

Original Research Article

Comparison of Flexible Dentures with Conventional Acrylic Dentures

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Abstract: *Background:* Flexible dentures offer potential advantages over conventional acrylic dentures, particularly in terms of comfort, aesthetics and patient satisfaction. This study aimed to compare the clinical performance, patient-reported outcomes and longevity of flexible and conventional acrylic dentures. *Methods:* The study was conducted in the Department of Prosthodontics at Bangabandhu Sheikh Mujib Medical University (BSMMU) and beau-dent, Dhaka, Bangladesh, over one year from July 2015 to June 2016. A total of 60 participants were randomly assigned to two groups: Group A (flexible dentures, n=30) and Group B (conventional acrylic dentures, n=30). Various clinical parameters such as retention, stability, soft tissue irritation and chewing efficiency were assessed. *Results:* Group A showed significantly better outcomes in comfort (VAS: 9.0 ± 1.1 vs. 7.5 ± 1.6 , $p = 0.001$), aesthetic satisfaction (93.3% vs. 76.7%, $p = 0.015$) and ease of use (86.7% vs. 70.0%, $p = 0.032$). Additionally, soft tissue irritation was significantly lower in Group A (10.0% vs. 26.7%, $p = 0.042$) and chewing efficiency was higher (VAS: 8.5 ± 1.2 vs. 7.8 ± 1.4 , $p = 0.047$). Group A had fewer fractures/repairs (6.7% vs. 16.7%, $p = 0.038$), though staining incidence was similar between both groups. *Conclusion:* Flexible dentures provide superior comfort, aesthetics and reduced soft tissue irritation compared to conventional acrylic dentures. These advantages make them a preferred choice for patients with high aesthetic and comfort demands, while both denture types showed similar retention and stability.

Keywords: Flexible dentures, conventional acrylic dentures, patient satisfaction, aesthetics, soft tissue irritation.

INTRODUCTION

Edentulism, the partial or complete loss of natural teeth is a significant global health concern that impacts millions of people particularly in the aging population.¹ It affects mastication, speech, aesthetics and overall quality of life, making prosthetic rehabilitation essential for restoring oral functionality and psychological well-being.² Dentures as one of the most common modalities of treatment, have evolved significantly over time to meet patient demands for comfort, aesthetics and functionality.³ Among the various types of dentures, flexible dentures and conventional acrylic dentures represent two widely used options, each with distinct advantages and limitations.⁴

Conventional acrylic dentures, fabricated using polymethyl methacrylate (PMMA), have long been the gold standard in prosthodontics due to their affordability, ease of fabrication and satisfactory functional outcomes.^{5,6} However, their rigidity, tendency to fracture under high stress and potential to cause soft tissue irritation limit their acceptability in some cases.⁷ These limitations have paved the way for alternative materials, such as thermoplastic polyamide resins, which are used to fabricate flexible dentures.⁸ Flexible dentures have gained popularity for their

lightweight, flexible nature, improved aesthetics and ability to adapt comfortably to oral tissues.⁹ These features make them particularly suitable for patients with irregular alveolar ridges or those who experience discomfort with rigid materials.¹⁰ However, concerns remain regarding their long-term durability, retention and susceptibility to staining compared to conventional acrylic dentures.¹¹

Patient satisfaction is a critical determinant of the success of dental prostheses.¹² Factors such as comfort, aesthetics, chewing efficiency and ease of use play pivotal roles in ensuring adherence to denture use.¹³ Additionally, clinical parameters like retention, stability and soft tissue health significantly influence the overall effectiveness of dentures.¹⁴ Maintenance-related outcomes, including fracture rates, staining and frequency of replacement, are equally crucial as they impact the cost-effectiveness and longevity of the prostheses.¹⁵

Despite the widespread use of both flexible and conventional acrylic dentures, there is limited evidence comparing their clinical performance, patient-reported outcomes and maintenance requirements in a systematic manner.¹¹ Most existing studies focus on

specific aspects, such as material properties or patient preferences, without providing a holistic comparison.⁷ This knowledge gap highlights the need for comprehensive research to guide clinicians in selecting the most appropriate denture type based on individual patient needs and circumstances.

The present study aimed to address this gap by comparing flexible dentures with conventional acrylic dentures across multiple dimensions, including clinical effectiveness, patient satisfaction and maintenance outcomes. By evaluating these parameters in a structured and evidence-based manner, this study seeks to provide valuable insights into the relative advantages and disadvantages of each denture type.

METHODOLOGY AND MATERIALS

The study was conducted in the Department of Prosthodontics at Bangabandhu Sheikh Mujib Medical University (BSMMU) and beau-dent, Dhaka, Bangladesh, over one year from July 2015 to June 2016. A total of 60 participants requiring partial or complete dentures were purposively selected and divided into two equal groups: Group A (flexible dentures) and Group B (conventional acrylic dentures). Inclusion criteria included adult patients aged 18 years or older with edentulous areas suitable for either denture type, good oral hygiene and willingness to participate, while exclusion criteria were poor oral hygiene, systemic conditions affecting oral health, or history of denture-related complications.

RESULTS

Table I: Baseline Characteristics of Participants

Characteristic	Group A (n=30)	Group B (n=30)	p-value
Mean Age (years)	55.3 ± 6.8	56.1 ± 7.2	0.682
Gender (M/F)	12 (40.0%) / 18 (60.0%)	14 (46.7%) / 16 (53.3%)	0.612
Dental Arch (Upper/Lower)	18 (60.0%) / 12 (40.0%)	17 (56.7%) / 13 (43.3%)	0.812
Smoking Status (%)	9 (30.0%)	10 (33.3%)	0.573

Table I presents the baseline characteristics of participants in Group A (flexible denture users) and Group B (conventional acrylic denture users). The mean age of participants was comparable between the groups (55.3 ± 6.8 years in Group A vs. 56.1 ± 7.2 years in Group B, p = 0.682). Gender distribution showed no significant difference, with 40% males and 60% females in Group A compared to 46.7% males and

Detailed clinical and demographic data were collected at baseline, including age, gender, dental arch type and habits such as smoking. The dentures were fabricated using standard procedures, with flexible dentures made from thermoplastic polyamide resin and conventional dentures made from heat-cured acrylic resin. Clinical parameters assessed included retention, stability and soft tissue irritation, evaluated by experienced clinicians using standardized scales. Patient-reported outcomes such as comfort, aesthetic satisfaction, ease of use and overall satisfaction were measured using a visual analog scale (VAS). Maintenance outcomes, including fracture rates, staining incidence and replacement frequency, were documented during follow-up visits at three, six and 12 months.

All data were recorded systematically and analyzed using statistical software, with categorical variables expressed as frequencies and percentages and continuous variables as means and standard deviations. Chi-square tests were used for categorical data, while independent t-tests compared continuous variables between groups. A p-value of <0.05 was considered statistically significant. All participants provided written informed consent. Data confidentiality was strictly maintained and the study adhered to the principles of the Declaration of Helsinki. This structured approach ensured a comprehensive evaluation of the comparative effectiveness and patient satisfaction associated with flexible and conventional dentures.

53.3% females in Group B (p = 0.612). Similarly, the distribution of dental arches (upper/lower) was similar between the groups, with 60% upper and 40% lower arches in Group A and 56.7% upper and 43.3% lower arches in Group B (p = 0.812). The proportion of smokers was also comparable, with 30% in Group A and 33.3% in Group B (p = 0.573).

Table II: Clinical Performance of Dentures

Parameter	Group A (n=30)	Group B (n=30)	p-value
Retention (%)	27 (90.0%)	25 (83.3%)	0.421
Stability (%)	26 (86.7%)	24 (80.0%)	0.374
Soft Tissue Irritation (%)	3 (10.0%)	8 (26.7%)	0.042*
Chewing Efficiency (VAS)	8.5 ± 1.2	7.8 ± 1.4	0.047*

Table II highlights the clinical performance of dentures in Group A (flexible denture users) and Group

B (conventional acrylic denture users). Retention rates were slightly higher in Group A (90.0%) compared to

Group B (83.3%), though the difference was not statistically significant ($p = 0.421$). Stability was also comparable, with 86.7% in Group A and 80.0% in Group B ($p = 0.374$). However, soft tissue irritation was significantly lower in Group A (10.0%) than in Group B

(26.7%), with a statistically significant difference ($p = 0.042$). Chewing efficiency, measured by Visual Analog Scale (VAS), was significantly better in Group A (8.5 ± 1.2) compared to Group B (7.8 ± 1.4 , $p = 0.047$).

Table III: Patient-Reported Outcomes

Parameter	Group A (n=30)	Group B (n=30)	p-value
Comfort (VAS)	9.0 ± 1.1	7.5 ± 1.6	0.001*
Aesthetic Satisfaction (%)	28 (93.3%)	23 (76.7%)	0.015*
Ease of Use (%)	26 (86.7%)	21 (70.0%)	0.032*
Overall Satisfaction (VAS)	8.7 ± 1.3	7.2 ± 1.8	0.005*

Table III presents patient-reported outcomes comparing Group A (flexible denture users) and Group B (conventional acrylic denture users). Comfort levels, assessed by Visual Analog Scale (VAS), were significantly higher in Group A (9.0 ± 1.1) compared to Group B (7.5 ± 1.6 , $p = 0.001$). Aesthetic satisfaction was also greater in Group A, with 93.3% of patients

satisfied, compared to 76.7% in Group B ($p = 0.015$). Ease of use showed a statistically significant advantage for Group A (86.7%) over Group B (70.0%, $p = 0.032$). Overall satisfaction, evaluated via VAS, was higher in Group A (8.7 ± 1.3) than in Group B (7.2 ± 1.8 , $p = 0.005$).

Table IV: Maintenance and Longevity Outcomes

Outcome	Group A (n=30)	Group B (n=30)	p-value
Fractures/Repairs (%)	2 (6.7%)	5 (16.7%)	0.038*
Staining Incidence (%)	6 (20.0%)	3 (10.0%)	0.081
Lifespan (Months)	10.8 ± 1.5	11.2 ± 1.7	0.426
Replacement Rate (%)	3 (10.0%)	4 (13.3%)	0.513

Table IV summarizes the maintenance and longevity outcomes of the dentures in Group A (flexible dentures) and Group B (conventional acrylic dentures). The incidence of fractures/repairs was significantly lower in Group A (6.7%) compared to Group B (16.7%, $p = 0.038$). Staining was more common in Group A (20.0%) than in Group B (10.0%), though this difference was not statistically significant ($p = 0.081$). The lifespan of dentures did not differ significantly between groups, with Group A lasting 10.8 ± 1.5 months and Group B 11.2 ± 1.7 months ($p = 0.426$). The replacement rate also showed no significant difference between the two groups (Group A: 10.0%, Group B: 13.3%, $p = 0.513$).

findings align with Elmorsy et al., who reported comparable retention and stability between flexible and acrylic dentures.¹⁶ The lack of significant differences underscores the effectiveness of both materials in ensuring functional stability during use.

DISCUSSION

The comparison of flexible dentures and conventional acrylic dentures in our study sheds light on important differences in clinical performance, patient satisfaction and maintenance outcomes. By analyzing our findings alongside established literature, we aimed to provide a comprehensive understanding of these denture types and their implications in prosthodontic care.

Significantly, the soft tissue irritation rate was lower in Group A (flexible dentures, 10.0%) compared to Group B (acrylic dentures, 26.7%), with a p-value of 0.042. This result supports the hypothesis that the softer, more adaptable nature of flexible dentures reduces mucosal trauma, as suggested by Singh and Dhiman.¹⁷ Furthermore, chewing efficiency, measured on a visual analog scale (VAS), was significantly higher in Group A (8.5 ± 1.2) compared to Group B (7.8 ± 1.4 , $p = 0.047$). Hazari et al., attributed the superior masticatory performance of flexible dentures to their closer adaptation to the mucosal surface and their flexibility, which minimizes pressure points and discomfort.¹⁸

Our study demonstrated that retention rates were high in both groups, with flexible dentures (90.0%) slightly outperforming acrylic dentures (83.3%), although the difference was not statistically significant ($p = 0.421$). Stability outcomes followed a similar trend, with flexible dentures showing slightly better performance (86.7% vs. 80.0%, $p = 0.374$). These

Patient satisfaction parameters revealed substantial advantages for flexible dentures. Comfort levels were significantly higher in Group A (9.0 ± 1.1) than in Group B (7.5 ± 1.6 , $p = 0.001$), reflecting the adaptability of flexible materials to intraoral anatomy. Similarly, aesthetic satisfaction was higher in Group A (93.3%) compared to Group B (76.7%, $p = 0.015$). These findings corroborate Takabayashi, who emphasized the superior aesthetic appeal of flexible dentures due to their translucent base material and the absence of visible metal clasps.¹⁹

Ease of use also favored flexible dentures (86.7% vs. 70.0%, $p = 0.032$), highlighting their lighter weight and reduced insertion difficulty. Overall satisfaction scores further reinforced these trends, with Group A scoring significantly higher (8.7 ± 1.3) than Group B (7.2 ± 1.8 , $p = 0.005$). These results align with Singh et al., who found that flexible dentures are particularly well-received by patients prioritizing comfort and aesthetics.²⁰

Maintenance outcomes highlighted a lower fracture and repair rate in Group A (6.7%) compared to Group B (16.7%, $p = 0.038$). This finding underscores the mechanical resilience of thermoplastic materials, as noted by Dhiman and Chowdhury.²¹ The reduced fracture risk in flexible dentures is attributed to their ability to absorb and distribute stress more effectively than acrylic dentures, which are more prone to brittle fractures.

Staining incidence was slightly higher in Group A (20.0%) compared to Group B (10.0%), but the difference was not statistically significant ($p = 0.081$). Ahmad et al., also reported similar staining tendencies in flexible dentures, which may be influenced by the material's porosity and interaction with staining agents in the oral environment.²² The average lifespan of dentures was comparable between groups (10.8 ± 1.5 months for flexible dentures and 11.2 ± 1.7 months for acrylic dentures, $p = 0.426$). Replacement rates were similarly low and statistically insignificant between the groups (10.0% vs. 13.3%, $p = 0.513$).

Our findings align with the benefits of flexible dentures reported by Singh and Dhiman, particularly in enhancing patient comfort and minimizing soft tissue irritation.¹⁷ However, the slight increase in staining incidence with flexible dentures echoes Sharma and Shashidhara, who noted that maintenance of esthetic properties may require additional care.²³

The comparable retention, stability and durability between the two groups indicate that conventional acrylic dentures remain a viable and cost-effective option for patients. However, the aesthetic and comfort advantages of flexible dentures may justify their higher cost for patients prioritizing these attributes.^{24,25}

Limitations of the study

One limitation of this study is the relatively short follow-up period, which may not fully capture long-term issues such as wear, staining, or material degradation. Additionally, the sample size of 60 participants may limit the generalizability of the results. Future studies with a larger sample size and extended follow-up could provide more comprehensive insights.

CONCLUSION

Flexible dentures demonstrate superior comfort, aesthetics and reduced soft tissue irritation compared to conventional acrylic dentures, making them an attractive option for patients prioritizing these factors. However, both denture types offer comparable performance in terms of retention, stability and durability. Personalizing denture choice based on patient needs and preferences can enhance overall satisfaction and clinical outcomes.

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