise impact of complete dentures on the oral microbiota.

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