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EVALUATION OF PRESSURE AND NON-PRESSURE FINAL IMPRESSION TECHNIQUES IN FABRICATION OF COMPLETE DENTURE

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Abstract
Background: Edentulism is highly prevalent among older adults and poses significant challenges to oral function, aesthetics, and quality of life, particularly in resource-limited settings. The purpose of the study is to compare patient outcomes and denture performance using pressure versus non-pressure final impression techniques in complete denture fabrication.
Aim of the study: The aim of the study was to compare patient outcomes and denture performance using pressure versus non-pressure final impression techniques in complete denture fabrication.
Methods: This comparative clinical study was conducted at the Department of Prosthodontics, Bangabandhu Sheikh Mujib Medical University, in collaboration with beau-dent, Dhaka, Bangladesh (June 2020–July 2021), included 60 completely edentulous patients aged 50–80 years. Participants were randomly assigned to receive dentures via selective pressure (Group A) or mucostatic (Group B) impression techniques. Denture retention, stability (graded clinically), and patient comfort (VAS) were assessed at four weeks. Data were analyzed using SPSS v22 with Chi-square and t-tests; $p < 0.05$ was considered significant.
Results: Among 60 participants (mean age 65.18 ± 7.83 years; 32 males, 28 females), the pressure technique group showed better outcomes: excellent retention 18 (30.0%) vs 8 (13.3%) ($p = 0.048$), good stability 25 (41.7%) vs 15 (25.0%) ($p = 0.015$), and mean VAS comfort 82.4 ± 10.1 vs 70.3 ± 14.5 ($p = 0.0004$).
Conclusion: Pressure final impression techniques enhance denture retention, stability, and patient comfort, making them preferable for complete denture fabrication.

Key words: Pressure Technique, Non-Pressure Technique, Complete Denture.

Introduction

Edentulism is frequently observed among individuals over 65 years of age [1]. In countries like Bangladesh, a significant portion of the population resides in rural areas, where resources for dental care are limited [2]. Complete dentures continue to serve as the primary treatment option for completely edentulous patients, especially in resource-constrained settings. Patients without natural teeth often face challenges with conventional dentures, including inadequate stability, support, retention, and reduced masticatory efficiency.

Complete dentures are provided to restore both function and aesthetics in edentulous patients [3]. Rehabilitation with complete dentures is designed to enhance oral function, improve masticatory efficiency, and contribute to overall quality of life. Successful prosthetic rehabilitation of a fully edentulous arch depends heavily on accurate impression making, as it forms the foundation for a well-fitting prosthesis [4].

Among the critical steps in fabricating removable complete dentures, taking an accurate impression is essential for clinical success [5]. The overall quality of the denture, including patient satisfaction, comfort, stability, and chewing performance, is largely determined by the final impression [6-9]. Impression techniques are generally classified into mucostatic (minimal pressure), mucocompressive (functional), and selective pressure approaches. The mucostatic technique captures the denture-bearing tissues in a static, undisturbed form using a flowable material, whereas the mucocompressive technique records tissues in their functional state to enhance denture stability during use. The selective pressure technique integrates elements of both pressure and minimal pressure approaches to optimize load distribution on the residual ridges [10,11].

Despite the variety of impression techniques available, there remains a lack of consensus on which method consistently provides superior denture performance and patient satisfaction, particularly in populations with resorbed or compromised ridges. Previous studies have evaluated individual techniques, but few have directly compared pressure (selective pressure) and non-pressure (mucostatic) approaches in terms of clinical outcomes and patient-reported comfort. Addressing this gap is crucial for guiding evidence-based clinical decisions in complete denture fabrication. The purpose of the study is to compare patient outcomes and denture performance using pressure versus non-pressure final impression techniques in complete denture fabrication.

Objective

- To compare patient outcomes and denture performance using pressure versus non-pressure final impression techniques in complete denture fabrication.

Methodology & Materials

This comparative clinical study was conducted at the Department of Prosthodontics, Bangabandhu Sheikh Mujib Medical University (BSMMU), in collaboration with beau-dent, Dhaka, Bangladesh, from June 2020 to July 2021. A total of 60 completely edentulous patients were recruited based on specific inclusion and exclusion criteria to evaluate the outcomes of pressure versus non- pressure final impression techniques in complete denture fabrication. Data were collected on denture retention, stability, and patient-reported comfort to assess the clinical performance and patient satisfaction associated with each technique.

Inclusion Criteria:

- Patients aged between 50 and 80 years.
- Presence of completely edentulous arches (maxillary and/or mandibular).
- Well-healed, healthy residual ridges with adequate bone height (Atwood's classification Class I, II, or III).
- Good general health and cooperative attitude.
- No previous experience with complete dentures.

Exclusion Criteria:

- Patients with severe bony undercuts or flabby ridge tissue.
- History of temporomandibular joint (TMJ) disorders or parafunctional habits.
- Presence of neurological disorders affecting motor control or perception.
- Systemic conditions that could impair healing or oral tissue health (e.g., uncontrolled diabetes).
- Patients undergoing radiotherapy in the head and neck region.

Participants were randomly allocated into two equal groups: Group A (Pressure Technique), receiving complete dentures fabricated using the selective pressure impression technique, and Group B (Non-Pressure Technique), receiving dentures fabricated using the mucostatic impression technique. Preliminary impressions were made with irreversible hydrocolloid, followed by custom tray fabrication and border molding with low-fusing impression compound. Final impressions were recorded using zinc oxide eugenol paste according to the allocated technique. Standard protocols were followed for jaw relation, try-in, and denture processing. After insertion, participants were evaluated at four weeks for denture retention and stability, graded as excellent, good, fair, or poor, and for patient comfort using a 100 mm Visual Analog Scale (VAS). Data were analyzed using SPSS version 22, with categorical variables compared using the Chi-square test, and continuous variables (VAS scores) expressed as mean ± SD and compared using independent samples t-test. A p-value <0.05 was considered statistically significant.

Results

Table 1: Demographic Characteristics of Study Participants (N = 60)

Variable		Number (n)	Percentage (%)
Age (Years)	50–60	18	30.0
	61–70	25	41.7
	71–80	17	28.3
	Mean Age	65.18 ± 7.83	
Gender	Male	32	53.3
	Female	28	46.7

Table 1 presents the frequency and percentage distribution of participants according to age and gender. The largest age group was 61–70 years with 25 participants (41.7%), followed by 50–60 years with 18 participants (30.0%), and 71–80 years with 17 participants (28.3%). The mean age of participants was 65.18 ± 7.83 years. Regarding gender, 32 participants (53.3%) were male and 28 participants (46.7%) were female.

Table 2: Comparison of Denture Retention Scores Between Techniques (N=60)

Retention Score	Group A (Pressure Technique) n (%)	Group B (Non-Pressure Technique) n (%)	p-value
Excellent	18 (30.0%)	8 (13.3%)	0.048
Good	9 (15.0%)	14 (23.3%)	
Fair	3 (5.0%)	6 (10.0%)	
Poor	0 (0.0%)	2 (3.3%)	

Table 2 illustrates the distribution of denture retention scores among participants using pressure and non-pressure impression techniques. In the pressure technique group, 18 participants (30.0%) achieved excellent retention, 9 (15.0%) had good retention, 3 (5.0%) fair retention, and none (0.0%) had poor retention. In contrast, the non-pressure technique group showed lower retention outcomes, with 8 participants (13.3%) rated excellent, 14 (23.3%) good, 6 (10.0%) fair, and 2 (3.3%) poor. Statistical analysis indicated a significant difference between the two techniques (p = 0.048).

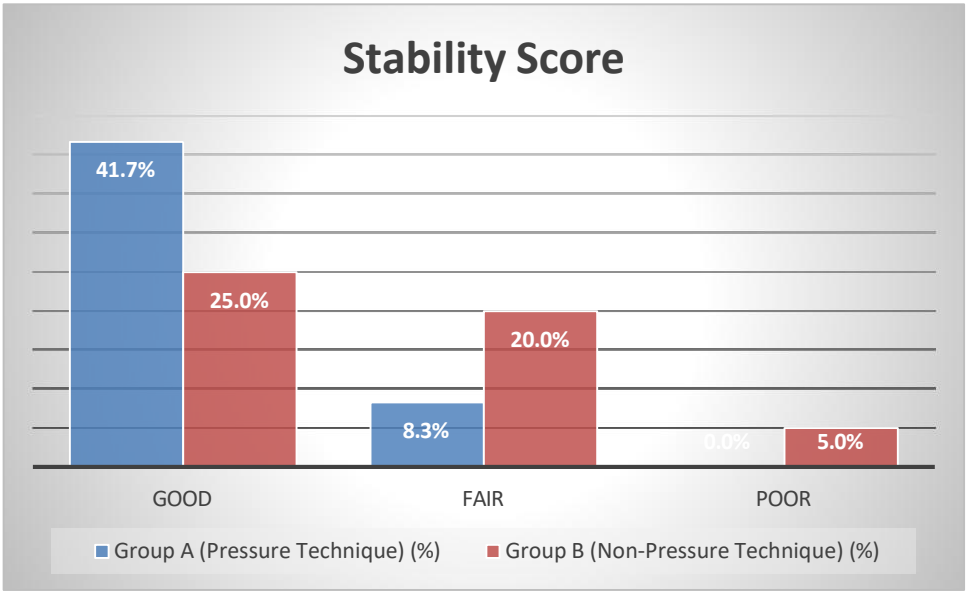

Figure 1: Comparison of Denture Stability Scores Between Techniques (N=60)

Figure 1 illustrates the distribution of denture stability scores among participants using pressure and non-pressure impression techniques. In the pressure technique group, 25 participants (41.7%) achieved good stability, 5 (8.3%) fair stability, and none (0.0%) had poor stability. In contrast, the non-pressure technique group showed lower stability outcomes, with 15 participants (25.0%) rated good, 12 (20.0%) fair, and 3 (5.0%) poor. Statistical analysis indicated a significant difference between the two techniques ($p = 0.015$).

Table 3: Comparison of Patient Comfort Based on Visual Analog Scale (VAS) Scores After 4 Weeks of Denture Use (N = 60)

Group	Mean VAS Score ± SD	p-value
Group A (Pressure Technique)	82.4 ± 10.1	0.0004
Group B (Non-Pressure Technique)	70.3 ± 14.5	

Table 3 presents the mean patient-reported comfort scores using a 0–100 mm Visual Analog Scale (VAS) after four weeks of using complete dentures fabricated with pressure and non-pressure impression techniques. Participants in the pressure technique group reported a higher mean comfort score of 82.4 ± 10.1, compared to 70.3 ± 14.5 in the non-pressure technique group. Statistical analysis indicated a significant difference between the two groups ($p = 0.0004$).

Discussion

Evaluation of pressure and non-pressure final impression techniques in complete denture fabrication provides important insights into prosthodontic outcomes among edentulous patients. The choice of impression technique significantly influences denture retention, stability, and patient comfort, which are critical for successful rehabilitation and overall oral function. The findings of this study highlight the clinical advantages of selective pressure (pressure) impressions over mucostatic (non-pressure) techniques, with higher rates of excellent retention, improved stability, and greater patient-reported comfort. These results underscore the importance of technique selection in complete denture fabrication to optimize prosthesis performance and enhance patient satisfaction.

The demographic profile of the study participants indicates that the majority were aged 61–70 years (41.7%), followed by 50–60 years (30.0%) and 71–80 years (28.3%), with a mean age of 65.18 ± 7.83 years. This distribution is consistent with the typical age range of complete denture wearers and aligns with previous studies. For example, Choudhary et al.[12] assessed 200 completely edentulous patients aged 45 years and above, with a gender distribution of 46.09% males and 53.91% females, while Seenivasan et al.[13] included 128 completely edentulous patients aged between 40 and 50 years,

reporting a similar gender distribution of 46.09% males and 53.91% females. Ogunrinde et al.[14] reported a mean age of 69.10 ± 10.6 years among edentulous patients, ranging from 40 to 90 years, while Turker et al.[15] observed a mean age of 61.62 years with participants aged 39 to 89 years. Regarding gender, the present study included 32 males (53.3%) and 28 females (46.7%), showing a slight male predominance. This pattern is similar to Ogunrinde et al.[14], who reported 56.2% males, but contrasts with Turker et al.[15], where females were the majority (59.9%). These demographic characteristics suggest that the study sample is broadly representative of the general edentulous population, providing a valid foundation for evaluating the comparative effects of pressure and non-pressure impression techniques on clinical outcomes.

In the present study, dentures fabricated using the pressure impression technique demonstrated superior retention compared to those made with the non-pressure technique. Specifically, 30.0% of participants in the pressure group achieved excellent retention, whereas only 13.3% in the non-pressure group reached the same level, with a statistically significant difference ($p = 0.048$). These results are in agreement with previous research. Sanaye et al.[16] reported that denture bases fabricated using selective pressure techniques exhibited the highest retention compared to Massad's and functional techniques, while Chopra et al.[17] emphasized that selective pressure impressions enable more controlled distribution of pressure on the mucosa, which contributes to better adaptation and retention of the denture base. Collectively, these findings reinforce that applying controlled pressure during the final impression phase enhances tissue adaptation, thereby improving the functional performance of complete dentures.

Similarly, denture stability was significantly influenced by the impression technique employed. In the pressure group, 41.7% of participants achieved good stability, compared to 25.0% in the non-pressure group ($p = 0.015$), indicating a clear advantage of the pressure technique. These findings are supported by El-Khodary et al.[18], who reported that selective pressure impressions result in improved denture stability relative to non-pressure techniques, highlighting the benefit of applying controlled pressure to critical support areas. Singla et al.[19] further emphasized that selective pressure impressions enhance stability by accurately capturing the functional contours of the edentulous ridge, promoting optimal denture-tissue adaptation. Taken together, these findings suggest that careful application of pressure during final impressions allows for a more intimate and precise fit of the denture base, reducing movement during function and improving overall prosthetic performance.

Patient comfort, evaluated using the Visual Analog Scale (VAS) after four weeks of denture use, was also significantly higher in the pressure group (82.4 ± 10.1) compared to the non-pressure group (70.3 ± 14.5, $p = 0.0004$). This indicates that the pressure technique not only improves objective clinical parameters, such as retention and stability, but also positively affects subjective patient experiences. Rao et al.[20], in a systematic review, similarly noted that pressure-based impression techniques often result in better patient comfort, likely due to enhanced adaptation of the denture base to the supporting tissues, leading to reduced soreness, improved chewing efficiency, and overall satisfaction. Therefore, the use of pressure techniques appears to offer a comprehensive clinical benefit, improving both functional outcomes and patient-reported comfort.

Limitations of the study

This study had the following limitations:

- The relatively small sample size may limit the generalizability of the findings.
- Conducting the study in a tertiary care setting may affect the applicability of the results to other healthcare contexts.

Conclusion

Successful complete denture fabrication depends largely on the accuracy of the final impression technique, which influences denture retention, stability, and patient comfort. In this study, dentures fabricated using the pressure final impression technique demonstrated superior clinical outcomes compared to the non-pressure method. The pressure technique provided better denture adaptation, resulting in improved retention, enhanced stability, and higher patient-reported comfort, supporting

its clinical preference in complete denture fabrication for optimal prosthesis performance and patient satisfaction.

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