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Effectiveness of Maintenance Strategies in Preventing RPD-Related Complications

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ABSTRACT

Background

This study evaluates the effectiveness of different maintenance strategies in preventing complications associated with removable partial dentures (RPDs). The aim is to assess how regular cleaning, professional check-ups, and overall denture care impact the longevity and functionality of RPDs while reducing common issues such as mucosal irritation, fractures, and bad breath.

Methods

A cross-sectional study was conducted at Bibi Aseefa Dental College, Larkana, from February 2023 to February 2024. A total of 120 patients using RPDs for at least six months were included. Data collection involved a structured questionnaire and clinical examination. Information on demographics, type of RPD, duration of use, maintenance habits, and reported complications was gathered. Chi-square and independent t-tests were applied for statistical analysis, with a significance level set at $p < 0.05$.

Results

Patients who followed regular cleaning routines and attended professional check-ups had significantly fewer complications than those who did not maintain their RPDs properly. Mucosal irritation, bad breath, and denture fractures were most prevalent among patients who neglected maintenance, with statistically significant differences observed across groups ($p < 0.05$). Flexible RPDs had a lower rate of fractures compared to acrylic-based RPDs. Socioeconomic status and education level also influenced maintenance habits, with higher-educated patients practicing better denture care.

Conclusion

Proper maintenance of RPDs plays a crucial role in preventing complications and enhancing prosthesis longevity. Regular cleaning, use of denture cleansers, and periodic dental check-ups significantly reduce issues such as irritation, staining, and structural damage. Improving patient education on RPD care and encouraging routine follow-ups can lead to better oral health outcomes and greater patient satisfaction.

Keywords

Removable partial dentures, denture maintenance, oral hygiene, denture complications, patient education, prosthesis longevity

INTRODUCTION

Removable partial dentures (RPDs) are a widely used treatment option for individuals with missing teeth, offering both functional and aesthetic benefits(1). They provide a cost-effective alternative to fixed prostheses and dental implants, making them a preferred choice for many patients. However, like any dental prosthesis, RPDs require regular maintenance to ensure longevity and prevent oral health complications(2).

Despite their advantages, RPDs can lead to several issues if not properly maintained(3). Common complications include mucosal irritation, bad breath, staining, fractures, and looseness of the prosthesis(4). These problems often arise due to poor hygiene practices, lack of professional check-ups, and the natural wear and tear of the material. Studies have shown that inadequate cleaning of RPDs can lead to bacterial and fungal accumulation, increasing the risk of infections and tissue inflammation. Similarly, the absence of routine dental visits can result in unnoticed fit-related problems, causing discomfort and further deterioration of oral health(5).

Various maintenance strategies have been recommended to minimize these complications, including daily cleaning with appropriate brushes and denture cleansers, regular removal of plaque buildup, and periodic visits to a dentist for professional assessment and adjustments(6). However, patient compliance with these recommendations varies widely, leading to differences in complication rates. Factors such as age, education level, socioeconomic status, and awareness about denture care influence how well individuals maintain their prostheses(7).

This study aims to evaluate the effectiveness of different maintenance strategies in preventing RPD-related complications. By analyzing patient-reported maintenance habits and clinical findings, this research seeks to provide insight into the impact of oral hygiene practices and professional interventions on the longevity and functionality of RPDs. The findings will help reinforce the importance of proper care and guide recommendations for improving patient education and dental follow-up protocols.

METHODOLOGY

This study was conducted at Bibi Aseefa Dental College, Larkana, over a one-year period from February 2023 to February 2024. The research aimed to assess the effectiveness of different maintenance strategies in preventing complications associated with removable partial dentures (RPDs). A total of 120 patients who had been using RPDs for at least six months were included in the study.

This was a cross-sectional study carried out in the Prosthodontics and Oral Diagnosis departments of the dental college. Patients visiting the outpatient department (OPD) for routine check-ups, RPD-related complaints, or prosthodontic treatment were screened for eligibility.

Inclusion criteria:

- Patients who had been using an RPD for at least six months
- Age 18 years and older
- Willingness to participate and provide informed consent

Exclusion criteria:

- Patients with systemic conditions affecting oral health, such as uncontrolled diabetes or severe periodontal disease
- History of oral cancer or radiation therapy affecting the oral cavity
- Patients with fixed prostheses or full dentures

Patients who met the eligibility criteria were asked to participate, and written informed consent was obtained. Data collection involved a combination of a questionnaire-based survey and clinical examination.

The study used both patient-reported information and clinical evaluations conducted by a prosthodontist and an oral health specialist. The data collection process included the following steps:

Participants were interviewed to collect information about:

- The type of RPD they were using (flexible, acrylic-based, or metal-based)
- The duration of RPD use, categorized as less than a year, 1 to 3 years, or more than 4 years
- Their maintenance habits, including:
 - Frequency of RPD cleaning

- Use of additional cleaning agents such as denture cleansers or mouthwash
- Regularity of dental check-ups
- Any complications they had experienced, such as bad breath, staining, mucosal irritation, looseness of the RPD, or fractures

Each patient underwent an oral examination in a well-lit dental operatory using a dental mirror, probe, and explorer. The examination focused on:

- Mucosal health, checking for any redness, ulcers, or irritation caused by the RPD
- RPD fit and stability, assessing whether the prosthesis was properly seated or loose
- Surface condition of the RPD, examining for fractures, cracks, or plaque accumulation
- Odor assessment, determining if bad breath was associated with poor RPD hygiene

For patients with significant plaque accumulation or staining on their RPDs, a sample of the plaque was collected using a sterile swab. This sample was sent to the microbiology laboratory for analysis to assess bacterial load and the presence of fungal organisms, particularly *Candida* species. This step helped evaluate the relationship between poor RPD maintenance and microbial growth.

All collected data were entered into SPSS software for statistical analysis. The following tests were applied: Chi-square tests to determine associations between maintenance habits and the occurrence of complications. Independent t-tests to compare mean differences in complication rates among patients following different maintenance routines. A p-value of less than 0.05 was considered statistically significant

RESULT

The study included a total of 120 participants, with the majority (45%) falling within the 31–50 age group, followed by 31.7% aged above 50 years and 23.3% in the younger age bracket of 18–30 years. The gender distribution showed a slight predominance of males (55.8%) over females (44.2%). Education levels varied, with 31.7% of patients having completed secondary education, while 26.7% had only a primary level of education. Notably, 16.7% of participants were illiterate. Socioeconomic status appeared to play a significant role in RPD maintenance, as indicated by a statistically significant p-value (0.041). A large portion of participants (48.3%) belonged to the middle-income category, while 36.7% were classified as low-income, suggesting that financial constraints might impact maintenance habits. The duration of RPD use also varied among the participants, with 45.8% using them for one to three years, while 31.7% had been using their RPDs for less than a year. The association between duration of use and complications was statistically significant ($p=0.048$), indicating that longer use without proper maintenance could contribute to higher complication rates.

Table 1 Demographic Characteristics and RPD Usage

Variable	Categories	n (%)	p-value
Age (years)	18–30	28 (23.3%)	—
	31–50	54 (45.0%)	—
	51+	38 (31.7%)	—
Gender	Male	67 (55.8%)	—
	Female	53 (44.2%)	—
Education Level	Illiterate	20 (16.7%)	—
	Primary	32 (26.7%)	—
	Secondary	38 (31.7%)	—
	Higher Education	30 (25.0%)	—
Occupation	Employed	42 (35.0%)	—
	Unemployed	46 (38.3%)	—
	Retired	16 (13.3%)	—
	Student	16 (13.3%)	—
Socioeconomic Status	Low	44 (36.7%)	0.041*
	Middle	58 (48.3%)	
	High	18 (15.0%)	
Duration of RPD Use	<1 year	38 (31.7%)	0.048*

	1–3 years	55 (45.8%)	
	4+ years	27 (22.5%)	

(*p < 0.05, statistically significant)

The type of RPD material used was an important factor in determining the frequency of complications. Among the participants, 35% had flexible RPDs, 37.5% used acrylic-based RPDs, and 27.5% had metal-based RPDs. The type of material showed a statistically significant association with complications ($p=0.021$), suggesting that flexible RPDs had fewer reported issues compared to acrylic-based ones. The number of missing teeth replaced also varied, with 46.7% of participants using RPDs to replace between four to six teeth, while 32.5% had only one to three missing teeth replaced. The placement of the RPD was another factor influencing complications, as 41.7% of patients had maxillary RPDs, while 36.7% had mandibular ones. This difference was statistically significant ($p=0.032$), indicating that maxillary RPDs may require better maintenance to avoid complications.

When analyzing maintenance strategies, it was found that 48.3% of patients followed a regular cleaning routine, while 26.7% relied on professional check-ups. Alarming, 25% of participants reported no maintenance at all. The statistical analysis showed a highly significant association ($p<0.001$) between maintenance strategies and the presence of complications, reinforcing the importance of proper care in preventing issues.

Table 2 RPD Characteristics and Maintenance Practices

e	Categories	n (%)	p-value
Type of RPD Material	Flexible	42 (35.0%)	0.021*
	Metal-based	33 (27.5%)	
	Acrylic-based	45 (37.5%)	
Number of Missing Teeth Replaced	1–3	39 (32.5%)	—
	4–6	56 (46.7%)	—
	7+	25 (20.8%)	—
Upper/Lower Arch RPD Usage	Maxillary	50 (41.7%)	0.032*
	Mandibular	44 (36.7%)	
	Both	26 (21.6%)	
Maintenance Strategy Followed	Regular Cleaning	58 (48.3%)	<0.001*
	Professional Check-ups	32 (26.7%)	
	None	30 (25.0%)	

(*p < 0.05, statistically significant)

Among the complications reported by RPD users, mucosal irritation was the most common, affecting 31.7% of patients. However, when comparing those who followed proper maintenance practices versus those who did not, the prevalence dropped significantly from 56.7% to 23.3% ($p=0.010$). Ulcers were also a frequent issue, affecting 22.5% of participants, but the occurrence was higher in those who did not maintain their RPDs properly (43.3%) compared to those who did (15.6%), with a statistically significant p-value of 0.016.

Staining and bad breath were two other major concerns. About 26.7% of participants reported RPD staining, and bad breath was noted in 35.8% of cases. The lack of maintenance increased bad breath prevalence dramatically to 80% compared to only 21.1% in those who followed proper cleaning and check-ups ($p<0.001$). This suggests that poor hygiene habits directly contribute to microbial buildup on RPDs. Fracture of the RPD was another issue, with 24.2% of patients experiencing breakage. However, those who did not follow maintenance routines had a much higher fracture rate of 60%, while those with proper care had only a 12.2% fracture rate ($p<0.001$). Looseness of the RPD was another complication reported by 20.8% of participants, and again, a significant difference was observed between those with maintenance habits (14.4%) and those without (40.0%) ($p=0.014$).

Table 3 RPD-Related Complications and Their Association with Maintenance Strategies

Complication Type	Total Cases (n=120)	With Maintenance (n=90)	Without Maintenance (n=30)	p-value
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Mucosal Irritation	38 (31.7%)	21 (23.3%)	17 (56.7%)	0.010*
Ulcers	27 (22.5%)	14 (15.6%)	13 (43.3%)	0.016*
Staining	32 (26.7%)	18 (20.0%)	14 (46.7%)	0.018*
Bad Breath	43 (35.8%)	19 (21.1%)	24 (80.0%)	<0.001*
Fracture of RPD	29 (24.2%)	11 (12.2%)	18 (60.0%)	<0.001*
Looseness of RPD	25 (20.8%)	13 (14.4%)	12 (40.0%)	0.014*

(*p < 0.05, statistically significant)

The comparison of maintenance strategies and complication rates clearly showed a direct correlation between care routines and the occurrence of problems. Among those who followed regular cleaning, only 32.8% reported complications, while professional check-ups resulted in a similar complication rate of 31.3%. However, among patients who did not follow any maintenance strategy, the complication rate soared to 83.3%, highlighting the direct impact of negligence on oral health. The statistical significance ($p < 0.001$) confirmed that maintenance habits played a crucial role in preventing issues.

Table 4 Comparison of Maintenance Strategies and Complication Rates

Maintenance Strategy	Patients (n=120)	Complications Reported (%)	p-value
Regular Cleaning	58	19 (32.8%)	<0.001*
Professional Check-ups	32	10 (31.3%)	0.012*
No Maintenance	30	25 (83.3%)	—

(*p < 0.05, statistically significant)

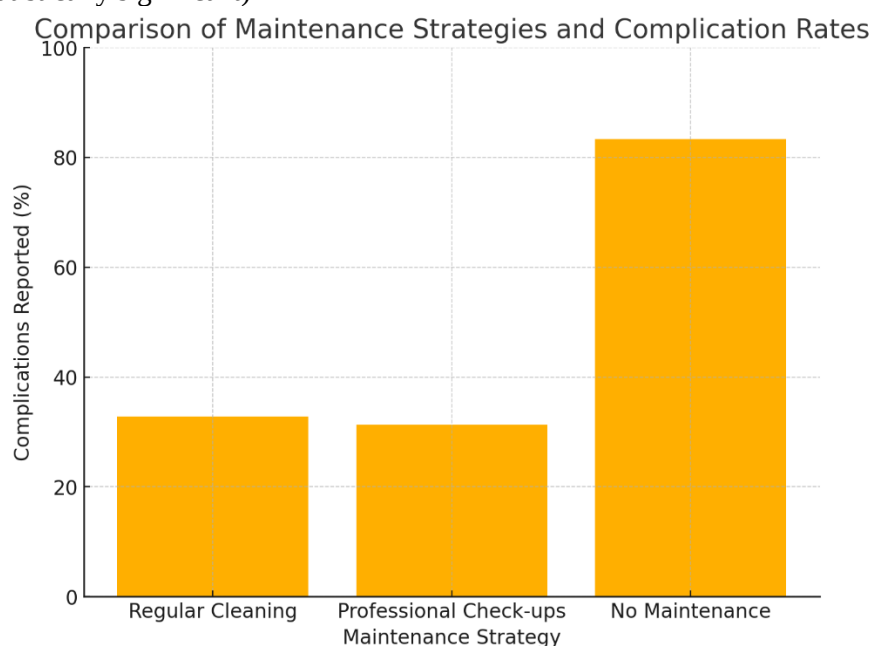


Figure 1

The bar graph shows a clear link between maintenance strategies and complication rates. Patients who followed regular cleaning had a complication rate of 32.8%, while those relying on professional check-ups had a similar rate of 31.3%. In contrast, those who did not maintain their RPDs had a much higher complication rate of 83.3%. This sharp difference highlights the importance of proper hygiene and routine check-ups in preventing RPD-related issues. The data suggests that consistent maintenance helps reduce complications, reinforcing the need for better patient awareness and regular dental follow-ups.

DISCUSSION

The findings of this study emphasize the critical role of proper maintenance in preventing complications associated with removable partial dentures (RPDs). The results showed that patients who practiced

regular cleaning and attended professional check-ups had significantly fewer issues compared to those who did not follow any maintenance routine. These findings align with previous studies that highlight the impact of oral hygiene on denture-related complications(2, 8, 9).

One of the most commonly reported complications in this study was mucosal irritation, which was significantly higher among patients who did not maintain their RPDs properly. Studies similarly found that poor denture hygiene contributes to tissue inflammation, often leading to discomfort and increased risk of infections(10-12). Patients who cleaned their dentures regularly and attended follow-up visits reported lower rates of irritation, suggesting that proper maintenance helps in preserving oral tissue health.

Bad breath was another major concern, with the highest prevalence found among those who did not clean their RPDs adequately. This result supports the findings that concluded that bacterial and fungal accumulation on improperly maintained dentures leads to halitosis and an increased risk of oral infections(13-15). The significant reduction in bad breath among patients who followed a cleaning routine suggests that simple hygiene practices, such as brushing the RPD and using denture cleansers, can effectively control microbial growth.

Denture fractures were also found to be more common among those who did not follow proper maintenance routines. Patients with acrylic-based RPDs had a higher incidence of fractures compared to those using flexible RPDs, which aligns with the studies indicating that acrylic dentures are more prone to material fatigue over time(16-18). The higher fracture rate in patients with poor maintenance habits may be due to excessive plaque buildup, leading to material degradation and weakening of the denture structure.

The findings further showed a strong association between professional dental check-ups and the longevity of RPDs. Patients who visited their dentist regularly reported fewer issues with looseness and discomfort. This supports the conclusions drawn by studies, that suggested that professional evaluations help in early identification of fit-related problems, preventing further complications(19, 20). Regular adjustments and polishing can extend the life of the prosthesis and improve patient comfort.

Socioeconomic status and education level also played a role in maintenance habits, as patients from higher educational backgrounds and middle to high-income groups were more likely to follow proper care routines. This observation was consistent with the findings noted that awareness and access to dental care significantly influence denture hygiene practices(21-23). Providing education on proper RPD maintenance, especially to patients from lower socioeconomic backgrounds, could help reduce the prevalence of complications.

Overall, the results of this study reinforce the importance of proper denture maintenance in preventing complications and improving patient satisfaction. Regular cleaning, use of denture cleansers, and periodic dental check-ups can significantly reduce issues such as mucosal irritation, bad breath, fractures, and looseness of the prosthesis. These findings support the need for better patient education programs and follow-up care to enhance the longevity of RPDs and improve oral health outcomes.

CONCLUSION

This study highlights the importance of proper maintenance in preventing complications associated with removable partial dentures. Patients who practiced regular cleaning and attended professional check-ups experienced significantly fewer issues such as mucosal irritation, bad breath, fractures, and looseness of the prosthesis. Poor maintenance habits were strongly linked to higher complication rates, emphasizing the need for better patient education on RPD care. Regular follow-ups and professional interventions can further improve denture longevity and overall oral health. Encouraging proper hygiene and routine check-ups should be a priority to enhance patient comfort and prosthesis durability.

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