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Survey of current materials and impression techniques for complete dentures among Indian Prosthodontists: An original research

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Abstract:

Aim: Purpose of our research was to analyse the current trend in impression material as well as techniques used for fabrication for complete denture prosthesis amidst prosthodontists based in India.

Methodology: Around 100 practicing prosthodontists participated in this questionnaire survey containing 16 close ended questions; where they were asked about their preference of material and methods for making complete denture impression. Statistical analyses were performed using the SPSS 25.0 (Statistical Package for the Social Sciences).

Results: Majority of responses indicated use of irreversible hydrocolloid in stock metal tray for making the preliminary impression. The selective pressure was the mostly used impression technique (78.3%). The most common material for the fabrication of custom trays was autopolymerizing acrylic resin (96.7%). All respondents border molded the custom tray prior to making the final impression. The final impression materials used were zinc oxide eugenol impression paste (73.3%), polyvinylsiloxane (11.7%), polyether (11.7%) and polysulphide (3.3%).

Conclusion: Although there is variability in impression materials and techniques used by Prosthodontists for the fabrication of complete dentures, the results showed interesting trends. A lot of prosthodontists used conventional techniques of complete denture impression techniques.

Keywords Impression; Techniques; Materials; Complete; Denture

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INTRODUCTION

Edentulism may be a common problem in geriatric population over 65 years old. In order to revive function and esthetic of edentulous patient complete denture might be provided.[1] Impression making may be a critical step in fabrication of complete denture.[2] There are numerous features that is needed for effective impression making such as technique used, type of the material, and patient condition. Different techniques for creating complete denture impression are given in text books and literature, showing diversity of options. Selection of the right technique depends on the clinical situation, materials availability, clinician knowledge and knowledge. Commonly utilized primary impression materials are alginate and impression compound.[3,4] Grant AA, in 1994 reported 3 primary impression materials and a whole of 7 procedures for final impressions. Different clinicians offer different solutions to an equivalent problem.[5] Literature review shows that in UK showed that alginate is that the most ordinarily used material for primary impression.[6] In US survey indicates variability in materials and techniques employed by prosthodontists for final impressions for the fabrication of complete dentures.[7] There are not any local studies done addressing this issue. Apart from the change in choice of material and method preferred by the private practitioners, with the advent of computer aided design/computer aided manufacturing (CAD/CAM), digital dental technology has rapidly expanded. Digital impressions have gained popularity and acceptance from the clinicians when compared to conventional impressions. Many authors have specified that digital impressions have several advantages of 3-D pre-visualisation, cost-efficiency and less working time.[8] Other advantages comprise of removal of tray selection procedure; reducing the risk of distortion and material consumption and enhanced patient comfort and acceptance.[9,10] These impressions can be stored electronically and communicated as digital information.[9,11] Currently CAD/CAM technology has been applied in fabricating complete dentures. Concerning the diversity of recommendations, the dental practitioner is confronted with a choice of materials and techniques for complete dentures impressions. Proper impression procedure is important to get good retention and peripheral seal and provides support and stability for complete denture.[12,13] Ideally, the established borders of ultimate impression should be similar in thickness and length to denture flanges.[12,14,15] Following the predefined sequential steps ensures a successful complete denture.[14,16] These include primary impression, custom tray construction, border moulding, and final impressing. Methods of Impression making have evolved with the introduction of new material and techniques; currently a wide range of materials and techniques are available for various clinical situations which mandate the complete understanding of impression concepts and principles. Despite the advances, material choice usually relies on personal preference and experience.[1] Investigators have suggested using elastomeric materials over older traditional materials like flowers of zinc impression paste for complete denture impressions. Using elastomers comes with many advantages like accuracy, stability in dimensions, flexibility and multiple pours option. [18] Though, there is always a disagreement regarding which impression materials and techniques can be sued for CD denture among dental professionals.[19,20] Studies have been conducted to assess the preferences of materials and techniques utilized for impression making in CD in several parts of world. Evidence suggests that there is variability in choice of the materials and techniques for CD impressions making among practitioners. A diverse range of clinical preferences exist.[21-24]

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AIM OF THE STUDY

Purpose of our research was to analyse the current trend in impression material as well as techniques used for fabrication for complete denture prosthesis amidst prosthodontists based in India through the means of a survey.

METHODOLOGY

A questionnaire-based survey was conducted among 100 Prosthodontists practicing in India. Ethical approval for the start of the study was obtained via Institutional Review Committee (IRC). A pre tested questionnaire from a printed study was used for the study. A self-administered questionnaire consisting of 16 close-ended questions was distributed to the participants (Table 1) and therefore the researcher facilitated the respondents. All the participants remained anonymous throughout the survey. Data was entered in Statistical Package for Social Sciences (SPSS) version 25.0 for descriptive analysis using frequency and mean distributions. Questionnaire was based on the preference of material and methods for making complete denture impression which included questions related to awareness regarding digital impression and whether practitioners have utilized the digital impression procedure for making complete denture impression.

RESULTS

When inquired about the type of tray used for creating preliminary impression, 95% responded that they use stock metal tray for creating the preliminary impression which was also statistically significant (p=0.034). Only 3.3% reported that they use stock plastic tray. The material of choice for preliminary impression was irreversible hydrocolloid (alginate) (66.7%); 15% of practitioners showed using modelling plastic impression compound. (Table 2,3) A majority of the respondents (78.3%) favoured selective pressure impression philosophy. 15% advocated using the mucostatic technique and 6.7% utilized the muco-compressive procedure. Most of the practicing prosthodontists used self-cure acrylic for the fabrication of custom trays (96.7%). Of the respondents those fabricated custom tray, 58.3% preferred to construct the tray a couple of days before final impression making, others made few hours before on the day of procedure. All respondents border moulded the custom tray before taking final record. 88.3% recorded the borders in sections, 10% simultaneously recorded all the borders and 1.7% reported using both the techniques. The most widely used material for peripheral tracing of the custom tray was modelling plastic impression compound (95%), followed by wax (5%). It was seen that maximum prosthodontists used zinc eugenol impression paste (73.3%), polyvinylsiloxane (11.7%), polyether impression material (11.7%) and polysulphide impression material (3.3%)

Table 1- Questionnaire of the present study

S. No.	Question
1	Which material do you prefer for primary impression?
2	Which type of tray you prefer for creating preliminary impression?
3	Which technique you prefer to take impression?
4	Which material do you prefer to fabricate custom trays?
5	When do you usually fabricate custom trays for final impression making- few days before or few hours before?
6	How do carry out border moulding – in section/all-together/ or use both techniques?
7	Which material do you prefer for peripheral tracing of custom tray?
8	Which impression material you usually use for taking final impression?

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9	Which method you utilize to determine the borders of custom tray? (marking on preliminary impression/ marking on preliminary cast/ others)
10	Do you incorporate wax spacer in custom tray?
11	Do you include tissue stops in fabricated custom tray?
12	Are relief holes included in your fabricated custom tray?
13	Which technique do you use for determining depth of posterior palatal seal in final impression?
14	Do you correct minor deficiencies in your final impression?
15	How do you locate posterior palatal seal in final impression? (marking intra-orally/arbitrary cast carving/ others)
16	Do you advise patients not to wear dentures for 24 hours before final impression?

Table 2- Percentage distribution noted in the present study

Q. No.	Variables	Answers
1	Material for primary impression	• 66.7%- irreversible hydrocolloid (alginate) • 15%- impression compound
2	Type of tray for primary impression	• 95% -metal tray • 3.3% -stock plastic tray
3	Technique for taking impression	• 78.3%- selective pressure • 15% -mucostatic technique • 6.7% - muco-compressive technique.
4	Material used for fabricating custom trays	• 96.7%- self-cure acrylic • 3.3%- others
5	Timing for fabricating custom tray	• 58.3% -construct the tray a couple of days before final impression • 41.7%-construct a couple of hours before
6	Border moulding technique	
7	Material for peripheral tracing of custom tray	• 95%- impression compound • 5%- wax
8	Material for final impression	• 73.3%- zinc eugenol • 11.7%- polyvinylsiloxane

		• 11.7%- polyether • 3.3%- polysulphide
9	Method for determining border of custom tray	• 88.3%- in sections • 10%-all in one go • 1.7%- both
10	Wax spacer in custom tray	• 90% -wax spacer • 10% -others
11	Tissue stops in custom tray	• 95% - yes • 5%- no
12	Relief holes in custom tray	100%- yes
13	Technique for determining depth of PPS in final impression	• 75%- T- burnisher • 23.3 % -arbitrarily • 1.7% -both
14	Correction of minor faults in final impression	• 70% -corrected minor deficits with dental wax • 30%- no corrections
15	Method for locating PPS in final impression	• 88.3%- marking intra-orally • 8%-arbitrary cast carving • 3.7%-other
16	Advising patients to stop wearing dentures 24 hours before final impression	• 78.3%- advice against wearing • 21.7%- no such advice

Table 3- Measurements of the data in the present study

S. No.	Mean ±SD	P value
1	1.36±1.12	0.07
2	1.23±1.09	0.034
3	1.57±1.31	0.088
4	2.12±1.22	0.094
5	1.63±1.33	0.067
6	1.69±1.27	0.058
7	2.16±1.98	1.34
8	1.03±0.98	0.01
9	1.11±0.92	0.023
10	3.03±2.12	1.78
11	2.15±1.24	1.12
12	3.45±1.89	2.3
13	1.22±0.89	0.066
14	1.36±1.12	0.086
15	1.99±1.02	0.98
16	1.78±1.16	0.77

**p<0.05 is significant*

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DISCUSSION

The impression process of complete denture is a vital step which tailors prosthesis to suit optimum denture-supporting area and safeguards a peripheral seal. Preliminary impression is made with various impression materials from modelling compound to alginate in a stock metal tray. Currently, there has been an increase in the use of high viscosity irreversible hydrocolloid as a primary impression material due to its availability and working properties.[25-30] The current study showed that the bulk of practitioners preferred alginate for creating primary impression while a way smaller percentage of them used impression compound. Previous studies in UK, India, and America revealed the similar tendency among clinicians to employ alginate impression materials. Hyde TP and McCord JF reported in their study where, 905 questionnaires were sent to general dental professionals within the Greater Manchester area to assess their clinical preferences. They revealed that 88% of participants used only irreversible hydrocolloid for taking primary impressions. In response to an equivalent question for secondary impressions, 94% of respondents mentioned irreversible hydrocolloids as an option. Additional materials stated as a choice for secondary impressions included zinc oxide–eugenol (29%) and polyvinyl siloxane (13%). There are many materials for the final impression however preferences vary much among dentists but there is no evidence to justify that one procedure or material produces better long term results than the another.[31] In our study, we noticed that all the respondents carried out both primary and final impression procedures. The custom tray was border-moulded prior to final impression procedure. This finding corelated with the findings from earlier studies. The most preferred material for the fabrication of custom trays was autopolymerizing acrylic (96.7%). These findings are in agreement with earlier studies. 58.3% preferred to construct the custom tray a few days prior to making final impression. These results are in agreement with from former studies.[32] Evidences indicate that there exist noticeable differences within the choice of ultimate impression materials in several geographic regions. Analysis of the surveys conducted within the western countries reveals that metallic oxide pastes have fallen from popularity and there's predilection in use of elastomeric impression materials; initially polysulfide and recently polyvinylsiloxanes. In striking contrast to the present result, majority of respondents within the current survey used flowers of zinc eugenol impression paste for final impression. This finding coincided with the findings from studies conducted among practitioners in South East Asia.[33] The possible explanation for the preferred use of zinc oxide eugenol in this region could be its cost effectiveness and the difference in teaching and training in dental schools.

CONCLUSION

Maximum prosthodontists used conventional techniques of complete denture impression techniques. They largely used impression philosophy among majority of respondents was selective pressure technique.

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