

# Preference of impression material and technique for complete denture treatment among the dental practitioners in Bhubaneswar: Questionnaire Based Survey

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## Abstract

**Background & Aim:** Proper impression procedure is essential for obtaining good retention, support and stability for complete denture. With time various impression materials and techniques have evolved, presently computer aided design/computer aided manufacturing (CAD/CAM) technology in the field of removable complete denture prosthetics have effectively reduced patient visits and decreased chair side time, thus expediting the otherwise cumbersome process. Despite the advances, material choice usually relies on personal preference and experience and varies from those taught in dental schools. This study focuses on questionnaire-based survey to assess and know the impression materials and techniques for complete dentures that are being followed by the dental practitioners (DPs) in Bhubaneswar. **Method:** A total of 400 questionnaires were sent to dental practitioners (DPs) in Bhubaneswar to assess and know the impression materials and techniques for complete dentures that are preferred by them. **Results:** The results revealed that general practitioner preferred using irreversible hydrocolloid for primary impression and for secondary impressions Zinc oxide-eugenol (ZOE) was preferred material of choice for impression making in complete denture. **Conclusions:** The survey reflects a diverse range of clinician preferences but in the era of evidence based dentistry, clinical decision making should be made on best available evidence with the fact in mind that patient satisfaction and comfort is our ultimate goal.

**Keywords:** Impression Materials, Digital Impressions, Clinician Preference.

## 1. INTRODUCTION

An accurate impression is of critical importance for the success of a complete denture. The accurate reproduction of the edentulous arch is required for the stability, fit, and esthetics of the removable prosthesis. Through the years, different materials and techniques have been used for making impressions of edentulous arches. The procedure for border molding has been accepted and taught in dental school in the conventional manner for decades and is still the widely used technique for replicating the intraoral anatomy. Evidence gathered from the literature suggests that the impression techniques used in general dental practice may vary from those taught at dental schools.<sup>1</sup> 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 stated that digital impressions present with a several benefit of 3-D pre-visualisation, cost-effective and reduced working time.<sup>2</sup> Other advantages include elimination of tray selection procedure; minimising the risk of distortion and material consumption and enhanced patient comfort and acceptance.<sup>3,4</sup> These impressions can be stored electronically and communicated as digital information.<sup>3,5</sup> Currently CAD/CAM technology has been applied in fabricating complete dentures. Given the variety of recommendations, the dental practitioner is faced with a choice of materials and techniques for complete dentures impressions. The aim of this survey was to assess and know the impression materials and techniques for complete dentures that are being followed by the dental practitioners in Bhubaneswar.

## 2. MATERIAL AND METHODS

A structured questionnaire was designed to collect the data. A questionnaire was prepared on Google form and was mailed and shared on social media groups to 400 dental practitioners (DPs) in Bhubaneswar. The email addresses of the dentists were obtained from the Indian Dental Association (IDA) and Indian Prosthodontic Society (IPS) Odisha branch member lists. The first part of the questionnaire considered the general information such as demographic information, types of practice, and years of experience. The second part consisted of 14 multiple choice questions 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. (Table 1) Descriptive analyses were conducted to analyze all items on questionnaire using SPSS statistics software.

## 3. RESULTS

A total of 220 responses were received. Out of 400, 60 incomplete forms were submitted and 130 did not submit their responses therefore were eliminated from the study. The total numbers of dental practitioners who responded were grouped on the basis of qualification and their types of practice whether working in Dental School or had a private practice or both to analyze the responses given (Table 2). The total years of experience ranged from 1 to 35 years. 182 (82.7%) DPs routinely provided conventional complete dentures in their routine clinical practice where as 38 (17.3%) did not. (Figure 1) Regarding the primary impression

procedures, 89 (40.4%) DPs preferred irreversible hydrocolloid impression material and the second most favour material was impression compound 85 (38.6%). (Table 3) With respect to final impression procedures, the great majority of the respondents 212 (96.4%) favoured the use of laboratory constructed special trays (Figure 2). The material of choice for construction of custom tray was self cure acrylic resin 181 (82.3%). (Table 4) The spacer was used by many clinicians (Figure 3) with the design preference of full spacer with tissue stops 155 (70.4%). (Table 5) Most of the DPs 203 (92.3%) preferred border molding with green stick compound (Table 6) and used Zinc oxide Eugenol impression material for final impression. (Table 7) As far as awareness regarding digital impressions for fabricating complete denture was concerned 170 (77.2%) were aware of it (Figure 4) but had not fabricated complete denture using digital impression method 217 (98.9%). A very negligible number of DPs 3 (1.36%) had fabricated complete denture using the digital method of impression making and preferred this method because they experienced reduced chair side time. (Figure 5). The most observable reason for not fabricating complete denture was the cost factor (Figure 6) where as the conventional method of fabricating complete denture was preferred because of it being cost effective and DPs were comfortable with the procedures. (Table 8)

**Table 1:** The Questions for the study

Question Number	Question	Answer Options
1.	Do you routinely provide conventional complete denture in your clinical practice?	Yes or No
2.	Are you aware of digital impressions in complete denture?	Yes or No
3.	Have you fabricated complete dentures using the digital impression?	Yes or No
4.	The reason for not fabricating a complete denture using the digital impression	List of Options
5.	If you fabricate complete denture using the digital impression, you prefer digital method of impression making in complete denture because	List of Options
6.	You prefer conventional method of impression making in complete denture because	List of Options
7.	Which material do you prefer from the given list below for primary impression?	List of Options
8.	Do you record secondary impression for your conventional complete denture case?	Yes or no
9.	Do you routinely use laboratory constructed special trays to take secondary impressions?	Yes or no
10.	Which of the following materials would you use for constructing a special tray for a definitive impression?	List of options
11.	Do you use spacer in the custom tray?	Yes or no
12.	If yes, what design of the spacer do you use?	List of Options
13.	Which material do you use to carry out border molding?	List of Options
14.	What is the choice of material for secondary impression?	List of Options

**Table 2:** The frequency of the dental practitioners included into the study based on their qualification and their attachment to Dental School/Private practice/both.

Qualification	BDS	MDS (Prosthodontist)	MDS (Others)	Total
Attachment				
Dental School	20	32	24	76
Private practice	55	16	26	97
Both	10	37	0	47
Total	85	85	50	220

**Table 3:** The frequency of answer of DPs to Question no 7-Which materials do you prefer from the given list below for primary impression? along with the list of options.

<b>A</b>	Irreversible hydrocolloid	89 (40.4%)
<b>B</b>	Impression Compound	85 (38.6%)
<b>C</b>	Polyvinyl siloxane	30 (13.6%)
<b>D</b>	Impression plaster	-
<b>E</b>	Zinc oxide and Eugenol	-
<b>F</b>	Others	16 (7.2%)

**Table 4:** The frequency of answer of DPs to Question no 10- Which of the following materials would you use for constructing a special tray for a definitive impression? along with the list of options

<b>A</b>	Shellac	9 (4%)
<b>B</b>	Self-cured acrylic resin	181 (82.3%)
<b>C</b>	Light-cured acrylic resin	30 (13.6%)
<b>D</b>	Others	-

**Table 5:** The frequency of answer of DPs to Question no 12- what design of the spacer do you use? along with the list of options

<b>A</b>	Full spacer with tissue stops	155 (70.4%)
<b>B</b>	Full spacer without tissue stops	13 (5.9%)
<b>C</b>	Partial spacer	47 (21.3%)
<b>D</b>	Others	5 (2%)

**Table 6:** The frequency of answer of DPs to Question no 13- Which materials do you use to carry out border molding? along with the list of options

<b>A</b>	Green stick (low fusing compound)	203 (92.3%)
<b>B</b>	Putty (Rubber base)	13 (5.9%)
<b>C</b>	Any other	4 (1.8%)

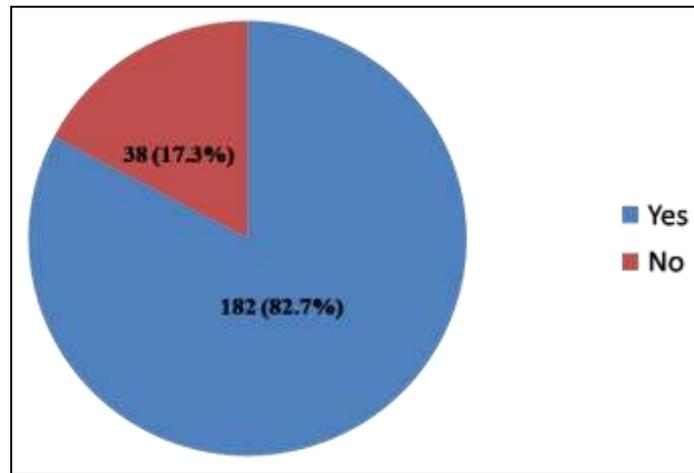
**Table 7:** The frequency of answer of DPs to Question no 14- What is the choice of material for secondary impression? along with the list of options

<b>A</b>	Irreversible hydrocolloid	-
<b>C</b>	Polyvinyl siloxane	44 (20%)
<b>D</b>	Impression plaster	-
<b>E</b>	Zinc oxide and Eugenol	176 (80%)
<b>F</b>	Others	-

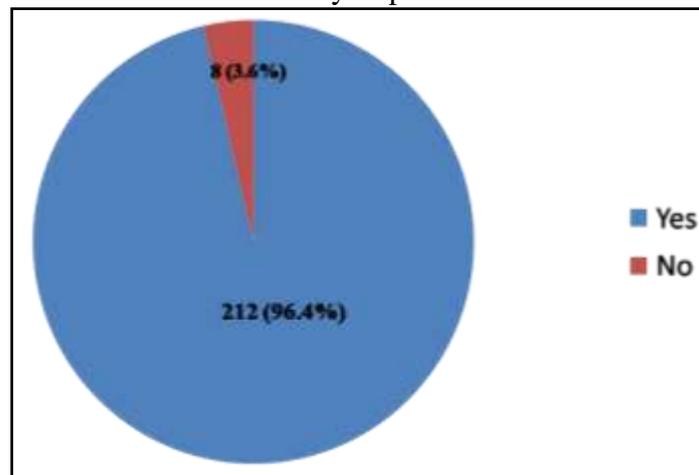
**Table 8:** The frequency of answer of DPs to Question no 6- You prefer conventional method of impression making in complete denture because (along with the list of options)

<b>A</b>	Cost effective	43
<b>C</b>	Comfortable with the procedures	13
<b>D</b>	Both a and b	147
<b>E</b>	Others	14

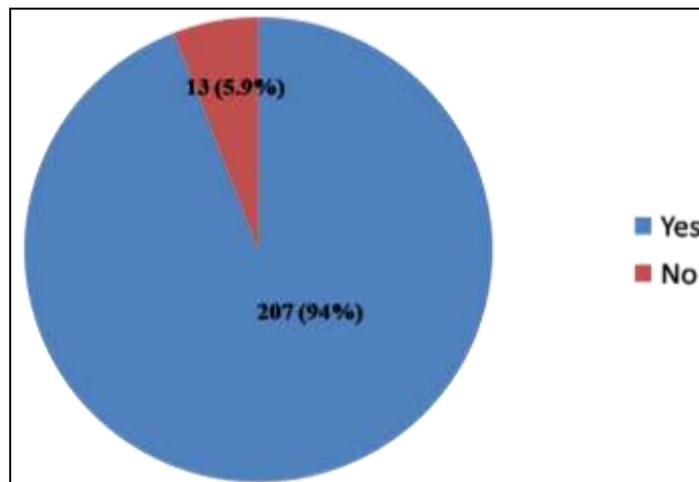
**Figure 1:** The frequency of DPs routinely providing conventional complete denture in their clinical practice.



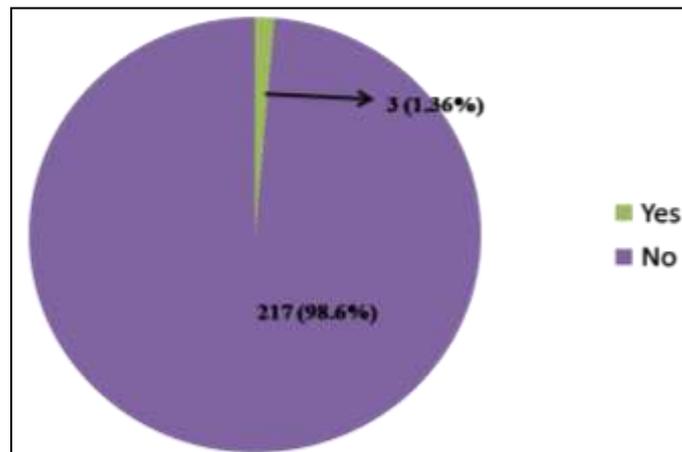
**Figure 2:** The frequency of DPs routinely using laboratory constructed special trays to take secondary impressions



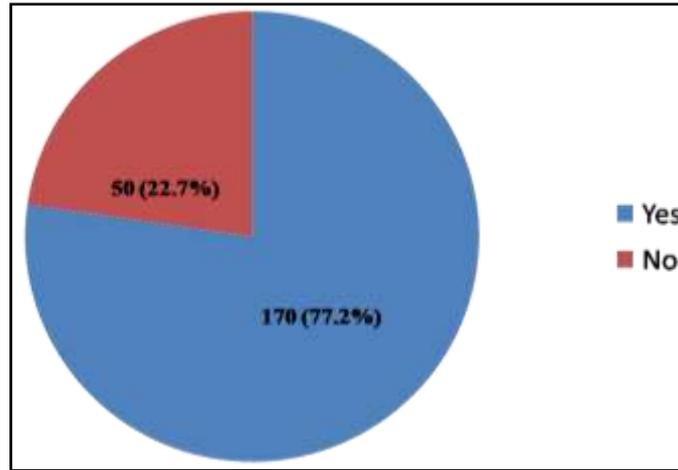
**Figure 3:** Response to question no. 11-Do you use spacer in the custom tray?



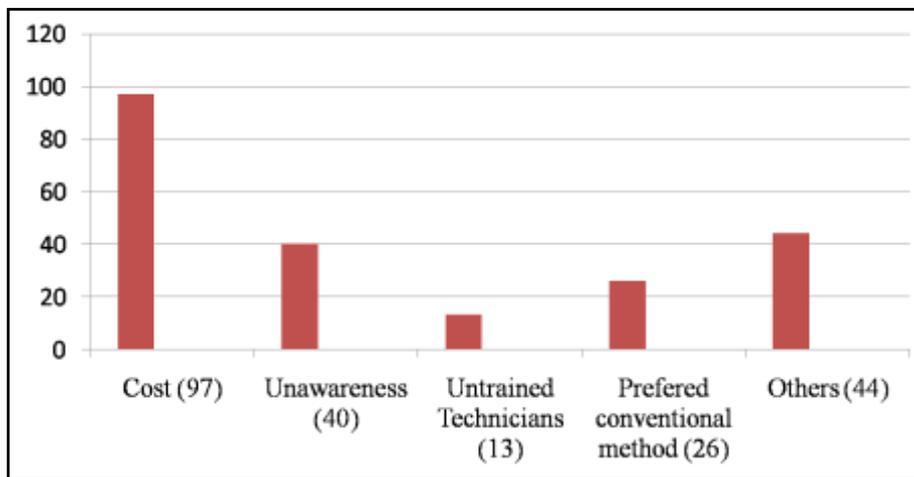
**Figure 4:** Awareness of digital impressions in complete denture among DPs



**Figure 5:** The frequency of DPs fabricating complete dentures using the digital impression



**Figure 6:** Reason for preferring conventional method of impression making in complete denture over digital impression.



#### 4. DISCUSSION

The impression procedure of complete denture is a critical step which customizes the prosthesis to the optimal denture-supporting area and ensures a peripheral seal. The results of the current survey revealed that impression techniques and material used in private dental practice varied from those taught at dental school. The current study showed that the majority of practitioners preferred irreversible hydrocolloid (alginate) impression material for making primary impression. Although the percentage of DPs using impression compound was lesser than irreversible hydrocolloid, surprisingly the DPs using impression compound were working in Dental schools. This could emphasize on the fact that DPs still prefer impression compound for primary impression when it comes to teaching undergraduate students but the same practitioners working in their private practice preferred irreversible hydrocolloid. 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.<sup>6, 7, 8,9,10</sup> Hyde TP and McCord JF did a survey, a total of 905 questionnaires were sent to general dental

practitioners in the Greater Manchester area to identify current clinical practices. The results of the study revealed that 88% of respondents use only irreversible hydrocolloid for primary impressions. In response to the same question for secondary impressions, 94% of respondents mentioned irreversible hydrocolloids as an option. Other material mentioned as an option for secondary impressions included zinc oxide–eugenol (29%) and polyvinyl siloxane (13%).<sup>6</sup> 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. A Medline/PubMed search was done by Gunnar CE for articles on impression materials and method. Among many articles only two controlled studies were found suggesting choice of material for complete denture impressions, the first one compared fluid wax and polysulfide rubber for mandibular complete denture impression and demonstrated that there was no significant difference in adjustment of dentures up to one year after delivery. The other study compared three materials for final impression and found ZOE was the least favoured material.<sup>11</sup> Many general practitioners use a single alginate impression as the definitive impression for the construction of complete dentures, which conflicts with the teaching in practically all dental schools.<sup>1</sup> The basic impression philosophies proposed over years for impression making are: mucostatic, muco compressive, and selective-pressure impressions technique.<sup>12,13</sup> Out of various impression philosophies proposed over years, the selective-pressure impression technique is most accepted. It combines the principles of both muco compressive and minimal pressure techniques, which were proposed by Carl O. Boucher.<sup>13</sup> Selective pressure can be achieved by fabrication of a custom tray with a proper spacer design. A wide range of spacer design is available for different situations. Based on the particular condition, the dentist needs to select spacer design for the success of complete denture therapy. The use of custom tray with a proper spacer design and its application during impression making is of utmost importance for stable, retentive prostheses that is in harmony with surrounding and underlying tissues.<sup>14</sup> The result of survey done by Kakatkar VR showed the design of the spacer used by 72 % is full spacer with tissue stops.<sup>9</sup> The present study observed that many DPs opted for full spacer with tissue stops. With respect to construction of custom tray the favour material was self cure acrylic resin. Result of study done by Kakatkar VR showed 67% preferring the use of self cure acrylic resin for fabricating custom trays.<sup>9</sup> Differing result with preference of shellac base plate for custom tray fabrication was observed by Hyde TP and McCord JF.<sup>7</sup> During under graduation training programme green stick compound is commonly used. 95% of US dental schools and 81% of North American dental students used green stick compound.<sup>8, 10</sup> In the current study the most reported border molding material was green stick modeling compound.

In the present study it was observed that Zinc oxide eugenol impression paste was preferred by the practitioners working in Dental colleges. On the basis of qualification poly vinyl siloxane was preferred material by the practitioners who had a master's degree of whether Prosthodontics or other speciality. Since the last decade, several investigators have recommended using newer elastomeric materials such as polyvinylsiloxane and polyether for final impressions to replace the older and more traditional materials.<sup>10</sup> It is reported complete dentures fabricated with the conventional method that included a preliminary impression made using alginate in a stock tray and subsequently a final impression made using silicone

in a border moulded custom tray resulted in higher general patient satisfaction.<sup>15</sup> The concept of digital impressions using CAD/CAM is growing quickly for impression making procedures over conventional methods.<sup>16</sup> Chandran SK et al suggested that digital impressions are superior to conventional impressions. Their study included systemic review of 36 articles. Among which 24 studies which compared digital and conventional impression, based on accuracy, suggested that digital impression possessed superior accuracy. On patient preferences 4 articles concluded digital impression as the preferred choice. And 8 studies assessed the operator preference and the outcome was in support of digital impressions.<sup>17</sup> Ruthwal Y et al stated that the intraoral digital impression technique has a distinct superiority in work efficiency and saving of materials.<sup>18</sup> Despite of the advantage the technology is providing, in the present study the digital impression procedure was not utilized by many practitioners. The expense in these methods being enormous discourages many practitioners to shift from the conventional methods which are simple and cost effective to the new digital era. To overcome these hurdles dedicated and timeless research continues to develop hardware and software so as to make these technologies in reach of the practitioners. Undoubtedly training and continued education is needed to adapt to newer technology. Sang LJ et al did a study to evaluate the difficulty level and operator's perception between dental students and experienced clinician when making digital and conventional implant impression. The result of their study concluded that the clinician group felt more proficient with the conventional impression technique.<sup>19</sup> D'Arienzo LF et al stated that digitization of edentulous jaw was feasible with the use intraoral scanner, only to replace the preliminary impression and constructing a special tray. It is essential to exert a selective pressure in peripheral areas that is currently not possible without the functional impression.<sup>20</sup>

## 5. CONCLUSION

Several 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. A thorough knowledge of oral anatomy, material sciences, and various techniques is essential for complete understanding of impression concepts and principles. Despite the advances, material choice usually relies on personal preference and experience. Regardless of what material or technique is utilized the success of complete dentures largely depends on the operator's skill to record the denture bearing area accurately. This study explained the current trends of dental practitioners regarding impression procedures in complete dentures. Proper impression procedure is essential to obtain good retention, support and stability for complete denture.

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