Research Article

Prosthodontic Techniques And Materials Used For Removable Prosthesis By Dental Practitioners In District Dehradun – A Survey Study

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Abstract

Background
The success of removable prosthodontic treatment depends on appropriate selection of clinical techniques and materials. Although contemporary materials and digital technologies are available, conventional methods continue to be widely practiced. Information regarding the prosthodontic techniques and materials used by dental practitioners in District Dehradun is limited. Therefore, this survey was conducted to evaluate current clinical practices in removable prosthodontics among dental practitioners in the district.

Aim
To evaluate the prosthodontic techniques and materials used for complete and removable partial denture fabrication among dental practitioners in District Dehradun, Uttarakhand.

Materials and Methods
A questionnaire-based cross-sectional descriptive survey was conducted among 250 dental practitioners practicing in District Dehradun, Uttarakhand. Data were collected using a self-administered structured questionnaire distributed through Google Forms and printed questionnaires. The responses were analyzed using IBM SPSS Statistics Version 25.0. Descriptive statistics were expressed as frequencies and percentages, while Chi-square test was used to determine associations between practitioner characteristics and prosthodontic practice patterns, with statistical significance set at $p < 0.05$.

Results
Conventional prosthodontic techniques were predominantly used, with the custom tray (mucostatic) impression technique being the most preferred. The adoption of digital impression techniques and CAD/CAM workflows was limited. Practitioner qualification and clinical experience showed significant associations with the choice of prosthodontic techniques and materials ($p < 0.05$).

Conclusion
Conventional prosthodontic techniques and materials remain the predominant choice among dental practitioners in District Dehradun, while the adoption of digital technologies is limited. Practitioner qualification and clinical experience significantly influence clinical practice patterns.

INTRODUCTION

The rehabilitation of partially and completely edentulous patients is an important aspect of prosthodontic treatment. Removable prostheses, including complete dentures and removable partial dentures, are widely used for restoring esthetics, mastication, phonetics, and overall oral function.[1] The success of removable prosthodontic treatment depends on the proper selection and application of various clinical techniques and materials. Impression procedures, border moulding, jaw relation recording, denture base materials, and impression materials play a significant role in achieving retention, stability, comfort, and patient satisfaction.[2]

With advancements in dental materials and technology, newer prosthodontic techniques and materials such as elastomeric impression materials, improved interocclusal recording materials, and CAD-CAM fabricated dentures have been introduced into clinical practice.[3]

However, the use of these techniques and materials may vary among dental practitioners depending on their clinical experience, knowledge, availability of materials, patient affordability, and practice setup. In many cases, conventional methods are still preferred because of their simplicity, accessibility, and cost-effectiveness.[4]

Understanding the current trends in prosthodontic practice is important to evaluate the practical application of prosthodontic concepts and identify areas that require further education and improvement.[5]

Limited information is available regarding the prosthodontic techniques and materials used for removable prosthesis by dental practitioners in District Dehradun, Uttarakhand. Therefore, the present survey was conducted

to assess the various prosthodontic techniques and materials used by dental practitioners for removable prosthesis in District Dehradun.

AIM & OBJECTIVE

The study aims to integrate and evaluate the knowledge on impression techniques and materials used in complete denture and removable partial dentures among dental practitioners in District Dehradun, Uttarakhand and the objectives are:

1) To determine and evaluate the knowledge about impression techniques in complete denture.
2) To determine and evaluate the knowledge about impression materials in complete denture.
3) To determine and evaluate the knowledge about impression techniques in removable partial denture.
4) To determine and evaluate the knowledge about impression materials in removable partial denture.

Inclusion and exclusion Criteria

The study included dental practitioners who were willing to participate and were residing and actively practicing in District Dehradun, Uttarakhand. Dental practitioners who were unwilling to participate, medical professionals other than dentists, and dental practitioners residing or practicing outside District Dehradun, Uttarakhand, were excluded from the study.

Methodology

Sources of Data: The study data were obtained from dental practitioners residing and practicing in District Dehradun, Uttarakhand.

Study Design: This study was designed as a questionnaire-based, cross-sectional descriptive survey. Data were collected from dental practitioners residing and practicing in District Dehradun, Uttarakhand, using a self-administered structured questionnaire administered through both Google Forms and printed paper (hard copy) questionnaires.

Data Analysis

The collected data were entered into Microsoft Excel and analysed using the Statistical Package for the Social Sciences (SPSS) software (IBM SPSS Statistics, Version 25.0, IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the demographic characteristics of the participants and their responses regarding knowledge and practice of complete and removable partial denture procedures. Categorical variables were expressed as frequencies and percentages. Inferential statistics were employed to determine the association between selected independent variables (qualification and years of clinical practice) and prosthodontic practice patterns. The Chi-square test was used to compare categorical variables and assess statistically significant associations between groups. A p-value of less than 0.05 was considered statistically significant. The results are presented in the form of tables and interpreted to describe the prevailing trends in impression techniques, material preferences, digital technology adoption, patient management practices, and removable prosthodontic procedures among dental practitioners.

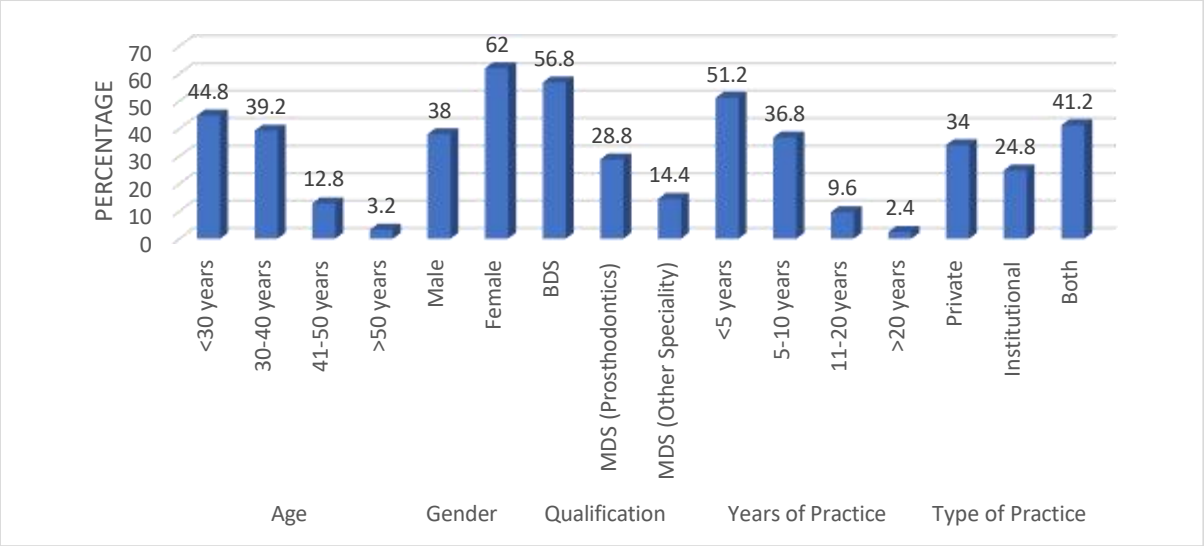
Results

The study included 250 dental practitioners with varied demographic and professional backgrounds. Nearly half of the participants (44.8%) were younger than 30 years, followed by 39.2% in the 30–40 years age group, indicating that the majority (84%) were below 40 years of age. Female practitioners constituted a higher proportion (62.0%) than males (38.0%). More than half of the respondents held a Bachelor of Dental Surgery (BDS) qualification (56.8%), while 28.8% were MDS in Prosthodontics and 14.4% belonged to other dental specialties. Regarding clinical experience, 51.2% had less than five years of practice, whereas only 2.4% had over 20 years of experience, suggesting that the study population was predominantly composed of early-career practitioners. In terms of practice setting, 41.2% were involved in both institutional and private practice, followed by 34.0% exclusively in private practice and 24.8% in institutional practice.

Table 1. Demographic Characteristics of Study Participants (N = 250)

Characteristic	Category	Frequency (n)	Percentage (%)
Age	<30 years	112	44.8

	30-40 years	98	39.2
	41-50 years	32	12.8
	>50 years	8	3.2
Gender	Male	95	38.0
	Female	155	62.0
Qualification	BDS	142	56.8
	MDS (Prosthodontics)	72	28.8
	MDS (Other Speciality)	36	14.4
Years of Practice	<5 years	128	51.2
	5-10 years	92	36.8
	11-20 years	24	9.6
	>20 years	6	2.4
Type of Practice	Private	85	34.0
	Institutional	62	24.8
	Both	103	41.2



Graph 1. Demographic Characteristics of Study Participants (N = 250)

Table 1 and Graph 1 demontrates the custom tray (mucostatic) impression technique was the most commonly preferred approach (44.8%), followed by selective pressure impressions (27.2%), while only 9.6% of practitioners reported using digital impression techniques. Greenstick compound was the predominant material used for border moulding (78.0%). Conventional wax rims remained the preferred method for recording jaw relations (84.0%), bilateral balanced occlusion was the most commonly adopted occlusal scheme (92.0%), and self-cure acrylic resin was the preferred record base material (64.0%). Routine facebow transfer was reported by only 38.0% of practitioners. Zinc oxide eugenol was the most frequently used final impression material (36.0%), followed by alginate (24.0%) and elastomeric impression materials (22.0%). Heat-cure acrylic resin was the most preferred denture base material (44.8%), acrylic denture teeth were predominantly used (86.0%), and soft liners were the most common material for relining procedures (48.0%).

The majority of respondents (90.0%) provided removable partial dentures in their clinical practice. Cobalt-chromium alloy was the most commonly used material for major connectors (57.8%), while the custom tray (mucostatic) technique remained the preferred impression technique for removable partial denture fabrication (60.0%). Digital impression techniques were adopted by only a small proportion of practitioners (8.0%). Digital prosthodontic technologies was relatively limited, with more than half of the practitioners (56.0%) not using CAD/CAM or digital workflows. Flexible dentures were provided by 46.0% of respondents, and most practitioners managed fewer than five removable prosthodontic cases per month.

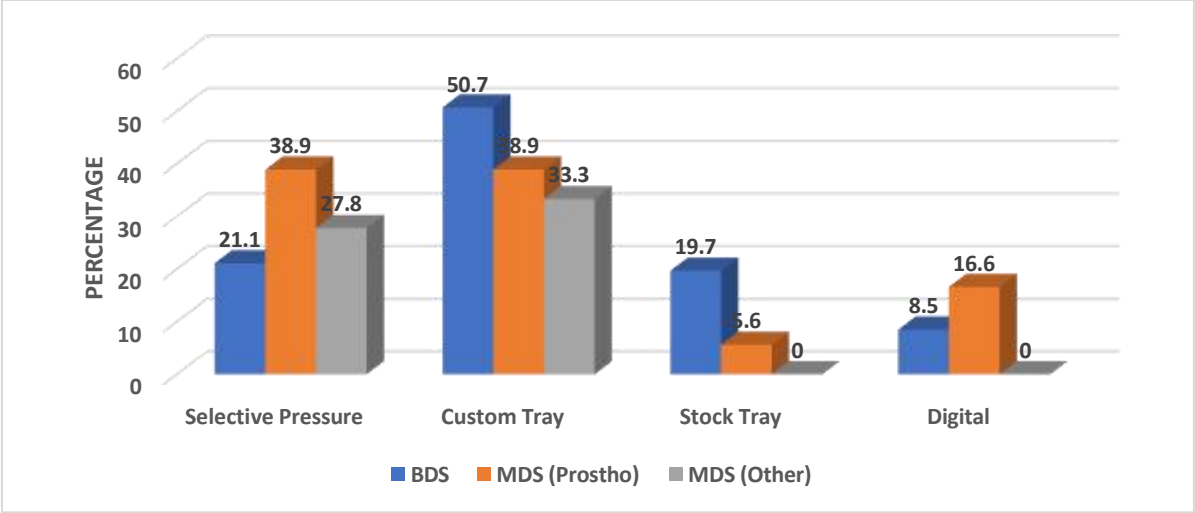
The majority of practitioners (82.0%) routinely provided written post-insertion instructions, with the first follow-up visit most commonly scheduled within 24 hours of denture delivery. Relining and rebasing procedures were generally performed on an occasional basis according to clinical need. The poor denture fit and inadequate

retention were the most frequently encountered complications (40.0%), followed by mucosal ulcers, denture fractures, and esthetic concerns. Patient comfort, esthetics, and treatment cost were the primary factors influencing acceptance of removable prostheses, while most practitioners reported a greater patient preference for fixed prosthetic treatment.

Verbal communication was the most commonly employed method of patient education, whereas demonstrations using models, printed leaflets, and digital educational tools were used less frequently. Preference for fixed prostheses was identified as the leading reason for patient refusal of removable prostheses, followed by treatment cost, misconceptions regarding removable dentures, and esthetic concerns. Inadequate patient awareness, high treatment costs, limited laboratory support, and insufficient professional training were reported as the major challenges affecting removable prosthodontic practice.

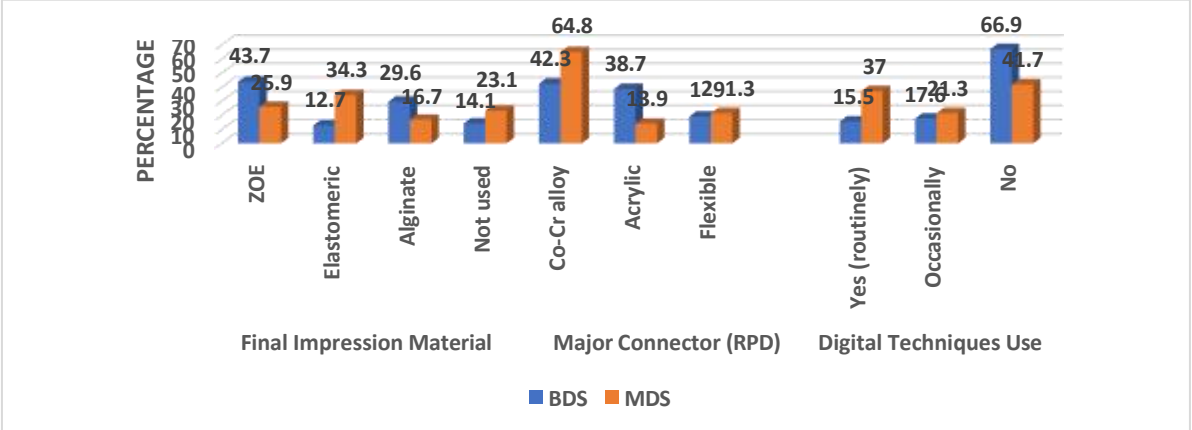
Graph 2 demonstrated a statistically significant association between practitioners' qualifications and their preferred impression technique (Chi-square test, p = 0.008). Prosthodontists showed greater adoption of selective pressure and digital impression techniques, whereas BDS practitioners predominantly preferred the custom tray (mucostatic) technique, indicating that professional specialization influences the selection of contemporary clinical techniques.

Graph 2. Association between Qualification and Preferred Impression Technique



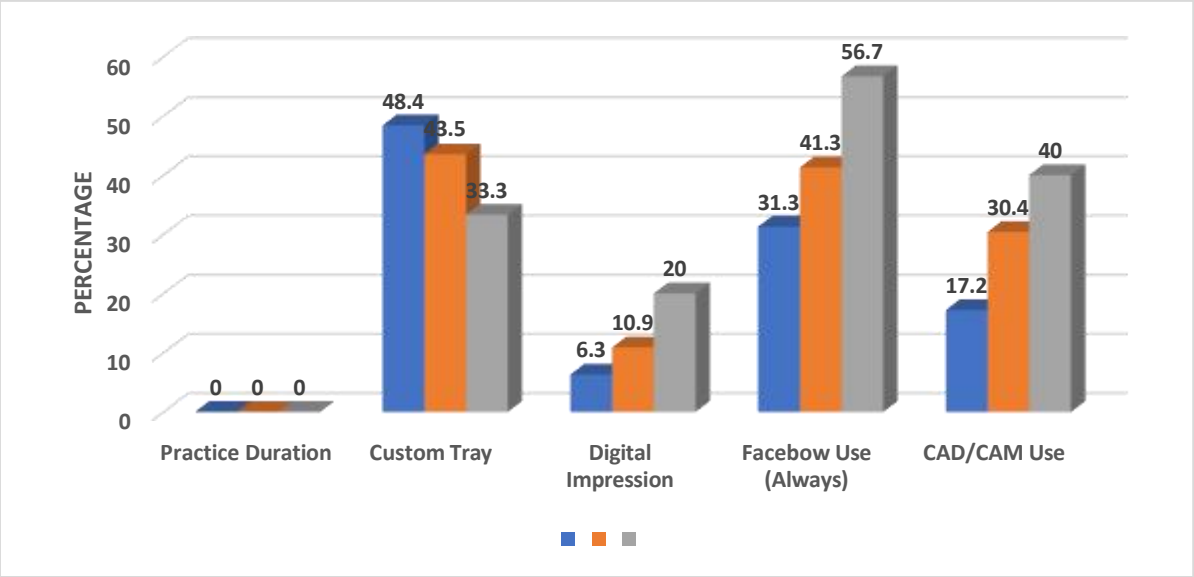
As presented in Graph 3, significant differences were observed between BDS and MDS practitioners regarding impression material selection, major connector materials, and the routine use of CAD/CAM technologies (p < 0.001). MDS practitioners demonstrated greater utilization of elastomeric impression materials, cobalt-chromium major connectors, and digital workflows, reflecting increased adoption of contemporary prosthodontic materials and technologies.

Graph 3: Comparison of Material Preferences Between BDS and MDS Practitioners



Finally, Graph 4 revealed significant associations between years of clinical experience and prosthodontic practice patterns. Practitioners with greater clinical experience showed higher utilization of digital impression techniques, routine facebow transfer, and CAD/CAM technologies ($p < 0.05$), indicating that increased clinical experience is associated with greater adoption of advanced prosthodontic techniques and digital technologies.

Graph 4 Association Between Years of Practice and Technique Selection



Discussion

The present cross-sectional survey evaluated the prosthodontic techniques and materials used for removable prosthesis among dental practitioners in District Dehradun. The findings demonstrated that conventional prosthodontic procedures continue to be widely practiced despite the availability of contemporary materials and digital technologies. The study further revealed that practitioner qualification and clinical experience significantly influenced the selection of impression techniques, impression materials, major connector materials, and digital workflows.

The present study found that the custom tray (mucostatic) impression technique (44.8%) was the most commonly preferred method for complete denture impression making, followed by the selective pressure technique (27.2%), whereas only 9.6% of practitioners reported using digital impression techniques. These findings are in accordance with the survey conducted by Singh et al. [6] who reported a considerable difference between the theoretical concepts taught in prosthodontics and their practical implementation in private dental practice. They observed that most practitioners continued to rely on conventional impression techniques because they are familiar, economical, require minimal armamentarium, and provide predictable clinical outcomes. The low adoption of digital impressions observed in the present study further supports their findings and suggests that conventional impression procedures continue to dominate routine prosthodontic practice.

Border moulding remains an essential step in complete denture fabrication because it directly influences peripheral seal and denture retention. In the present study, greenstick compound (78%) was the most frequently used border moulding material. Similar findings were reported by Kumar P et al. [7] who demonstrated that accurate border moulding significantly improves denture retention and stability irrespective of the material used. They emphasized that greenstick compound remains one of the most reliable materials because of its ease of manipulation, ability to record functional vestibular movements, and predictable clinical performance. The widespread use of greenstick compound among practitioners in the present study therefore reflects continued confidence in this conventional technique.

Regarding jaw relation procedures, conventional wax rims (84%) remained the preferred method for recording maxillomandibular relations, while bilateral balanced occlusion was the most commonly adopted occlusal scheme. Similarly, heat-cure acrylic resin (44.8%) was the preferred denture base material, and acrylic denture teeth (86%) were predominantly selected for denture fabrication. These findings indicate that practitioners continue to favour materials with well-established clinical success, satisfactory mechanical properties, ease of manipulation, and cost-effectiveness. Polyzois and Lagouvardos [8] also reported that conventional complete

denture techniques continue to be emphasized during undergraduate prosthodontic education, thereby contributing to their continued use in routine clinical practice.

The present study showed that zinc oxide eugenol (36%) was the most commonly used final impression material, followed by alginate and elastomeric impression materials. Although elastomeric materials provide superior dimensional stability and surface detail reproduction, their higher cost and technique sensitivity may explain their comparatively lower use in routine clinical practice. These findings suggest that practitioners continue to balance clinical accuracy with affordability and patient acceptance while selecting impression materials.

With respect to removable partial dentures, 90% of practitioners routinely fabricated removable partial dentures, while cobalt-chromium alloy (57.8%) was the most commonly preferred material for major connectors. These findings are comparable with those reported by Khan et al. [9] who observed that appropriate knowledge regarding removable partial denture design and major connector selection is essential for successful prosthodontic rehabilitation. Their study further demonstrated that postgraduate practitioners possessed better knowledge of removable partial denture design than general practitioners. Likewise, the present study demonstrated greater utilization of cobalt-chromium frameworks and advanced prosthodontic materials among specialists compared with BDS practitioners.

The attitude of dental practitioners toward cast removable partial dentures has also been investigated by Nagraj et al [10] who reported that although clinicians recognized the superior biomechanical properties of cast partial dentures, their routine use was often influenced by laboratory support, treatment cost, and patient acceptance. Similar observations were noted in the present survey, where practitioners reported that patient preference, affordability, and laboratory availability influenced the selection of removable prosthodontic treatment.

Digital prosthodontics is rapidly transforming removable prosthesis fabrication; however, the present study demonstrated that 56% of practitioners did not routinely use CAD/CAM or digital workflows. Similar findings were reported by Pasricha and Aggarwal [11] who described CAD/CAM dentures as an important advancement in removable prosthodontics capable of improving precision, reducing processing errors, and enhancing clinical efficiency. Nevertheless, they concluded that routine implementation remains limited because of high equipment costs, limited laboratory support, and the requirement for additional training. These factors may explain the limited adoption of digital technologies observed in the present survey.

A statistically significant association was observed between practitioner qualification and the selection of impression techniques and materials. Prosthodontists demonstrated greater utilization of elastomeric impression materials, selective pressure impression techniques, cobalt-chromium frameworks, and CAD/CAM technologies than BDS practitioners. These findings indicate that specialist education plays an important role in promoting evidence-based clinical practice and the adoption of contemporary prosthodontic techniques.

Similarly, years of clinical experience significantly influenced prosthodontic practice patterns. Practitioners with greater clinical experience showed increased use of digital impression techniques, facebow transfer, and CAD/CAM technology. This may be attributed to continuing professional education, greater clinical exposure, and increased confidence in incorporating advanced treatment modalities into routine practice.

The findings of the present study are also supported by AlSultan et al. [12] who evaluated the knowledge, attitudes, and practices of general dental practitioners regarding removable prosthodontics. Their study demonstrated that although practitioners possessed satisfactory theoretical knowledge, variations existed in clinical practice depending on educational background, clinical experience, and access to continuing education programmes. Similar variations were observed in the present study, particularly regarding the selection of impression techniques, prosthodontic materials, and digital workflows.

El Yamani et al. similarly reported considerable variation among practitioners regarding removable partial denture design and treatment planning. They emphasized that adherence to standard prosthodontic principles and continuing professional education are essential for improving treatment quality. These observations are consistent with the findings of the present survey, where differences in clinical practice were evident among practitioners with different qualifications and levels of experience. [13]

The importance of patient awareness and acceptance should also be considered when planning removable prosthodontic treatment. Shigli et al.[14] reported that knowledge regarding removable prosthodontic treatment among patients significantly influences treatment acceptance and long-term compliance. In the present study, practitioners identified patient preference for fixed prostheses, treatment cost, and inadequate awareness as the major reasons for refusal of removable prostheses. These findings further emphasize the need for effective patient education and communication to improve acceptance of removable prosthodontic treatment.

Henderson et al. [15] emphasized that appropriate removable partial denture design depends on sound biomechanical principles, accurate diagnosis, and careful treatment planning rather than merely material selection. The present study demonstrated that most practitioners preferred cobalt-chromium major connectors

and conventional impression procedures, suggesting that fundamental prosthodontic principles continue to guide removable prosthesis fabrication despite recent technological advancements.

The present study has certain limitations. As a questionnaire-based survey, the findings depended on self-reported responses and may not always reflect actual clinical practice. Furthermore, the study was limited to dental practitioners practicing in District Dehradun, which may restrict the generalizability of the findings to other geographical regions. Nevertheless, the survey provides valuable insight into the current trends in removable prosthodontic practice and identifies areas where continuing dental education and increased integration of digital technologies may improve clinical outcomes.

Overall, the findings indicate that conventional prosthodontic techniques and materials remain the mainstay of removable prosthodontic practice among dental practitioners in District Dehradun. Although awareness of digital dentistry is increasing, its routine implementation remains limited. Greater emphasis on continuing professional education, evidence-based clinical practice, and wider accessibility to digital technologies may facilitate the gradual adoption of contemporary prosthodontic techniques while maintaining the predictability and clinical success associated with conventional treatment approaches.

One limitation of the present study was that it was questionnaire-based and depended on the responses provided by practitioners. In addition, the study was limited to District Dehradun and may not represent the practices followed in other regions. Nevertheless, the survey provides useful information regarding current prosthodontic practices and materials used for removable prosthesis among dental practitioners. Overall, the study emphasizes the need for continuous updating of clinical knowledge and incorporation of advanced prosthodontic techniques and materials to improve treatment outcomes and patient satisfaction in removable prosthodontics.

Conclusion

The present survey evaluated the prosthodontic techniques and materials used for complete and removable prosthesis among dental practitioners in District Dehradun. Based on the objectives of the study, the following conclusions can be drawn:

1. **Knowledge regarding impression techniques for complete dentures:** Most dental practitioners preferred the custom tray (mucostatic) impression technique for complete denture fabrication, while the use of digital impression techniques remained limited.
2. **Knowledge regarding impression materials for complete dentures:** Zinc oxide eugenol was the most commonly used final impression material, followed by alginate and elastomeric impression materials, indicating continued preference for conventional materials in clinical practice.
3. **Knowledge regarding impression techniques for removable partial dentures:** The custom tray (mucostatic) impression technique was the preferred method for removable partial denture fabrication, whereas digital impression techniques were adopted by only a small proportion of practitioners.
4. **Knowledge regarding impression materials for removable partial dentures:** Cobalt-chromium alloy was the most preferred material for major connectors in removable partial dentures. Practitioner qualification and clinical experience significantly influenced the selection of materials and techniques.
5. **Overall**, conventional prosthodontic techniques and materials continue to be the mainstay of removable prosthodontic practice in District Dehradun. Continuous professional education and improved accessibility to digital technologies are essential to encourage the adoption of evidence-based contemporary prosthodontic practices and improve patient care.

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