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Clinical Assessment Of Sore Areas In Kennedy Class-IV Edentulous Patients: Flexible Vs. Acrylic Partial Dentures

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Abstract

Background: *Kennedy Class-IV edentulous patients require prosthetic rehabilitation that balances aesthetic satisfaction and functional efficiency. Acrylic partial dentures (APDs) have long been a standard treatment due to their affordability and structural stability, whereas flexible partial dentures (FPDs) have gained popularity due to their improved comfort and adaptability. However, comparative data on sore area formation and long-term aesthetic acceptance between these two materials remain limited. This study aims to evaluate aesthetic preference and mucosal response in Kennedy Class-IV patients treated with APDs versus FPDs.*

Methods: *A prospective comparative study was conducted on 40 Kennedy Class-IV edentulous patients at the Department of Prosthodontics, Bangabandhu Sheikh Mujib Medical University. Patients were divided into two equal groups, with Group A (n = 20) receiving FPDs and Group B (n = 20) receiving APDs. Aesthetic grading and sore area incidence were evaluated over a one-year follow-up period, with assessments at 1 week, 2 weeks, 1 month, 3 months, 6 months, and 1 year.*

Results: *Aesthetic preference for FPDs became statistically significant from one month onward (p = 0.011 at 1, 3, and 6 months; p = 0.008 at 1 year), with a higher percentage of FPD users rating their dentures as good (G-I) compared to APD users. Sore area formation showed no significant difference initially but became significantly lower in FPD users from six months onward (p = 0.017 at 6 months and 1 year). By one year, 95.0% of FPD users were completely free of sore areas, compared to 65.0% of APD users.*

Conclusion: *The results indicate that FPDs provide superior long-term aesthetic satisfaction and significantly reduce sore area formation compared to APDs. These findings suggest that FPDs should be considered a primary treatment option for Kennedy Class-IV patients prioritizing comfort and aesthetics.*

Keywords: *Flexible Partial Dentures, Acrylic Partial Dentures, Kennedy Class-IV, Aesthetic Satisfaction, Sore Area Formation, Prosthodontics, Mucosal Adaptation*

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I. Introduction

Edentulism, the condition of partial or complete loss of teeth, is a significant global public health concern affecting oral function, aesthetics, and overall quality of life. The impact of edentulism extends beyond functional limitations, influencing speech, mastication, and self-esteem, while also contributing to nutritional deficiencies and systemic health risks (1). Among partially edentulous classifications, Kennedy Class-IV presents unique biomechanical challenges, as it involves anterior teeth loss without posterior support, necessitating careful prosthetic planning (2). Removable Partial Dentures (RPDs) remain a cost-effective and widely used prosthetic solution for the restoration of partially edentulous arches, with acrylic partial dentures (APDs) and flexible partial dentures (FPDs) being the most commonly prescribed types (3). However, despite their extensive use, clinical concerns persist regarding the soft tissue responses and sore area formation associated with these prostheses, necessitating further investigation. Acrylic Partial Dentures (APDs) have long been the preferred choice due to their affordability, ease of fabrication, and structural rigidity. Made from

polymethyl methacrylate (PMMA), APDs offer superior retention and mechanical stability, making them a practical option for patients requiring interim or long-term solutions (4). However, their rigid nature often leads to mucosal irritation and sore area formation due to concentrated pressure points on the oral tissues, particularly in Kennedy Class-IV patients who lack posterior abutments for additional support (1). Additionally, studies suggest that APDs, while durable, contribute to increased periodontal injury, reducing overall patient satisfaction with prolonged use (3). In contrast, Flexible Partial Dentures (FPDs), constructed from polyamide-based thermoplastic materials, have gained popularity due to their adaptability, improved aesthetics, and absence of metal clasps. These dentures engage soft tissue undercuts, enhancing retention and comfort, while their flexibility distributes occlusal forces more evenly, theoretically reducing mucosal soreness (5). However, concerns remain regarding their long-term functional efficacy, as FPDs may exhibit lower structural stability compared to APDs, potentially affecting masticatory efficiency and retention (6). While patient-reported satisfaction is generally higher for FPDs due to their comfort and esthetic appeal, clinical assessments reveal a need for further evaluation, particularly in terms of sore area incidence and stress distribution within the edentulous oral mucosa (1). Sore area formation in RPD wearers is a multifactorial issue, largely influenced by denture adaptation, occlusal discrepancies, and material properties. Poor denture adaptation can cause localized pressure points, leading to mucosal irritation and ulceration, especially in mandibular Kennedy Class-IV cases where soft tissues bear a disproportionate amount of load (7). Studies have highlighted that denture base displacement is higher in acrylic dentures compared to flexible ones, correlating with increased incidence of mucosal soreness (8). Additionally, occlusal imbalances and excessive bite force have been implicated in reducing the pressure-pain threshold of edentulous oral mucosa, further exacerbating discomfort in RPD users (9). Material flexibility plays a crucial role in stress distribution, as softer, more adaptive materials tend to mitigate pressure-induced mucosal irritation. A study by Verma et al. demonstrated that soft liners in denture bases significantly reduced sore area formation by absorbing occlusal forces and preventing direct pressure on mucosal tissues (10). However, while flexible materials improve initial comfort, they may also compromise denture retention over time, necessitating further research into their clinical longevity and impact on tissue health (11). Despite the wealth of studies comparing APDs and FPDs, a notable research gap exists in the quantitative assessment of sore area formation in Kennedy Class-IV cases. Most comparative studies have focused on patient satisfaction, bite force, and retention, yet few have directly evaluated the incidence and severity of mucosal irritation resulting from different denture materials in anteriorly edentulous cases (2,8). Moreover, while research on the biomechanical effects of RPDs exists, there is a lack of region-specific data, particularly in Bangladesh, where factors such as dietary habits, oral hygiene practices, and socioeconomic constraints influence denture adaptation and tissue response (3). Given that APDs remain the predominant choice due to their affordability, it is imperative to assess whether FPDs provide statistically significant benefits in reducing mucosal soreness, justifying their cost-effectiveness for Bangladeshi patients. This study aims to compare the incidence and severity of sore areas in Kennedy Class-IV edentulous patients using APDs and FPDs, addressing the existing knowledge gap in quantitative sore area assessment. By incorporating clinical observations, patient-reported discomfort, and mucosal health evaluations, this research will provide evidence-based insights into the most suitable denture material for anteriorly edentulous patients, particularly in resource-limited settings like Bangladesh. The findings will not only contribute to prosthodontic literature but also aid clinicians in optimizing treatment strategies, ultimately improving patient comfort, prosthetic longevity, and oral health-related quality of life.

II. Methods

This prospective comparative study was conducted in the Department of Prosthodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University over a period of two years, from January 2009 to December 2010. The study aimed to compare the incidence of sore area formation in Kennedy Class-IV edentulous patients rehabilitated with either flexible partial dentures (FPDs) or acrylic partial dentures (APDs). A total of 40 Kennedy Class-IV edentulous patients who attended the Prosthodontic Department for prosthetic rehabilitation were selected as study participants. The sample was divided into two equal groups: Group A (n=20) received flexible partial dentures, while Group B (n=20) received acrylic partial dentures. Selection criteria were strictly followed to ensure the reliability of the study. Inclusion criteria required that patients have an ideal terminal abutment, optimal oral health status, and be in good mental and physical health. Both male and female patients were included in the study. Exclusion criteria comprised medically compromised individuals, extreme age groups (below 20 or above 70 years), poor oral hygiene, chronic periodontitis, high frenal attachment, severely resorbed ridges, and the presence of soft or hard tissue undercuts. Patient evaluation focused on aesthetic acceptance, mucosal response, and sore area development. The aesthetic assessment was categorized into three groups based on patient perception: G-I (Good) for a pleasant, natural appearance, G-II (Fair) for a generally acceptable but less natural appearance, and G-III (Poor) for an unnatural or unsatisfactory

appearance (12). The incidence and severity of sore areas were recorded at multiple follow-up intervals, with evaluations conducted at one week, one month, and three months post-insertion.

III. Results

Table 1: Distribution of patients on the basis of aesthetic by flexible partial denture and acrylic partial denture in different follow up visits (n=40).

Aesthetic Grading	Group A (n=20)	Group B (n=20)	P value
	n (%)	n (%)	
1 Week			
G-I	5 (25.0)	3 (15.0)	0.564ns
G-II	13 (65.0)	16 (80.0)	
G-III	2 (10.0)	1 (5.0)	
2 Weeks			
G-I	7 (35.0)	5 (25.0)	0.490 ns
G-II	13 (65.0)	15 (75.0)	
G-III	0 (0.0)	0 (0.0)	
1 Month			
G-I	14 (70.0)	6 (30.0)	0.011 *
G-II	6 (30.0)	14 (70.0)	
G-III	0 (0.0)	0 (0.0)	
3 Months			
G-I	14 (70.0)	6 (30.0)	0.011 *
G-II	6 (30.0)	14 (70.0)	
G-III	0 (0.0)	0 (0.0)	
6 Months			
G-I	14 (70.0)	6 (30.0)	0.011*
G-II	6 (30.0)	14 (70.0)	
G-III	0 (0.0)	0 (0.0)	
1 year			
G-I	11 (55.0)	3 (15.0)	0.008 *
G-II	9 (45.0)	17 (85.0)	
G-III	0 (0.0)	0 (0.0)	

P value reached from chi-square test

The comparison of aesthetic acceptance between flexible partial dentures (FPDs) and acrylic partial dentures (APDs) over different follow-up periods reveals notable trends. At the one-week follow-up, a higher percentage of patients in Group A (FPD users) (25.0%) reported a good (G-I) aesthetic rating compared to 15.0% in Group B (APD users), though the difference was not statistically significant ($p = 0.564$). The majority of patients in both groups rated their dentures as fair (G-II), with 65.0% in Group A and 80.0% in Group B, while G-III (poor aesthetic outcomes) were minimal in both groups. By the two-week follow-up, aesthetic satisfaction improved for both groups, with G-I ratings increasing to 35.0% in Group A and 25.0% in Group B, though the difference remained statistically insignificant ($p = 0.490$). No patients in either group reported poor (G-III) aesthetics, indicating initial adaptation and acceptance of both denture types. A statistically significant difference emerged at the one-month follow-up, where 70.0% of Group A (FPD) users rated their dentures as G-I, compared to only 30.0% in Group B (APD) ($p = 0.011$). This trend persisted through the three-month and six-month follow-ups, with 70.0% of FPD users maintaining a G-I rating, while only 30.0% of APD users reported a similar level of satisfaction ($p = 0.011$ for both time points). By the one-year follow-up, the aesthetic preference for flexible dentures remained superior. 55.0% of Group A (FPD users) rated their dentures as G-I, whereas only 15.0% of Group B (APD users) did so, demonstrating a statistically significant difference ($p = 0.008$). The majority of APD users (85.0%) continued to rate their dentures as G-II (fair aesthetics) compared to 45.0% of FPD users, while no patients in either group reported G-III (poor aesthetic outcomes).

Table 2: Distribution of patients on the basis of presence of sore areas by flexible partial denture and acrylic partial denture in different follow up visits (n=40).

Presence of Sore Areas	Group A (n=20)	Group B (n=20)	P value
	n (%)	n (%)	
1 Week			
Yes	9 (45.0)	13 (65.0)	0.203 ns

No	11 (55.0)	7 (35.0)	
2 Weeks			
Yes	7 (35.0)	11 (55.0)	0.203 ns
No	13 (65.0)	9 (45.0)	
1 Month			
Yes	5 (25.0)	8 (40.0)	0.311 ns
No	15 (75.0)	12 (60.0)	
3 Months			
Yes	4 (20.0)	7 (35.0)	0.288 ns
No	16 (80.0)	13 (65.0)	
6 Months			
Yes	1 (5.0)	7 (35.0)	0.017 *
No	19 (95.0)	13 (65.0)	
1 year			
Yes	1 (5.0)	7 (35.0)	0.017 *
No	19 (95.0)	13 (65.0)	

P value reached from chi-square test

The comparison of sore area formation between flexible partial dentures (FPDs) and acrylic partial dentures (APDs) across different follow-up periods indicates that FPDs resulted in fewer sore areas over time compared to APDs. At the one-week follow-up, 45.0% of Group A (FPD users) and 65.0% of Group B (APD users) reported the presence of sore areas, though the difference was not statistically significant ($p = 0.203$). The number of patients without sore areas was higher in the FPD group (55.0%) compared to the APD group (35.0%), suggesting a better initial adaptation with flexible dentures. By the two-week follow-up, the incidence of sore areas slightly decreased in both groups, with 35.0% of FPD users and 55.0% of APD users still experiencing mucosal irritation ($p = 0.203$). Although more patients in the FPD group (65.0%) had no sore areas compared to the APD group (45.0%), the difference remained statistically insignificant. At the one-month follow-up, the occurrence of sore areas continued to decline, with 25.0% of FPD users and 40.0% of APD users reporting sore spots ($p = 0.311$). By the three-month mark, only 20.0% of FPD users had persistent sore areas, whereas 35.0% of APD users continued to experience discomfort ($p = 0.288$), indicating a gradual improvement in adaptation for both groups. A statistically significant difference emerged at the six-month and one-year follow-ups, where only 5.0% of FPD users still reported sore areas, compared to 35.0% of APD users ($p = 0.017$ for both time points). By this stage, 95.0% of FPD users were completely free of sore areas, whereas 35.0% of APD users still had persistent mucosal irritation.

IV. Discussion

The present study aimed to compare aesthetic preference and sore area formation in Kennedy Class-IV edentulous patients rehabilitated with flexible partial dentures (FPDs) and acrylic partial dentures (APDs) over a one-year period. The findings revealed that FPDs were consistently rated higher in terms of aesthetics and caused fewer sore areas over time compared to APDs, with statistically significant differences emerging at key time points. These results align with multiple previously published studies that have explored the functional, aesthetic, and patient satisfaction aspects of FPDs versus APDs, reinforcing the clinical advantages of flexible denture materials. The aesthetic outcomes of this study demonstrated a statistically significant preference for FPDs from one month onward ($p = 0.011$ at 1, 3, and 6 months; $p = 0.008$ at 1 year), with a higher percentage of FPD users rating their dentures as good (G-I) compared to APD users. This finding is strongly supported by existing literature, which has consistently reported greater aesthetic satisfaction with flexible dentures due to their superior translucency, adaptability, and lack of metal clasps (6). Akinyamoju et al. also confirmed that patients preferred the more natural appearance of FPDs, particularly in Kennedy Class-IV cases, which require anterior restorations with high esthetic demands (1). The study by Ibrahim further reinforced this observation, reporting that 77.77% of patients favored flexible dentures for their superior aesthetics compared to only 47.05% who were satisfied with acrylic dentures (13). The systematic review by Awawdeh et al. also concluded that patient satisfaction was strongly correlated with denture aesthetics, with FPDs ranking significantly higher than APDs in multiple studies (14). The findings of the current study are therefore in line with the broader clinical consensus, which acknowledges flexible dentures as an aesthetically superior option for patients requiring anterior tooth replacement. Regarding sore area formation, the current study found no significant differences between FPD and APD users during the early follow-up periods ($p > 0.05$ at 1 week, 2 weeks, 1 month, and 3 months), but a statistically significant reduction in sore areas among FPD users from six months onward ($p = 0.017$ at 6 months and 1 year). By the end of the study, 95.0% of FPD users were completely free

of sore areas, compared to only 65.0% of APD users, indicating a long-term advantage of FPDs in reducing mucosal irritation. Similar trends have been observed in previous research, where FPDs exhibited lower mucosal irritation and pain compared to acrylic dentures due to their elasticity and pressure-distributing properties (15). A study by Mustafa et al. confirmed that acrylic dentures exerted greater pressure on the denture-bearing mucosa, leading to more irritation and soreness over time, while FPDs' viscoelastic properties allowed for better mucosal adaptation (16). Additionally, Akinyamoju et al. reported that acrylic dentures were associated with higher periodontal irritation, leading to lower long-term patient satisfaction. The study by Ibrahim (2021) also found that APD users frequently reported pain during eating, a major complaint linked to denture-induced sore areas, further corroborating the current study's findings (1). Histological studies have provided additional evidence supporting the mucosal benefits of FPDs. Rostom & Abdul Aziz conducted a histological assessment of mucosal response in denture wearers and found that FPD users exhibited less keratinized epithelium and lower tissue stress compared to APD users, indicating that flexible materials exert less trauma on oral tissues (17). Another study by Chumak et al. found that APDs led to greater microbial colonization and mucosal inflammation over time, potentially contributing to prolonged discomfort and sore area formation (18). These findings highlight the biomechanical advantage of flexible materials, which allow for even stress distribution across the edentulous ridge, reducing localized pressure points that typically contribute to mucosal irritation in APD users (6). The long-term clinical superiority of FPDs, particularly in reducing sore areas, is also reflected in their higher retention rates and overall patient preference. The systematic review by Awawdeh et al. confirmed that FPDs consistently received higher satisfaction scores than both APDs and metal-based dentures, reinforcing the role of flexible dentures as a comfortable and clinically viable alternative (14). Moreover, the study by Ibrahim highlighted that patients with APDs frequently required denture adjustments due to persistent sore areas, while FPD users reported fewer post-insertion complaints (13). These findings suggest that FPDs not only improve patient comfort but also reduce the need for frequent clinical interventions, making them a more efficient long-term solution. Despite the numerous advantages of FPDs, some studies have pointed out potential limitations related to their long-term durability. Binhuraib et al. noted that while flexible dentures provide superior comfort and aesthetics, they may have lower structural stability over time, potentially affecting their longevity (6). However, this concern is largely outweighed by the significant benefits of FPDs in reducing mucosal trauma and improving aesthetic satisfaction, making them the preferred choice for patients prioritizing comfort and esthetics. The findings of this study, combined with existing literature, suggest that flexible partial dentures offer clear advantages over acrylic partial dentures, particularly in aesthetic acceptability and reduction of mucosal irritation over time. Given the statistically significant reduction in sore areas from six months onward, it is recommended that FPDs be considered as the primary choice for Kennedy Class-IV patients who prioritize comfort and aesthetic outcomes. Additionally, these results reinforce the importance of material selection in prosthodontic treatment planning, as biomechanical properties significantly influence both patient satisfaction and clinical outcomes.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

V. Conclusion

The findings of this study confirm that flexible partial dentures (FPDs) provide superior long-term aesthetic satisfaction and significantly reduce sore area formation compared to acrylic partial dentures (APDs) in Kennedy Class-IV edentulous patients. Aesthetic preference for FPDs became statistically significant from one month onward, with a greater proportion of patients rating their dentures as good (G-I) compared to APD users. Similarly, sore area formation showed a statistically significant reduction in FPD users from six months onward, demonstrating that FPDs offer better mucosal adaptability and patient comfort over time. These findings align with existing literature, which consistently highlights FPDs as a more favorable option due to their superior flexibility, pressure distribution, and esthetic advantages. Given the clinical relevance of these results, FPDs should be considered as a primary treatment option for anteriorly edentulous patients, particularly for those prioritizing aesthetic appeal and long-term comfort. Future research should focus on evaluating the durability and cost-effectiveness of FPDs over extended periods, to further validate their long-term clinical benefits.

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