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Original article

Evaluation of Knowledge on Complete Denture Fabrication: A Cross-Sectional Study among Fourth-Year Dental Students at Gharyan University

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Abstract
Complete dentures remain an essential treatment option for edentulous patients, especially in regions where implant-supported prostheses are limited. Successful prosthodontic outcomes require systematic execution of clinical steps, including patient examination, impression taking, custom tray fabrication, jaw relation recording, try-in, and post-insertion management. This study aimed to assess the knowledge of complete denture fabrication among fourth-year dental students. A descriptive cross-sectional design was employed among 37 students (94.9% response rate) enrolled in 2024 at the Department of Prosthodontics, Faculty of Oral and Dental Medicine, Gharyan University. Data were collected using a validated, self-administered questionnaire covering patient assessment, primary and final impressions, custom tray design, jaw relation records, occlusal plane orientation, articulator use, try-in procedures, and post-insertion care, and analyzed descriptively. All students (100%) reported performing histories, oral examinations, primary impressions with alginate, and centric relation registration. Knowledge gaps were observed in advanced procedures: 75.7% selected light-cure acrylic for custom trays, awareness of spacers, stops, and relief holes was limited, polyvinylsiloxane was the most frequently used final impression material (62.2%), yet 59.5% disinfected impressions improperly with water alone. None used a face bow or semi-adjustable articulators, relying solely on non-adjustable types. Students demonstrated solid foundational knowledge of basic procedures; however, deficiencies in custom tray design, post-palatal seal determination, impression disinfection, and articulator use indicate a need for enhanced clinical teaching and practical training to meet current prosthodontic standards.
Keywords. Complete Denture, Dental Students, Prosthodontics, Impression Technique.

Introduction

Complete denture therapy remains the cornerstone for rehabilitation of edentulous patients, especially in resource-limited settings where implant-supported prostheses are less feasible [1, 2]. The success of therapy depends on the systematic execution of clinical and laboratory steps, including patient examination, impression making, border moulding, jaw relation recording, try-in, and post-insertion care [3–5]. Evidence-based prosthodontics emphasizes accurate impression philosophies such as selective pressure and functional impression techniques, which enhance denture fit and patient comfort [6, 7]. Infection control is equally important, with impression disinfection considered mandatory for cross-infection prevention [8, 9].
Recording jaw relations is a critical determinant of denture success. Dawson's bimanual manipulation is widely accepted as the gold standard [10], while unguided methods such as swallowing are less reproducible [11]. Similarly, while the role of face bow transfer in conventional complete dentures is debated, it is considered valuable in complex rehabilitations and teaching [12–14].
Despite technological advances, studies show limited use of advanced techniques among undergraduate students worldwide [15, 16]. To acquire knowledge and to gain skills, dental students transition from pre-clinical training to clinical training through their learning process. Before students can practice on patients, their clinical competence must be formally assessed. Assessment is an integral part of the educational process at any level and in any discipline. It is a process during which "consideration is given to the amount, level, worth, value or quality of outcomes or products of the learning process" [17].
This study aimed to assess fourth-year dental students' knowledge of the sequential steps in complete denture fabrication, including impressions, tray design, jaw relation, occlusal plane, articulator use, try-in, and post-insertion care, to identify strengths and gaps in their understanding.

Methodology

Study Design and Setting

This descriptive cross-sectional study was conducted to evaluate the knowledge of complete denture fabrication procedures among undergraduate dental students at the Faculty of Dentistry, Gharyan University.

Study Population

All fourth-year dental students enrolled during the academic year (n = 39) were invited to participate. A total of 37 students completed the survey, yielding a response rate of 94.9%.

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Study Tool

A structured, self-administered questionnaire was developed based on standard prosthodontics textbooks and related literature. It included questions on patient assessment, primary and final impressions, custom tray design, jaw relation records, occlusal plane determination, articulator use, try-in procedures, and post-insertion care. The questionnaire was reviewed and validated for clarity and content by two senior prosthodontists.

Statistical Analysis

Completed questionnaires were entered into Microsoft Excel and analyzed using SPSS version 25.0. Descriptive statistics, including frequencies and percentages, were calculated to summarize students' responses.

Results

A cross-sectional study was conducted to evaluate the knowledge of complete denture fabrication procedures among fourth-year dental students at Gharyan University.

As shown in (Table 1), all students (100%) stated taking a patient's case history and performing an oral examination before beginning the procedure; the vast majority (78.4%) were also appropriately certain that they would ask the patient to stop using their previous denture; and all students (100%) made a primary impression, primarily using alginate material (100%) with stock plastic trays (62.2%).

Table 1. Knowledge of Initial Assessment and Primary Impression (n=37)

Procedure	Correct practice	n	%	Incorrect practice	n	%
Case history and examination	Yes	37	100.0%	No	0	0.0%
Discontinue the previous denture	Yes	29	78.4%	No	8	21.6%
Perform primary impression	Yes	37	100.0%	No	0	0.0%
Primary impression material	Alginate	37	100.0%	Other	0	0.0%
Stock tray type	Plastic	23	62.2%	Metal	14	37.8%

Figure 1 revealed that knowledge regarding custom tray fabrication, above three-quarters of students (75.7%) selected the recommended light-cure acrylic resin, a quarter used self-cure resin (21.6%), and shellac (2.7%). Knowledge of essential design features varied. A high percentage of students who used ZOE impression material demonstrated an understanding of the need for a spacer and stops (12/14, 85.7%), though this represented only 32.4% of the entire cohort. Similarly, 69.6% of students using polyvinyl (16/23) included these features. However, the understanding of relief holes was poor among polyvinyl users (1/23, 4.3%), but better among ZOE users (9/14, 64.3%).

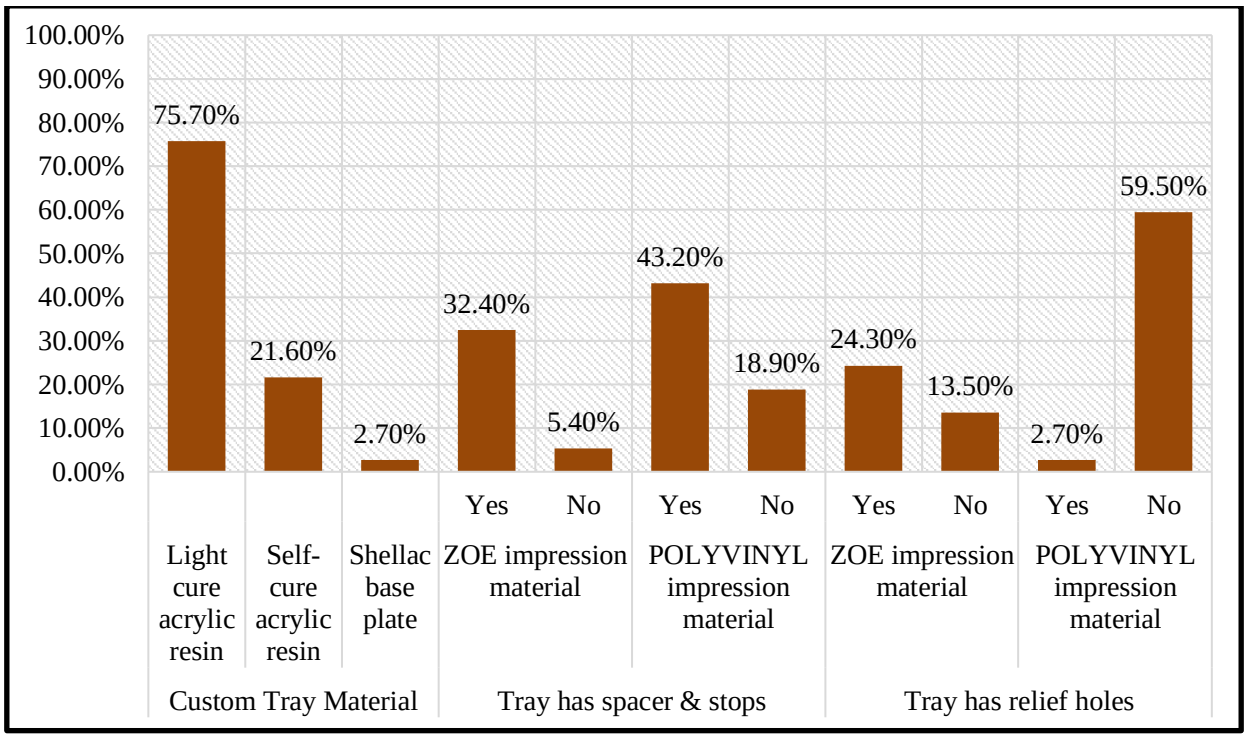

Figure 1. Knowledge of Custom Tray Fabrication (n=37)

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(Figure 2) indicated that the knowledge of final impression procedures was varied. For locating the post palatal seal (PPS), students were almost evenly split between marking its intra-orally (37.8%) and arbitrary carving on the cast (35.1%).

The majority of students (78.4%) correctly identified the sectional technique for border molding, with Green Stick compound being the overwhelmingly preferred material (86.5%). For the final impression itself, most students (62.2%) selected polyvinylsiloxane, while a significant minority (37.8%) opted for Zinc Oxide Eugenol (ZOE) paste. A majority of students (59.5%) incorrectly reported using tap water alone for disinfecting impressions, while less than half used appropriate chemical disinfectants such as sodium hypochlorite (27.0%) or glutaraldehyde (13.5%).

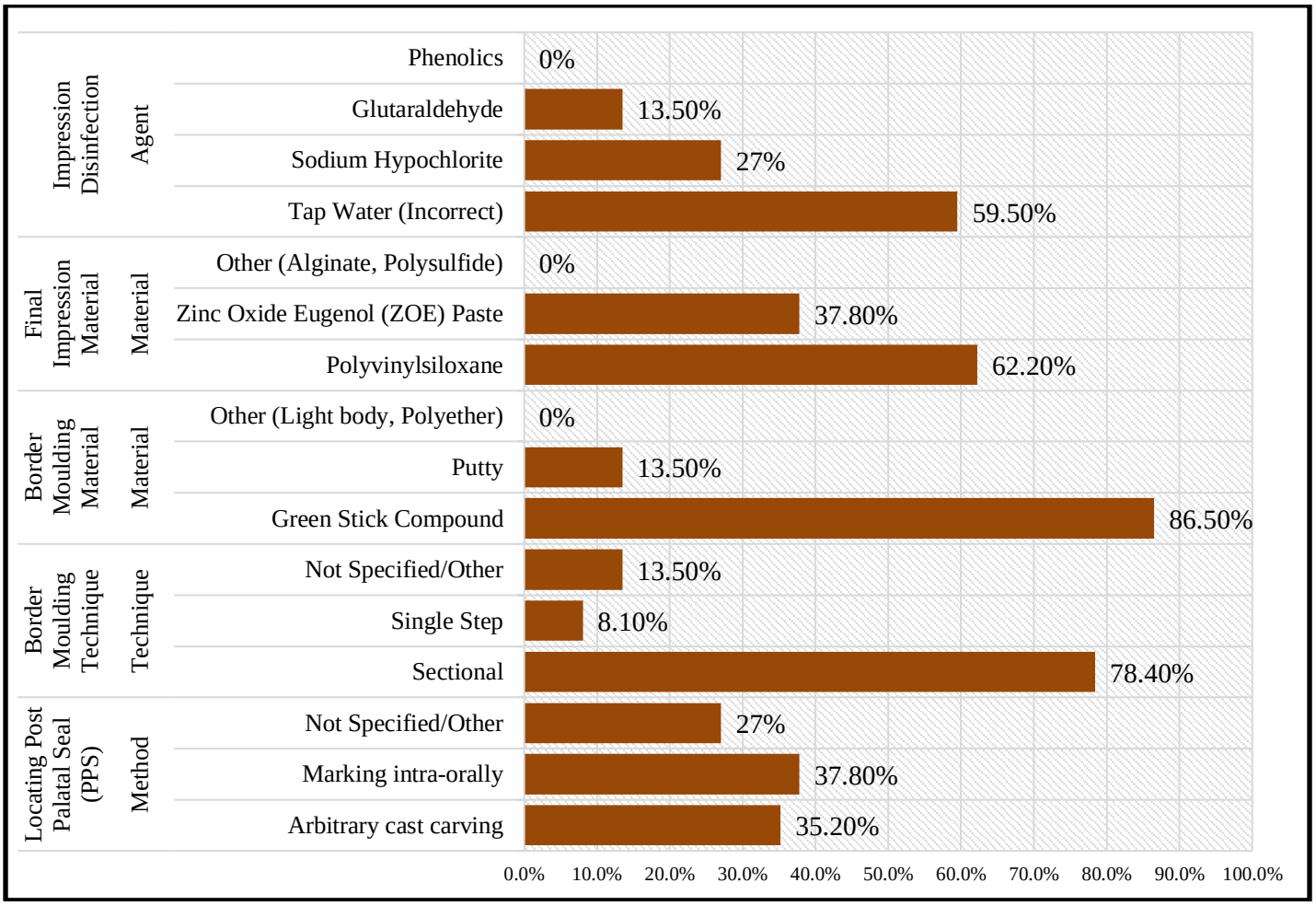

Figure 2. Knowledge of Final Impression Procedures (n=37)

The results indicate uniform knowledge in some foundational areas, but reveal significant deviations from ideal standard practices in others, as shown in (Table 2). All students (100.0%) correctly reported that they perform jaw relation registration, encompassing all three types: orientation, vertical, and horizontal. Furthermore, all students (100.0%) reported recording centric relation.

However, the techniques for recording centric relation varied considerably. The most common method was the swallowing technique (35.1%), followed by the retruding mandibular method (21.6%) and a combination of tongue tip to soft palate and swallowing (18.9%). A minority used less conventional methods like the excursive technique (13.5%). To determine the occlusal plane, the majority of students (83.8%) relied on anatomical landmarks, though above a quarter (16.2%) determined it arbitrarily.

A critical finding was the universal lack of use of a face bow for transferring records to an articulator (100.0%). Consequently, all students (100.0%) reported using a non-adjustable articulator, with no students using semi-adjustable or fully adjustable models.

Table 2. Knowledge of Jaw Relation and Articulator Procedures (n=37)

Question	Option	n	%
Perform jaw relation?	Yes	37	100.0%
Type of jaw relation	Orientation + Vertical + Horizontal (All)	37	100.0%
Determine the occlusal plane (Method)	Anatomical Landmarks	31	83.8%
	Arbitrarily	6	16.2%
Record Centric Relation?	Yes	37	100.0%

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Method for centric relation (Technique)	Retruding Mandibular Method	8	21.6%
	Tongue tip to soft palate with finger guide	4	10.8%
	Swallowing method	13	35.1%
	Tongue tip & Swallowing (Combined)	7	18.9%
	Excursive method	5	13.5%
Use of a face bow	No	37	100.0%
Type of Articulator	Non-adjustable	37	100.0%

Table 3 depicted that all students (100.0%) reported performing a try-in procedure, and all conducted this evaluation both on the articulator (extra-orally) and intra-orally. Furthermore, every student (100.0%) reported that their try-in procedure involved evaluating both the border extension and making occlusal adjustments. Upon insertion of the final denture, a large majority of students (91.9%) reported encountering no problems. A small number of students reported issues with vertical dimension (2.7%) and occlusal plane height (5.4%). Finally, all students (100.0%) correctly reported that they advise their patients about post-insertion instructions.

Table 3. Knowledge of Denture Try-in and Insertion Procedures (n=37)

Question	Option	n	%
Perform Try-in?	Yes	37	100.0%
	No	0	0.0%
Try-in on Articulator?	Yes	37	100.0%
	No	0	0.0%
Try-in Intra-orally?	Yes	37	100.0%
	No	0	0.0%
Type of Try-in Procedure (Evaluation)	Both Extension & Occlusion	37	100.0%
	Evaluate extension only	0	0.0%
	Occlusal adjustment only	0	0.0%
Problems During Insertion (Problem Type)	No problems	34	91.9%
	Vertical Dimension	1	2.7%
	Occlusal Plane Height	2	5.4%
	Other (CR, CO, Esthetic, etc.)	0	0.0%
Provide Post-Insertion Instructions?	Yes	37	100.0%
	No	0	0.0%

Discussion

The present study evaluated fourth-year dental students' knowledge of the consecutive steps in complete denture fabrication, aiming to identify both strengths and gaps in their understanding. The discussion focuses on comparing the students' performance with existing literature, highlighting areas of good practice, identifying deficiencies in key procedures, and situating these findings within the context of dental education both locally and globally.

In the present study, all participating students reported taking a detailed patient case history and performing an oral examination prior to initiating prosthodontic procedures. This practice aligns with the literature, which highlights that comprehensive examination is essential for effective treatment planning, as it simplifies the identification of systemic conditions, oral pathologies, and anatomical considerations [1,2]. A comparable level of compliance was reported by Alqahtani et al. [3], who found that 95% of dental interns performed an initial examination before commencing prosthodontic treatment. This finding suggests that students in the studied cohort demonstrated strong training in primary diagnostic protocols. Furthermore, 78.4% of students instructed patients to discontinue wearing old dentures prior to taking new impressions. This practice is supported by evidence that denture rest periods facilitate tissue rebound and improve the accuracy of impressions [4]. Nevertheless, other studies have reported variable compliance among both students and practitioners, importance the need for greater emphasis on this step within dental curricula [5]. A majority of students in this study (62.2%) relied on plastic stock trays, whereas a minority (37.8%) opted for metal trays. This reliance on less rigid trays may compromise impression accuracy, as plastic trays are more prone to distortion under functional loading. Previous studies have demonstrated that metal stock trays provide superior stability and accuracy compared with plastic alternatives [6]. These findings suggest the need to strengthen training on tray selection and to emphasize the advantages of metal trays in achieving optimal prosthodontic outcomes.

Custom trays, light-cure resin (75.7%), were the most frequently chosen material, in agreement with contemporary practice favoring dimensionally stable materials [7]. However, the use of shellac and self-cure acrylic persists among a minority, indicating variability in training and resource availability. A majority (78.7%) reported using sectional green stick compound for border moulding, which reflects awareness of the

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importance of functional extension. Evidence supports that border moulding enhances the retention and stability of dentures by recording functional movements of oral musculature [8]. This percentage is comparable to findings from a study in Saudi Arabia, where 80% of students adopted sectional border moulding [9]. Nearly two-thirds of the students (62.2%) used polyvinyl siloxane (PVS) for making the final impression, while others used zinc oxide eugenol (37.8%), alginate, and polysulfide 0%. The preference for PVS indicates exposure to modern elastomeric materials, which demonstrate higher accuracy and dimensional stability than alginate [10,11]. However, alginate's continued use reflects limitations in accessibility or cost. Only 40.5% of students disinfected impressions, while 59.5% rinsed with water only. This represents a significant gap in infection control knowledge and practice. The CDC and WHO emphasize strict adherence to disinfection of all prosthodontic materials to prevent cross-infection [13, 14]. Comparable studies in Libya and other countries revealed similarly low compliance, suggesting a global need for stronger infection control training in undergraduate curricula [15, 16].

Students reported varied techniques for recording jaw relation: swallowing (35.1%), tongue-to-palate (29.7%), and retruded methods (21.6%). None used Dawson's bimanual manipulation, which is considered the gold standard for establishing reproducible centric relation [17]. Literature confirms that unguided methods, such as swallowing, yield less predictable results [18]. A systematic review by Abduo (2018) concluded that guided techniques significantly improve the reproducibility of centric relation [19]. This gap highlights the need for increased emphasis on teaching evidence-based jaw relation techniques. None of the students used a face bow, and all relied on a simple hinge articulator. This reflects a limitation in exposure to advanced prosthodontic instruments. Several studies argue that face bow transfers have a minimal impact on denture patient satisfaction, while others advocate its role in complex rehabilitations [20, 21, 22]. Regardless, undergraduate training should at least familiarize students with the principles of articulator use beyond simple hinge devices.

All students conducted a try-in and provided post-instructions. This result is encouraging, as it indicates awareness of the importance of esthetic and functional verification, as well as patient education for adaptation. Studies confirm that thorough post-insertion guidance enhances patient satisfaction and reduces the risk of denture-related stomatitis [23, 24]. The results suggest that while students demonstrate strong knowledge in examination, try-in, and some impression steps, significant deficiencies exist in infection control, jaw relation recording, and advanced instrumentation .These findings align with reports from other regions, suggesting a global challenge in dental curricula to balance traditional and modern prosthodontic approaches [25, 26]. This study has a few limitations. It was conducted at a single university with a relatively small number of students, so the results may not represent other settings. Being cross-sectional, it only provides a snapshot of knowledge at one point in time. In addition, the use of self-reported questionnaires may have introduced bias, and the study assessed theoretical knowledge rather than actual clinical skills.

Conclusion and Recommendations

Fourth-year dental students at Gharyan University demonstrated good knowledge of basic denture fabrication steps but showed gaps in technical areas such as tray design, disinfection, post-palatal seal, and articulator use. Strengthening clinical teaching and practical training in these aspects is recommended to align their skills with modern prosthodontic standards and improve patient care.

Conflict of interest. Nil

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