

Complete Denture Impression Procedures and Techniques Practiced by Dentists across the State of Gujarat: A Survey

Dr. Rupal J. Shah¹, Dr. Sanjay B. Lagdive², Dr. Prakash K. Barajod³,
Dr. Maulik N. Patel⁴

¹(H.O.D and Professor, Department of Prosthodontics Government Dental College and Hospital, Ahmedabad, India)

²(Professor, Department of Prosthodontics Government Dental College and Hospital, Ahmedabad, India)

³(Postgraduate student, Department of Prosthodontics Government Dental College and Hospital, Ahmedabad, India)

⁴(Department of Prosthodontics Government Dental College and Hospital, Ahmedabad, India)

Abstract: Impression making is an essential step of complete denture construction. While many surveys have been done on this topic elsewhere, there are few such surveys in India and none in Gujarat. Aims: The purpose of this study was to survey dental practitioners across the state of Gujarat for complete denture impression materials and techniques. Materials and Methods: A questionnaire consisting of 20 questions regarding complete denture impression procedures was prepared for the purpose of an online survey which was randomly sent to 1504 dental practitioners through e-mail followed by a second reminder email to the non-respondents. Microsoft Excel was used to prepare graphs to show the percentage of responses. Results and Conclusions: Following a reminder e-mail, 995 practitioners replied, yielding a response rate of 66%. The following conclusions could be drawn from the results: Impression compound was the most frequently used material (78%) for preliminary impression. Selective pressure was the most predominant impression philosophy (91%). Most dentists performed final impressions in a border molded custom tray. The most common materials of choice for border molding and final impressions were modeling plastic impression compound (88%) and zinc oxide eugenol paste (84%) respectively. 79% respondents made a special consideration for flabby tissue.

Keywords: Complete denture, Dentists, Gujarat, Impression materials and techniques.

I. Introduction

The rate of edentulism has declined owing to the fact that more people are retaining their natural teeth to a greater age. However, as the adult population is also rising, it can be concluded that a sizable patient population will continue to need complete denture services [1]. While these reports are for the U.S; it can be safely assumed that in India, with a large number of socioeconomically disadvantaged rural people, the need for complete denture services will surely remain high.

Impression making is an essential step for complete denture construction. The complete denture impression procedures are essential in that they impart a border seal with proper extensions that result in a stable and retentive denture base [2-4].

Theories of impression making have evolved through trial of a variety of materials and techniques. Even if selective pressure is the most accepted and followed impression philosophy; there are variations in designing of the custom tray for the same, as advocated by different academicians [3-14]. Newer elastomeric materials for border molding and final impressions have also been introduced, [15,16] as are modified impression procedures for special clinical situations [17-19].

Many surveys on complete denture procedures have been reported in the past. These have involved surveys of schools, laboratories and general/prosthodontic practitioners, both in the U.S and U.K [20-32]. Only a few such surveys have been done in India [33,34] and there are no reports in literature about the materials and techniques for complete denture impressions currently used by dental practitioners of Gujarat. The purpose of this study was- to survey the dental practitioners of Gujarat regarding the same and present and compare the results with the current respective trends elsewhere (in India and other countries) discussing its scientific basis.

II. Methodology

A slightly modified questionnaire based on a recent survey [32] was prepared and first tested by the faculty members of the Prosthodontia Department. An online survey of the tested and corrected questionnaire was then sent randomly to 1504 dental practitioners. The survey comprised of 20 questions regarding impression procedures which would take approximately 5 minutes to complete. All responses remained

anonymous. Each respondent was allowed to choose only one option from the given set of answers. An additional provision for writing comments was also provided for some of the questions.

The results were prepared in graphs using Microsoft Excel.

III. Results

Following a reminder e-mail to those who had not responded, 995 practitioners replied, yielding a response rate of 66%. (All percentages in this article are rounded to the nearest whole number).

With regards to qualification, 37% (368) of respondents were post graduates, out of which 34% (126) were Prosthodontists.

A majority of respondents- 97% (965) reported practicing complete denture prosthodontics.

Of the 965 respondents; 943 (98%) reported performing both preliminary and final impressions, while 10 (1%) did not. 12 respondents reported (1%) taking a single impressions only in some cases (Fig 1). Some of the comments from such respondents were “as per alveolar ridge condition”, “only one impression is taken, when silicone putty along with a wash impression is used” and “for a repeat denture, we use the old dentures and directly take final impressions”.

With regards to the type of tray used for making preliminary impressions, 897 respondents (93%) indicated using stock metal trays, 58 (6%) used stock plastic trays, and 10 (1%) used thermoplastic trays (Fig 2).

618 (64%) respondents did not separately modify the stock trays with any material prior to making the preliminary impression, 280 (29%) modified and 67 (7%) did so in some cases only (Fig 3). Some of the comments from respondents who indicated “not always”, were: “depends on bone height and vestibular depth”, “only if the tray is hurting or touching the ridge” and “depends on the ridge”.

Among the respondents who separately modified the stock trays, the material of choice was modeling plastic impression compound for 180 respondents (52%) followed by wax materials for the remaining 167 (48%) (Fig 4).

An overwhelming number of respondents, a total of 753 (78%) used impression compound as the material of choice for primary impression, 193 (20%) respondents used irreversible hydrocolloid, followed by 19 (1%) using elastomeric putty (Fig 5).

A majority of respondents 869 (91%) used selective pressure for final impressions, followed by conventional technique employed by 86 (9%). None used the functional technique or the mucostatic technique.

Autopolymerizing acrylic resin turned out to be the most widely used material for fabrication of custom tray with a total of 745 respondents (78%) using it, followed by shellac used by 172 (18%) respondents. Only 17 (2%) and 19 (2%) respondents used heat processed acrylic resin and visible light cured urethane dimethacrylate respectively.

There was a preference to fabricate the custom tray a few hours before the procedure by 716 (75%) respondents; 228 (23%) fabricated the custom tray a few days before the procedure while 11 (2%) mentioned “other”. Some of the comments by the respondents who indicated “other” were: “not specific with timing but special tray is kept adapted to cast”, “after getting the preliminary cast” and “one day before making the impression”.

A spacer was used by 765 (80%) respondents when fabricating the custom tray, while the remaining 190 (20%) did not use a spacer.

Of the 765 respondents who used a spacer; 268 (35%) employed a spacer design covering only the secondary stress bearing and relief areas, 221 (29%) employed a full spacer with tissue stops and additional relief, 153 (20%) used a spacer in special circumstances only and, the rest of the 123 (16%) made use of a full spacer not covering the major stress bearing areas with additional relief if required (Fig 6).

Of the 765 respondents who used a spacer; 274 (36%) decided the thickness arbitrarily, 261 (34%) decided spacer thickness based on the amount of relief and 230 (30%) decided the thickness based on the choice of impression material. A total of 937 (98%) respondents, border molded the custom tray for making final impressions, while only 18 (2%) did not. Among the respondents who border molded the custom tray, the most commonly used material was modeling plastic impression compound (green stick) used by 826 (88%) respondents; 75 (8%) used wax, 20 (2%) used polyether and 16 (2%) used polyvinylsiloxane.

Most respondents- 821 (86%) placed relief holes prior to making final impressions; 105 (11%) did not and 29 (3%) indicated “not always”. Some of the comments by respondents who mentioned “not always” were: “for upper impressions only”, “in some cases based on conditions such as torus or flabby tissue” and “poor ridge”. The final impression materials used majorly was zinc oxide eugenol paste- by 802 (84%) respondents; 67 (7%) used polyvinyl siloxane; 47 (5%) used non-eugenol paste and the remainder 4% used polyether (19), irreversible hydrocolloid (12) and “other” (8). Some of the responses as “other” included: “condensation silicone”, “both ZOE and PVS” and “zinc oxide paste for routine cases and elastomeric light body impression paste for flabby/knife edged ridges”.

754 (79%) respondents made a special consideration for movable tissue, while the remaining, 201 (21%) did not. Of those who made a special consideration for flabby tissue; 294 (39%) respondents placed relief holes in custom tray, 211 (28%) used a spacer on the cast, 166 (22%) used a modified impression technique (composite impression techniques, window method e.t.c.), and 83 (11%) performed selective reduction of custom tray (Fig 7).

IV. Figures

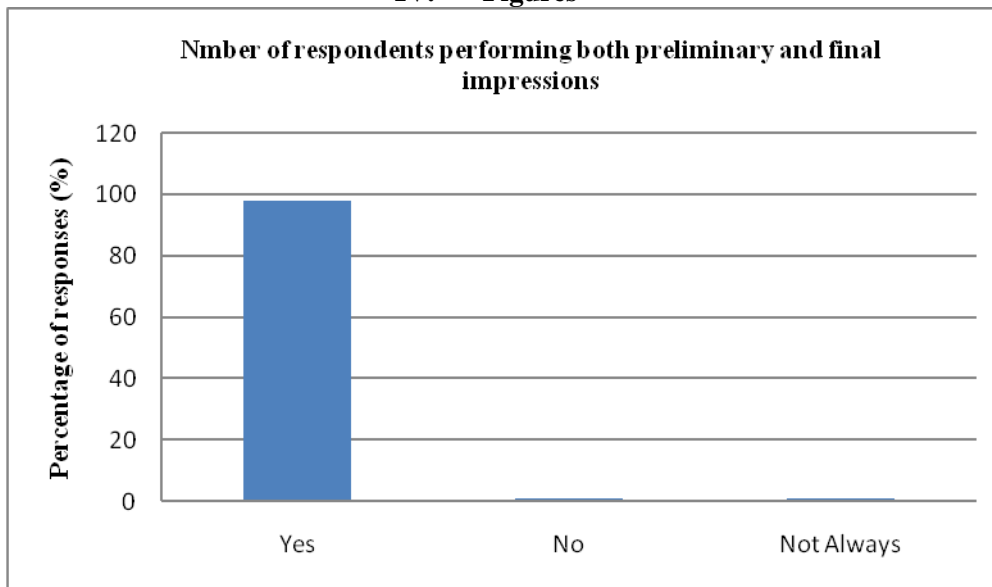


Figure 1: Percent distribution of responses for the number of respondents performing both preliminary and final impressions.

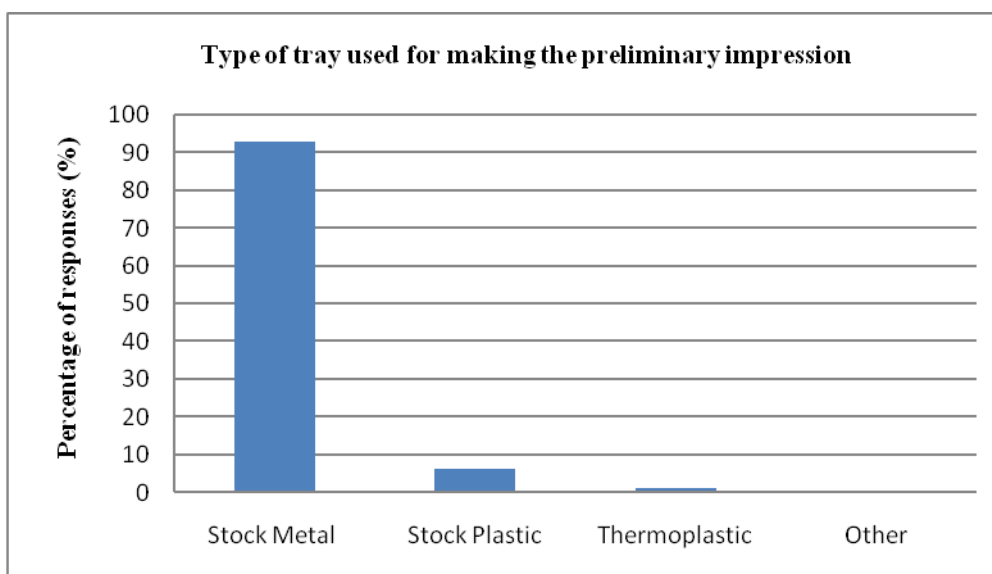


Figure 2: Percent distribution of responses for the type of tray used for making the preliminary impression.

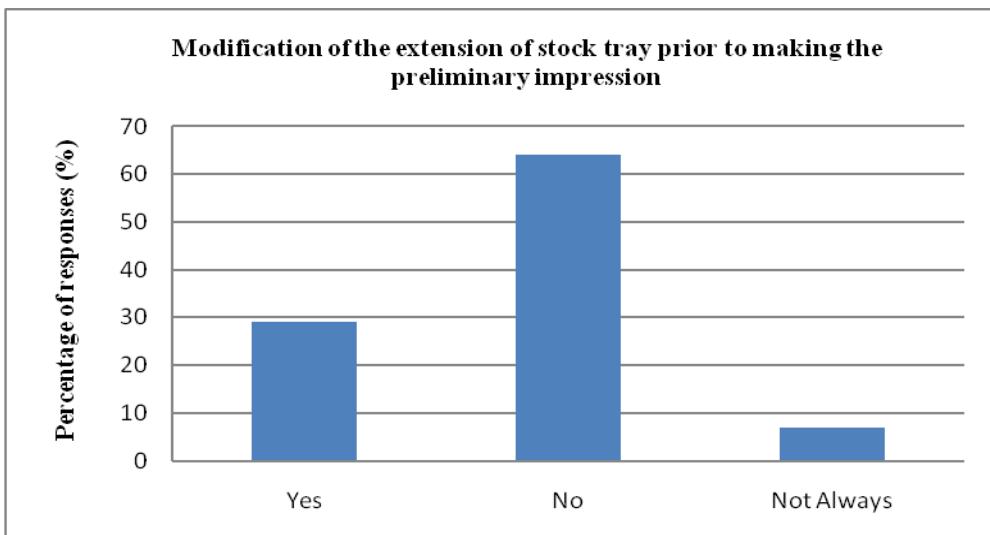


Figure 3: Percent distribution of responses for the modification of the extension of stock tray prior to making the preliminary impression.

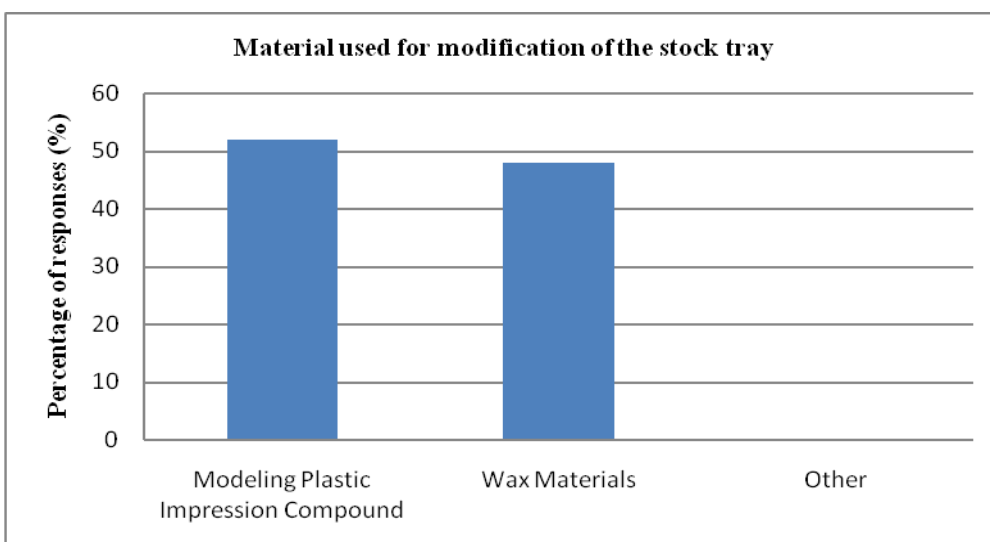


Figure 4: Percent distribution of responses for the material used for modification of the stock tray.

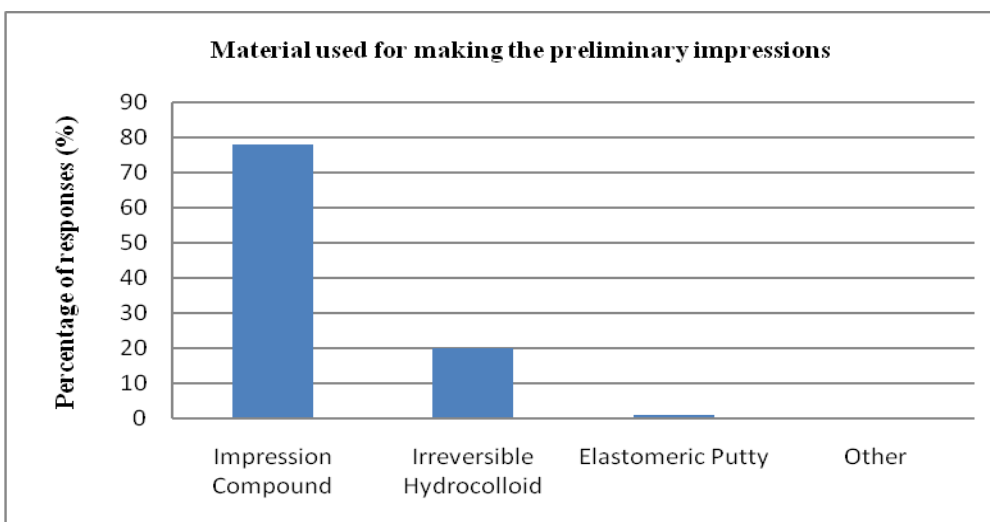


Figure 5: Percent distribution of responses for the material used for making the preliminary impression.

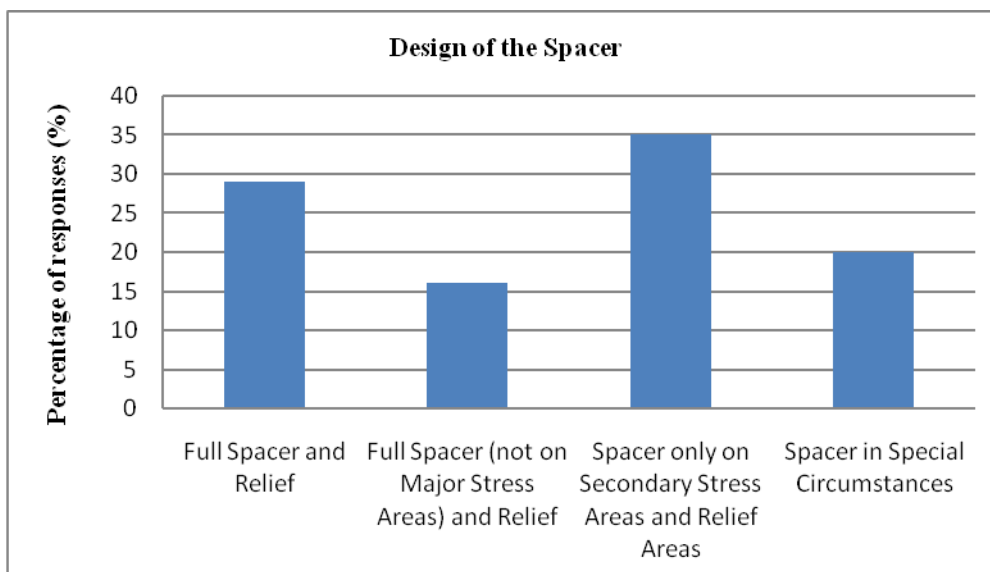


Figure 6: Percent distribution of responses for the design of the spacer.

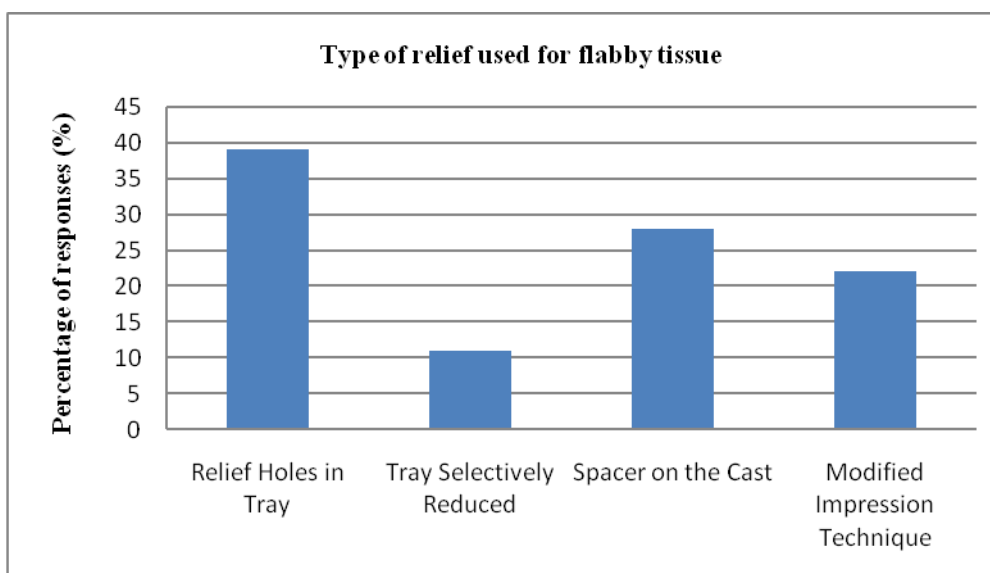


Figure 7: Percent distribution of responses for the type of relief used for flabby tissue.

V. Discussion

Majority of dentists (97%) participating in the survey practiced complete denture prosthodontics. The remaining dentists who did not, dropped out from the rest of the survey. So, the final sample size after Question 3 was 965.

Majority of dentists (98%) performed both preliminary and final impressions as part of complete denture therapy. This is consistent with the results of past surveys [24,27,30-34]. Recording of the definitive impression is the keystone of the denture-prescribing process [35]. Since 1950, it has been emphasized that a custom tray must be constructed from the cast of preliminary impression and a secondary impression be made in the custom tray. This fact has been repeatedly documented [2, 35-37].

Majority of them (93%) use stock metal trays for preliminary impressions. This is in contrast to a recent survey of post-doctoral program of dental schools in the U.S, wherein almost equal preference for both metal and plastic trays was found [32]. Although any tray can be used, consistently successful results tend to be produced when rigid trays of appropriate extension are used [35], hence the advantage of using metal trays.

64% of respondents did not separately modify the stock trays prior to making the preliminary impression. This is in agreement with a U.S postdoctoral program survey. No clear majority was found in favour of the material used for modifying the stock trays, as opposed to the previous survey wherein wax was used by the majority [32].

The most commonly used preliminary impression material in this survey was impression compound (78%); irreversible hydrocolloid was used by only 20% respondents. This is in agreement with a previous survey of private dental practitioners in India [34]. However, another survey of four major Indian cities showed that a majority (71%) use alginate for preliminary impressions [33]. Similar findings have been reported in a survey of practitioners in the United Kingdom [27]. A study of previous surveys of U.S dental schools also shows that the use of alginate as the primary impression material of choice has increased over the years [24-26,29,32].

For fabricating custom trays, 78% use autopolymerizing acrylic resin and 18% still use base plates. A survey of Indian cities also showed similar results [34]. Using base plates is not recommended, as it is a thermoplastic material. Previous surveys of U.S dental schools revealed that a majority use visible light cured resin to fabricate custom trays [28, 32]. Visible light cured resin exhibits lower residual monomer because of complete polymerization and, smaller polymerization shrinkage resulting in intimate adaptation to the tissues. At the same time it has high strength and rigidity [38,39].

There was a preference (75%) to fabricate custom trays a few hours before the procedure. This is in contrast with a previous U.S. dental school survey where 73% respondents fabricated custom trays a few days before the procedure to prevent distortion [32]. Research indicates that autopolymerizing acrylic resin tray should be fabricated 24 hours before the impression procedure [40]. Visible light-cured resins exhibit dimensional stability immediately after curing, thus allowing immediate clinical use after fabrication [38].

A very high percentage (98%) of respondents, who used a custom tray, also performed border molding. This has been the case with all previous surveys [20,23,24,28,30,32]. This reflects that border molding is a critical component of making impressions as it ensures a stable and retentive peripheral seal [35].

Most respondents (88%) used modeling plastic impression compound for border molding; only 4% used elastomeric impression materials including polyvinylsiloxane and polyether. A recent survey of Indian cities revealed a slightly higher percentage (17%) that uses elastomeric materials for border molding [34]. Previous surveys of the U.S dental schools and/or prosthodontists/general dentists have also shown modeling plastic impression compound as the major choice for border molding [20,23-26,28,30,32]. However, a close observation of these surveys shows a gradual rise in the use of elastomeric materials for border molding [26,28,30,32]. There are several advantageous features of modeling plastic impression compound including low cost, dimensional stability, little material waste, long shelf life and; its ability to place it incrementally, observe the surface and trim it back or add more material, and then readapt the same periphery. The compound border molding technique gives the dentist a profound understanding of the patient's anatomy [8,41]. On the other hand, an important advantage of using elastomeric impression materials for border molding is that it is less time consuming as all the borders can be recorded simultaneously. For the same reason errors in one section will not affect subsequent sections [15]. However, cutting away of overextended material is not so easily accomplished as with compound [8].

A clear majority (89%) used zinc oxide eugenol/ non eugenol pastes for making final impressions, while only 9% used elastomeric impression materials (7%, PVS and 2%, polyether). This is in agreement with a previous survey of Indian cities [34]. There is a striking contrast of this result with the trend in the U.S. Chronological study of the surveys in the U.S reveal that metallic oxide pastes have, fallen from popularity and been taken over by the use of elastomeric impression materials; initially polysulfide and recently polyvinylsiloxanes [20,21,23-25,28,30,32]. Some advantages of using elastomeric impression materials are ease of handling and manipulation, dimensional stability, adequate working and setting times, and improvement in properties of these materials [42]. A drawback of elastomeric impression materials is their hydrophobicity, particularly polyvinylsiloxanes [42,43]. Zinc oxide eugenol has low cost, low viscosity, produces good surface details and is also dimensionally stable. However it is inelastic, sticks to skin and mucosa and may cause burning sensation.

The predominantly used impression philosophy for final impressions turned out to be selective pressure (91%). Previous surveys have shown similar conclusions [20,25,28-34]. The selective pressure technique entails selectively loading those areas of maxilla and mandible that can best resist functional forces i.e. the primary stress-bearing areas and selectively relieving the loads on the secondary stress-bearing areas [2,4]. The remaining respondents routinely followed a standard conventional impression technique [35]. None of the respondents used the functional/pressure technique and the mucostatic/non-pressure technique as opposed to previous U.S dental school surveys [20,28,32].

Out of those who followed selective pressure, 66% used both spacers and relief holes, 18% made only relief holes, 11% made relief holes but used spacers in select cases only, while the remaining 5% used only spacers.

A majority of respondents (80%) used spacers and (86%) routinely placed relief holes. The purpose of drilling holes in the tray is to allow the final impression material to escape and reduce pressure on the tissues [8]. A shortcoming of the question regarding relief holes was that unlike in some of the previous surveys

[28,33], it did not ask specifically about the number of such holes, their location and whether they were placed in mandibular, maxillary or both custom trays. It is advocated by some that relief holes be placed with a medium sized round bur in addition to a wax spacer; in palate of the maxillary impression tray to furnish relief over the secondary stress areas of the rugae and midpalatine suture and; 10 mm apart in the center of the alveolar groove and over the retromolar pads for the mandibular impression tray [8,44]. Levin recommends drilling 8 to 10 holes using a Busch no 1 twist drill over the crest of the ridge for both maxillary and mandibular trays [11].

The questions on the design of spacer and how its thickness is decided elicited varied responses. Previous surveys, both in U.S and India have also attempted to know about the spacer design used [28, 33, 34]. The selective pressure theory was first advocated by Carl O. Boucher. Boucher recommends placement of baseplate wax, 1 to 2 mm thick on the cast within the outlined borders of the tray except the posterior palatal seal area and buccal shelf area. This provides space for the final impression material [8,44]. The secondary stress bearing areas and areas requiring further relief like; undercuts, area below mylohyoid ridge, areas of displaceable tissue over residual ridge e.t.c may be relieved with either additional baseplate wax on the cast or holes in the custom tray [8]. Many authors have interpreted Boucher's selective pressure in various ways [3-12]. All of these can be described collectively as "Modified Boucher Techniques" as pointed out by authors of a previous survey [28]. In the present survey, the various spacer design options were given consistent with this basic idea.

Respondents were also asked what criteria they considered for deciding on the spacer thickness. In a survey of U.S dental schools, majority of responding schools (45%) were using one layer of baseplate wax for relief [28]. Many authors have suggested the use of a single layer of baseplate wax for the purpose of relief [2,8,11,14,44] which provides approximately 1mm of relief. Since the idea of a wax spacer is to provide space for the final impression material [8,44], the type of impression material being used must have a bearing on deciding its thickness. A. Roy Macgregor [5] recommends the following thicknesses: 2.5 mm (two thicknesses of base-plate wax) for impression plaster, 0.5 mm (minimal clearance) for zinc oxide-eugenol paste, 2mm for alginate and 1.3 mm to 3mm for elastomeric impression materials (depending on type and consistency). The view held by other authors is that the plaster of Paris and metallic oxide impression pastes require no spacer in the tray because they have minimal viscosity and therefore have minimal tissue displacement [8]. In such cases, then instead of a full spacer, only the secondary stress areas and other areas requiring relief may be relieved either with wax or holes or both. Still others are of the opinion that a certain amount of space is always necessary for the impression material (Zinc oxide eugenol paste or light body rubber base impression material) as the tissues would always be compressed to a certain extent during the preliminary impressions. Additional relief must then be provided with wax in all areas except the stress bearing ones [12].

When no spacer is used, it becomes difficult for the dentist to control the seating pressure and accuracy of seating the tray especially with low viscosity materials [8]. While using a conventional technique with no spacer, both these problems can be solved by; creating a posterior seal with the help of tracing stick in the posterior palatal and retromolar pad regions and, an anterior stop by adding tracing compound in the region of upper and lower canines [35].

Various studies have been done regarding the controlling of pressure during impression making, factoring in the effects of variables such as spacers, relief holes and impression materials [13,14,45-47]. An in vitro study recommends a tray with an escape hole 1.0 mm or larger or a spacer thickness of base plate wax (1.40 mm) for making impressions of an edentulous maxilla [14]. Some studies underlie the importance of tray modifications [13,47], while others suggest that the viscosity of impression material used has more effect on pressure during impression making than tray modifications [45,46].

A special consideration for excessive movable tissue was made by 79% respondents. The responses for methods to manage the flabby tissues were varied with a marginal majority (39%) preferring to place relief holes. This is in contrast with a previous survey where majority used the window technique i.e a modified impression technique [32]. One reason for a varied response may be because of the fact that only one option was required to be selected and there might have been multiple valid answers for that question. A multitude of impression techniques have been suggested in the literature to help record a suitable impression of a flabby denture-bearing area [1, 48,49]. All of them attempt to compress the non-flabby tissues to obtain optimal support, and, at the same time record the flabby tissues in an undistorted position.

This survey did not ask questions about the impression techniques for other special conditions such as an atrophic ridge.

The present survey presents a general picture of impression making trends among dentists of Gujarat. This study reveals that conventional impression materials are still being widely used among the dental practitioners of Gujarat. This could be mainly due to economic concerns. However a thorough knowledge of anatomic foundations, physiologic conditions and biomaterial sciences accompanied with meticulous impression techniques and simple modifications (in routine procedures for eg modifying the stock tray for accurate preliminary impressions, correctly identifying and providing for the areas of relief) can ensure measurable

success (even with conventional materials). This proves a need for widespread education of the scientific fundamentals of impression procedures and material among the dental practitioners which would promote and integrate sound, evidence-based principles of patient management among the dental society at large.

VI. Conclusion

In summary, this survey has managed to reveal the current trends in impression making among the dental practitioners in Gujarat. Knowledge of the trends in impression making will help us to judge the scientific validity of various procedures that are followed. However, it must be acknowledged that there are certain limitations to our study. As complete denture impression making is extensively studied and documented, it was not possible to cover all possible aspects of the procedure in the questionnaire. The response rate of the survey was 66%. It is possible that a 100% response could have affected the results. It is also difficult to judge the truthfulness of the self-reported answers of the respondents.

Based on the results of this study and within its limitations, the following conclusions can be drawn:

1. The most commonly used material for preliminary impression was impression compound in a stock metal tray.
2. Most dentists performed final impressions in a border molded custom tray made of autopolymerizing acrylic resin, fabricated a few hours before the procedure.
3. Selective pressure was the predominant impression philosophy used by the respondents with a majority using spacer and relief holes in the design of custom tray.
4. Most commonly used materials for border molding and final impressions were modeling plastic impression compound and zinc-oxide eugenol paste respectively.
5. A majority of dentists made a special consideration for excessive movable (flabby) tissue.

The questions eliciting the most varied responses were related to (1) the spacer design used, (2) deciding the spacer thickness and (3) the method of providing relief for flabby tissue.

References

- [1]. Douglass CW, Shih A, Ostry L, Will there be a need for complete dentures in the United States in 2020? *J Prosthet Dent*, 87(1), 2002, 5-8.
- [2]. Davis DM, Developing an analogue for the maxillary/mandibular denture-bearing area, in Zarb GA, Bolender CL, Carlsson GE (Ed.), *Boucher's prosthodontic treatment for edentulous patients*, 11th ed. (St. Louis: Mosby, 1997) 141-182.
- [3]. Halperin AR, Graser GN, Rogoff GS, Plekavich EJ, *Mastering the art of complete dentures* (Chicago: Quintessence; 1988) 31-34, 43-51.
- [4]. Smutko GE, Making edentulous impressions, in Winkler S (Ed.), *Essentials of complete denture prosthodontics*, 2nd ed. (Delhi: AITBS Publishers, 2012) 88-106.
- [5]. MacGregor A. Roy, Fenn, Liddelov and Gimson's clinical dental prosthetics, 3rd ed. (London: Wright, 1989) 43-78.
- [6]. Neil DJ, Nairn RI, *complete Denture prosthetics*, 3rd ed. (London: Wright, 1990) 22-6.
- [7]. Rahn AO, Heartwell CM, *Textbook of complete dentures*, 5th ed. (New Delhi: Elsevier Science India, 2003) 221-47.
- [8]. Jacob RF and Zarb GA, Maxillary and mandibular substitutes for the denture-bearing area, in Zarb GA, Hobkirk JA, Eckert SE, Jacob RF (Ed.), *Prosthodontic treatment for edentulous patients*, 13th ed. (St. Louis: Mosby, 2012) 161-79.
- [9]. Rudd Kd and Morrow RM, Impression trays, in: Morrow RM, Rudd KD and Rhoads JE (Ed.), *Dental laboratory procedures, complete dentures, volume one*, 2nd ed. (St. Louis: C.V. Mosby, 1986) 26-56.
- [10]. Askew HC and Sharry JJ, Impressions, in Sharry JJ (Ed.), *Complete denture prosthodontics*, 3rd ed. (New York: McGraw-Hill Book Co., Inc, 1974). 191-210.
- [11]. Levin B, *Impressions for Complete Dentures* (Chicago: Quintessence; 1984) 71-93, 116, 125.
- [12]. Shetty S, Nag PV and Shenoy KK, The selective pressure maxillary impression: A review of the techniques and presentation of an alternate custom tray design, *J Indian Prosthodont Soc*, 7(1), 2007, 8-11.
- [13]. Frank RP, Controlling pressures during complete denture impressions, *Dent Clin North Am*, 14(3), 1970, 453-470.
- [14]. Komiyama O, Saeki H, Kawara M, Kobayashi K and Otake S, Effects of relief space and escape holes on pressure characteristics of maxillary edentulous impressions, *J Prosthet Dent*, 91(6), 2004, 570-576.
- [15]. Smith DE, Toolson LB, Bolender CL and Lord JL, One-step border molding of complete denture impressions using a polyether impression material, *J Prosthet Dent*, 41(3), 1979, 347-351.
- [16]. Loh PL, An alternative for making master impressions for complete dentures, *J Am Dent Assoc*, 128(10), 1997, 1436-1437.
- [17]. Osborne J, Two impression methods for mobile fibrous ridges, *Br Dent J*, 117(6), 1964, 392-394.
- [18]. McCord JF and Tyson KW, A conservative prosthodontic option for the treatment of edentulous patients with atrophic (flat) mandibular ridges, *Br Dent J*, 182(12), 1997, 469-472.
- [19]. Beresin VE and Schiesser FJ, Neutral zone in complete and partial dentures, 2nd ed. (St. Louis: Mosby, 1979) 15, 73-108, 158-83.
- [20]. Levin B and Sauer JL Jr, Results of a survey of complete denture procedures taught in American and Canadian dental schools, *J Prosthet Dent*, 22(2), 1969, 171-177.
- [21]. Harrison A. Prosthodontic techniques and the timing of complete denture procedures-a survey, *J Prosthet Dent*, 37(3), 1977, 274-279.
- [22]. Taylor TD, Matthews AC, Aquilino SA and Logan NS, Prosthodontic survey. Part I: removable prosthodontic laboratory survey, *J Prosthet Dent*, 52(4), 1984, 598-601.
- [23]. Taylor TD, Aquilino SA, Matthews AC and Logan NS, Prosthodontic survey. Part II: removable prosthodontic curriculum survey, *J Prosthet Dent*, 52(5), 1984, 747-749.

- [24]. Jagers JH, Javid NS and Colaizzi FA, Complete denture curriculum survey of dental schools in the United States, *J Prosthet Dent*, 53(5), 1985; 736-739.
- [25]. Levin B and Sanders JL, Results of a survey of complete denture procedures taught in American and Canadian dental schools: an update, *J Prosthet Dent*, 54(2), 1985, 302-306.
- [26]. Arbree NS, Fleck S and Askinas SW, The results of a brief survey of complete denture prosthodontic techniques in predoctoral programs in North American dental schools, *J Prosthodont*, 5(3), 1996, 219-225.
- [27]. Hyde TP and McCord JF, Survey of prosthodontic impression procedures for complete dentures in general dental practice in the United Kingdom, *J Prosthet Dent*, 81(3), 1999, 295-299.
- [28]. Petropoulos VC and Rashedi B, Current concepts and techniques in complete denture final impression procedures, *J Prosthodont*, 12(4), 2003, 280-287.
- [29]. Petropoulos VC and Rashedi B, Complete denture education in U.S.dental schools, *J Prosthodont*, 14(3), 2005, 191-197.
- [30]. Petrie CS, Walker MP and Williams K, A survey of U.S. prosthodontists and dental schools on the current materials and methods for final impressions for complete denture prosthodontics, *J Prosthodont*, 14(4), 2005, 253-62.
- [31]. Al-Ahmar AO, Lynch CD, Locke M and Youngson CC, Quality of master impressions and related materials for fabrication of complete dentures in the UK, *J Oral Rehabil*, 35(2), 2008, 111-115.
- [32]. Mehra M, Vahidi F and Berg RW, A complete denture impression technique survey of postdoctoral prosthodontic programs in the United States, *J Prosthodont*, 23(4), 2014, 320-327.
- [33]. Singh G, Kapoor V, Gambhir R and Bansal V, Application of prosthodontic techniques by private practitioners in Northern India—a survey, *Internet Journal of Epidemiology*, 9(2), 2010.
- [34]. Kakatkar VR, Complete denture impression techniques practiced by private dental practitioners: a survey, *J Indian Prosthodont Soc*, 13(3), 2013, 233-235.
- [35]. McCord JF and Grant AA, Impression making, *Br Dent J*, 188(9), 2000, 484-492.
- [36]. Collett HA, Complete denture impressions, *J Prosthet Dent*, 15(4), 1965, 603-614.
- [37]. Klein IE, The need for basic impression procedure in the management of normal and abnormal edentulous mouths, *J Prosthet Dent*, 7(5), 1957, 579-589.
- [38]. Ogle RE, Sorensen SE and Lewis EA, A new visible light-cured resin system applied to removable prosthodontics, *J Prosthet Dent*, 56(4), 1986, 497-506.
- [39]. Finer Y and Diwan R, Materials used in the management of edentulous patients, in Zarb GA, Hobkirk JA, Eckert SE and Jacob RF (Ed.), *Prosthodontic treatment for edentulous patients*, 13th ed. (St. Louis: Mosby, 2012) 121-160.
- [40]. Goldfogel M, Harvey WL and Winter D, Dimensional change of acrylic resin tray materials, *J Prosthet Dent*, 54(2), 1985, 284-286.
- [41]. O'Brien WJ, *Dental materials and their selection*, 3rd ed. (Chicago: Quintessence, 2002) 90-112.
- [42]. Powers JM, and Sakaguchi RL, *Craig's Restorative Dental Materials*, 12th ed. (St. Louis: Mosby Elsevier, 2006) 283-301.
- [43]. Mandikos MN, Polyvinylsiloxane impression materials: an update on clinical use, *Aust Dent J*, 43(6), 1998, 428-434.
- [44]. Davis DM, Developing an analogue for the maxillary/mandibular denture-bearing area, in Zarb GA and Bolender CL (Ed.), *Boucher's prosthodontic treatment for edentulous patients*, 12th ed. (St. Louis: Mosby, 2004) 211-251.
- [45]. Masri R, Driscoll CF, Burkhardt J, Von Fraunhofer A and Romberg E, Pressure generated on a simulated oral analog by impression materials in custom trays of different designs, *J Prosthodont*, 11(3), 2002, 155-160.
- [46]. Al-Ahmad A, Masri R, Driscoll CF, von Fraunhofer J and Romberg E, Pressure generated on a simulated mandibular oral analog by impression materials in custom trays of different design, *J Prosthodont*, 15(2), 2006, 95-101.
- [47]. Reddy SM, Mohan CA, Vijitha D, Balasubramanian R, Satish and Kumar M, Pressure produced on the residual maxillary alveolar ridge by different impression materials and tray design: an in vivo study, *J Indian Prosthodont Soc*, 13(4), 2013, 509-512.
- [48]. Lamb D J, *Problems and solutions in complete denture posthodontics* (London: Quintessence, 1993) 57-60.
- [49]. McCord JF and Grant AA, *A clinical guide to complete denture prosthodontics* (London: British Dental Association, 2000) 10-21.

Appendix

1. Qualification.

B.D.S

M.D.S

2. If M.D.S, then mention your specialty.

3. Do you practice complete denture prosthodontics?

Yes

No

4. Do you perform both preliminary and final impressions for complete denture prosthodontics?

Yes

No

Not Always (Comment)

5. What type of tray is used for making the preliminary impression?

Stock Metal Tray

Stock Plastic Tray

Thermoplastic Tray

Other (Please Specify)

6. Do you separately modify the extension of stock tray using any material prior to making the preliminary impression?

Yes

No

Not Always (Comment)

7. If yes, what material is used for modification of the stock tray?

Modeling Plastic Impression Compound

Wax Materials

Other (Please Specify)

8. What material is used for making the preliminary impression?

Impression Compound

Irreversible Hydrocolloid (Alginate)

Elastomeric Putty

Other (Please Specify)

9. What impression theory/ philosophy you use predominantly for making the final impression?

Mucostatic (Non-Pressure)

Functional (Pressure)

Selective Pressure

Conventional

10. What material you use predominantly for fabrication of the custom tray?

Shellac

Autopolymerizing Acrylic Resin

Heat Processed Acrylic Resin

Visible Light Polymerized Urethane Dimethacrylate

Other (Please Specify)

11. When is the custom tray fabricated (to prevent distortion)?

A Few Days before the Procedure

A Few Hours before the Procedure

Other (Please Specify)

12. Do you use a spacer in the design of the custom tray?

Yes

No

13. If yes, which design of spacer is mostly used?

Full Spacer with Tissue Stops and Additional Relief

Full spacer not covering the Major Stress Areas with Additional Relief if Required

Spacer covering only the Secondary Stress Bearing and Relief Areas

Spacer in Special Circumstances only (as in cases of flabby tissue, undercut areas, high vault or prominent ridges and spicules)

14. How do you decide the thickness of spacer?

Arbitrary Regardless of Impression Material Used

Based on the Choice of Impression Material

Based on the Amount of Relief

Other (Please Specify)

15. Do you border mold the custom tray prior to making the final impression?

Yes

No

16. What material is used for border molding the final impression?

Modeling Plastic Impression Compound (Green Stick)

Wax

Polyvinylsiloxane

Polyether

Other (Please Specify)

17. Are relief holes made in the custom tray prior to making the final impression?

Yes

No

Not Always (Comment)

18. What is the final impression material of choice?

Zinc Oxide Eugenol Paste

Non- Eugenol Paste

Polyvinylsiloxane

Polysulphide

Polyether

Irreversible Hydrocolloid

Impression Plaster

Other (Please Specify)

19. Is a special consideration made for excessive movable tissue?

Yes

No

20. If yes, how is relief provided for flabby tissue?

Relief Holes in Custom Tray

Selective Reduction of Custom Tray

Spacer on the cast

Modified Impression Technique (e.g. a window technique in conjunction with plaster, methods using light bodied impression paste e.t.c).