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Assessment of Periodontal Health Among Removable and Fixed Partial Denture Wearers patients

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Abstract

Background:

Periodontal health is a critical factor in the long-term success of prosthetic rehabilitation. Removable and fixed partial dentures are commonly used prosthetic options for partially edentulous patients. However, the effect of these dentures on periodontal tissues remains a concern. This study aims to assess and compare periodontal health among patients wearing removable and fixed partial dentures.

Material and Methods:

This cross-sectional study included 100 patients divided into two groups: 50 removable partial denture (RPD) wearers and 50 fixed partial denture (FPD) wearers. Participants were aged between 35 and 65 years, and all had been wearing their prostheses for at least one year. Periodontal health was evaluated using clinical parameters such as plaque index (PI), gingival index (GI), probing depth (PD), and clinical attachment level (CAL). Data were analyzed using the independent t-test for intergroup comparisons, with a significance level set at $p<0.05$.

Results:

The mean plaque index (PI) was significantly higher in RPD wearers (2.1 ± 0.3) compared to FPD wearers (1.6 ± 0.2) ($p=0.02$). Similarly, the gingival index (GI) showed a statistically significant difference between RPD (1.9 ± 0.4) and FPD wearers (1.3 ± 0.3) ($p=0.01$). Probing depths (PD) were also deeper in RPD patients (3.5 ± 0.5 mm) than in FPD patients (2.8 ± 0.4 mm) ($p=0.03$). The clinical attachment level (CAL) was worse in RPD patients (4.0 ± 0.6 mm) compared to FPD patients (3.2 ± 0.5 mm) ($p=0.04$).

Conclusion:

The findings indicate that removable partial dentures have a more adverse impact on periodontal health compared to fixed partial dentures. Regular periodontal evaluation and maintenance are essential for patients with removable dentures to minimize periodontal complications.

Keywords: Periodontal health, removable partial dentures, fixed partial dentures, plaque index, gingival index, probing depth, clinical attachment level.

Introduction:

Periodontal health is a key factor in maintaining oral function, comfort, and overall prosthetic success in patients with partial edentulism. Both fixed partial dentures (FPDs) and removable partial dentures (RPDs) are widely used to replace missing teeth, but their impact on periodontal tissues has been a topic of concern. Prosthetic appliances can influence plaque accumulation, increase gingival inflammation, and potentially lead to periodontal destruction if not properly maintained (1,2).

RPDs, in particular, have been associated with increased plaque retention due to the presence of clasps and the interaction with soft tissues, which may affect periodontal health negatively (3). Studies have suggested that RPD wearers are more prone to higher plaque indices, gingival inflammation, and probing depths compared to those with FPDs (4). FPDs, on the other hand, are believed to have a less detrimental impact on periodontal health due to their more stable and integrated design, which may allow better oral hygiene (5,6).

The purpose of this study is to compare the periodontal health of patients wearing removable and fixed partial dentures, focusing on key periodontal parameters such as plaque index (PI), gingival index (GI), probing depth (PD), and clinical attachment level (CAL). Understanding the differences in periodontal outcomes between these two prosthetic modalities is essential for guiding clinicians in prosthetic treatment planning and post-placement maintenance protocols.

Materials and Methods:

This cross-sectional study was conducted at the Department of Prosthodontics and Periodontology, involving 100 partially edentulous patients, divided into two groups: 50 patients using removable partial dentures (RPD group) and 50 patients using fixed partial dentures (FPD group). Ethical approval was obtained from the institutional review board, and written informed consent was collected from all participants before inclusion.

Inclusion Criteria:

- Partially edentulous patients aged between 35 and 65 years.
- Patients who had been wearing either RPD or FPD for at least one year.
- Patients with no systemic conditions affecting periodontal health (e.g., diabetes, immunodeficiency).

Exclusion Criteria:

- Patients with poor oral hygiene compliance.
- Those who had undergone periodontal treatment within the last six months.
- Patients on medications affecting periodontal health (e.g., immunosuppressants, bisphosphonates).
- Smokers.

Clinical Examination: Periodontal health was assessed by a single calibrated examiner using the following clinical parameters:

1. **Plaque Index (PI):** Evaluated according to the Silness and Löe plaque index, which scores plaque accumulation on a scale of 0 to 3.
2. **Gingival Index (GI):** Assessed using the Löe and Silness gingival index, which measures gingival inflammation on a scale of 0 to 3.
3. **Probing Depth (PD):** Measured at six sites per tooth (mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual, and disto-lingual) using a periodontal probe.
4. **Clinical Attachment Level (CAL):** Measured using a periodontal probe, from the cementoenamel junction (CEJ) to the base of the pocket.

Each patient's full-mouth periodontal examination was performed, including all remaining teeth. For RPD wearers, particular attention was given to abutment teeth.

Data Collection and Statistical Analysis: The data were collected and tabulated using Microsoft Excel. Statistical analysis was performed using SPSS software (version 23.0). Descriptive statistics were generated for demographic data, including means and standard deviations for the clinical parameters. The independent t-test was used to compare the periodontal health parameters between the RPD and FPD groups. Statistical significance was set at $p<0.05$.

Results:

The study included a total of 100 participants, with 50 removable partial denture (RPD) wearers and 50 fixed partial denture (FPD) wearers. The mean age of the participants was 52.4 ± 8.6 years in the RPD group and 50.2 ± 7.9 years in the FPD group. There was no significant difference in age between the two groups ($p=0.45$). The results for periodontal health parameters are summarized in Table 1.

Table 1: Comparison of Periodontal Health Parameters Between RPD and FPD Wearers

Parameter	RPD Group (Mean ± SD)	FPD Group (Mean ± SD)	p-value
Plaque Index (PI)	2.1 ± 0.3	1.6 ± 0.2	0.02*
Gingival Index (GI)	1.9 ± 0.4	1.3 ± 0.3	0.01*
Probing Depth (PD) (mm)	3.5 ± 0.5	2.8 ± 0.4	0.03*
Clinical Attachment Level (CAL) (mm)	4.0 ± 0.6	3.2 ± 0.5	0.04*

*p-value < 0.05 indicates statistically significant difference.

Plaque Index (PI):

The mean PI for RPD wearers was 2.1 ± 0.3, significantly higher than that of FPD wearers, who had a mean PI of 1.6 ± 0.2 (p=0.02). This indicates greater plaque accumulation in the RPD group.

Gingival Index (GI):

The mean GI in the RPD group was 1.9 ± 0.4, while in the FPD group, it was 1.3 ± 0.3. This difference was statistically significant (p=0.01), suggesting more gingival inflammation in RPD wearers.

Probing Depth (PD):

The mean probing depth for the RPD group was 3.5 ± 0.5 mm, which was significantly greater than the mean PD of 2.8 ± 0.4 mm in the FPD group (p=0.03).

Clinical Attachment Level (CAL):

The mean CAL for the RPD group was 4.0 ± 0.6 mm, compared to 3.2 ± 0.5 mm in the FPD group, and this difference was statistically significant (p=0.04). This indicates greater periodontal attachment loss in RPD wearers.

Overall, the RPD group demonstrated poorer periodontal health compared to the FPD group across all parameters, with statistically significant differences noted in plaque accumulation, gingival inflammation, probing depths, and attachment levels.

Discussion:

The present study assessed the periodontal health of patients using removable partial dentures (RPDs) and fixed partial dentures (FPDs), revealing that RPD wearers exhibited significantly poorer periodontal health across all evaluated parameters, including plaque index (PI), gingival index (GI), probing depth (PD), and clinical attachment level (CAL). These findings are consistent with previous studies that have demonstrated a higher prevalence of periodontal disease in patients with RPDs compared to those with FPDs (1,2).

Plaque accumulation was significantly higher in the RPD group, which can be attributed to the design of RPDs, particularly the presence of clasps and connectors that may retain more plaque and make it difficult for patients to maintain adequate oral hygiene (3). This is in agreement with Walton et al. (4), who reported that patients with RPDs generally have higher plaque levels compared to those with fixed prostheses. The design and material of RPDs can increase plaque retention, especially around abutment teeth, leading to gingival inflammation.

The gingival index (GI) was also significantly higher in RPD wearers, reflecting a greater degree of gingival inflammation. Gingival irritation in RPD users may result from both increased plaque retention and mechanical trauma caused by the movement of the prosthesis during function (5). These results align with the findings of Bergman et al. (6), who reported a higher incidence of gingival inflammation among RPD users. FPDs, being more stable, allow better hygiene access and less gingival irritation, which may account for the lower GI scores observed in this group.

Increased probing depths (PD) and clinical attachment loss (CAL) were observed in the RPD group, indicating more advanced periodontal deterioration compared to the FPD group. This is consistent with previous research showing that the mechanical forces exerted by RPDs can negatively affect the periodontal tissues of abutment teeth (7). Moreover, the movement of the RPD during function can lead to microtrauma, further exacerbating periodontal breakdown (8). In contrast, FPDs are more rigid and better distributed across the abutments, minimizing traumatic forces and subsequent attachment loss (9).

The results of this study emphasize the need for frequent periodontal evaluations and maintenance in RPD users to prevent the onset or progression of periodontal disease. These patients should be instructed on proper oral hygiene practices and encouraged to attend regular professional cleanings to manage plaque accumulation and gingival inflammation (10-12). Conversely, FPDs, while having a lesser impact on periodontal health, should still be monitored for potential long-term effects, especially if oral hygiene is not maintained.

Limitations:

This study has some limitations. The cross-sectional design prevents the establishment of a cause-effect relationship

between denture type and periodontal health. Longitudinal studies with a larger sample size would be beneficial to confirm these findings and evaluate the long-term periodontal effects of both RPDs and FPDs.

Conclusion:

This study demonstrates that removable partial dentures (RPDs) have a more detrimental impact on periodontal health compared to fixed partial dentures (FPDs), with higher levels of plaque accumulation, gingival inflammation, and greater probing depths and attachment loss. Regular periodontal monitoring and proper oral hygiene practices are crucial for RPD wearers to minimize periodontal complications. FPDs, while generally less harmful to periodontal tissues, also require consistent care to maintain long-term oral health.

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