

## **Research Article**

### **Impression Materials and Impression Techniques Used For Fixed Partial Dentures: A Survey among the Practitioners in Gujarat**

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**Abstract:** The aim of this survey was to integrate impression techniques evolved over the years for fixed partial dentures and to know the techniques and materials which are used in the present day by the practitioners. A questionnaire consisting of 10 questions was sent to various practitioners in Gujarat, of which 1000 questionnaires that were answered, were used for the study. The results showed that the 77.78% Prosthodontists use elastomeric impression materials, others 22.22% prosthodontists use irreversible hydrocolloids only. Amongst other practitioners 76.27% use irreversible hydrocolloid and 23.73% use elastomeric impression materials. Elastomeric impression technique practiced most commonly is putty relin with/without spacer (55.56%); other techniques are multiple-mix and monophasic techniques. We require ideal materials, techniques, and armamentarium for the long-term success of the treatment for fixed partial dentures. Recommended impression materials and techniques were used by Prosthodontists, not by general practitioners. Also, if we don't follow the ideal procedure, the result is likely to be unsatisfactory and frustrating for both the dentists and patient, resulting in disappointment and loss of confidence in each other.

**Keywords:** Dentures, Hydrocolloid, Monophasic, Elastomeric.

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#### **INTRODUCTION**

Fixed prosthodontic treatment involves the replacement and restoration of teeth by artificial substitutes that are not readily removable from the mouth. Fixed Prosthodontics treatment can offer exceptional satisfaction for both patient and dentist. It can transform an unhealthy, unattractive dentition with poor function into a comfortable, healthy occlusion capable of giving further service while greatly enhancing esthetics. Failure to achieve the desired specifications of design for function and esthetics would result in failure of the prosthesis. But, in order to achieve success meticulous attention should be paid to every detail from initial patient interview, then the active treatment phase, to a planned schedule of follow-up and therefore excellence in dental care is achieved through the dentist's ability to assess the patient, determine needs, design an appropriate treatment plan and execute the plan with proficiency. Various impression materials and impression techniques came in to use since times earlier till today for fixed partial dentures. Improved materials, instruments, and techniques have made it possible for today's operator of average skills to provide a service whose quality is on par with that produced only by the most gifted dentist of

year gone by[1]. Each material has its advantages and disadvantages. Impression material is selected according to patient's specific intraoral conditions.

This survey used a questionnaire consisting of 10 questions to assess and know about the impression materials and impression techniques for fixed partial dentures that are being followed by the practitioners in Gujarat.

#### **MATERIALS AND METHODS**

A questionnaire consisting of 10 questions was prepared to assess the details about impression materials and impression techniques in fixed partial denture. This questionnaire was initially sent to a group of 10 dentists, and a pilot study was carried out to check the contents and administrative aspects. Then the questionnaire was sent to the practitioners in Gujarat by E-mail, by Weblink and by post. All dentists were contacted regardless of age. An accompanying letter described the aims of the study and how the data would be used.

**Questionnaire for Impression materials and techniques in Fixed Partial Denture:**

1. Name of the practitioner:
2. Educational qualification:
  - a) BDS
  - b) MDS
3. In case of post graduation, please mention your speciality:
  - a) Pedodontics
  - b) Conservative Dentistry & Endodontics
  - c) Oral & Maxillofacial Surgery
  - d) Prosthodontics
  - e) Periodontics
  - f) Oral Pathology
  - g) Orthodontics
  - h) Oral Medicine & Radiology
  - i) Preventive & Community Dentistry
4. Which material do you routinely use for diagnostic impressions before tooth preparation?
  - a) Irreversible hydrocolloid or Alginate
  - b) Other( Please Specify)
5. Which tray are you using for making the impression after tooth preparation?
  - a) Dual arch tray (metal/plastic)
  - b) Complete arch (metal/plastic)
  - c) Sectional tray (metal/plastic)
  - d) Custom made acrylic tray
  - e) Other (please specify)
6. What do you practice routinely for gingival retraction?
  - a) Gingival retraction cord
  - b) Electrosurgery
  - c) Laser
  - d) Rotary curettage
  - e) Other (please specify)
7. If you use gingival retraction cord , is it used plain/ with chemical and which chemical?
8. Which material do you routinely use for impression after tooth preparation?
  - a) Condensation silicone
  - b) Addition silicone
  - c) Polyether
  - d) Polysulfide
  - e) Irreversible Hydrocolloid
  - f) Reversible hydrocolloid
  - g) Agar-alginate Combination
  - h) Other( Please Specify)
9. If you are using elastomeric impression materials, then which impression technique do you use?
  - a) Single mix (monophase) technique
  - b) Putty reline/dual mix technique with spacer
  - c) Putty reline/dual mix technique without spacer
  - d) Multiple mix technique
10. With what material is the cast poured?
  - a) Dental plaster (Type II)

- b) Dental stone (Type III)
- c) Dental stone high strength (Type IV)
- d) Dental stone high strength, high expansion (Type V)
- e) Other (Please specify)

**RESULTS**

A questionnaire consisting of 10 questions was sent to various practitioners in Gujarat, out of which 1000 questionnaires were filled.

Out of the 1000 dentists who responded to the questionnaire, 56.63% were BDS and 43.37% were MDS. Amongst the MDS person, 49.09% were Prosthodontists.

The survey results show the following result:

1. There are 35% practitioners who do not take diagnostic impressions and proceed with tooth preparation after clinical intraoral examination [Figure 1]. Most commonly used material for diagnostic preparation was Irreversible hydrocolloid. Amongst the practitioners who take diagnostic preparation, 94.23% dentists used irreversible hydrocolloid for diagnostic preparation.
2. Amongst the Prosthodontists, 85.19% use complete arch tray, 7.41% use sectional tray. Amongst the other practitioners, 79.45% use complete arch tray, 8.47% use special tray, 12.08% use sectional tray [Figure 2].
3. For gingival retraction method, 90.39% use gingival retraction cord, 6.73% use rotary curettage, 1.92% use laser, 0.96% use electrosurgery. Amongst the Prosthodontists, 96.30% use gingival retraction cord, 3.70% use laser [Figure 3].
4. Amongst the Prosthodontists, 62.96% use addition silicone, 22.22% use condensation silicone, 14.82% use irreversible hydrocolloid for impression in fixed partial denture. Amongst the other practitioners 47.46% use irreversible hydrocolloid, 39.42% use addition silicone, 12.23% condensation silicone, 0.96% use polyether [Figure 4].
5. Amongst the Prosthodontists, 55.56% use putty reline technique with spacer, 33.33% use putty reline technique without spacer, 11.11% use single-mix technique. Amongst the other practitioners ,46.15% use putty reline technique with spacer,36.42% use putty reline technique without spacer,19.23% use single-mix technique, 3.85% use multiple mix technique [Figure 5].
6. Amongst the Prosthodontists, 59.24% use type IV stone, 28.72% use type III stone, 7.41% use type II stone, 4.63% use type V stone. Amongst the other practitioners, 53.85% use type III, 33.23% use type IV, 8.65% use typeII, 4.27% type V stone [Figure 6]

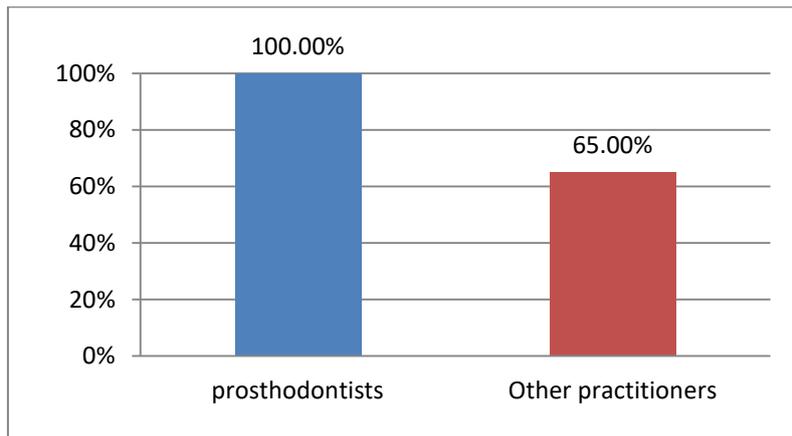


Fig- 1: Graph showing the % of practitioner using alginate for diagnostic impression

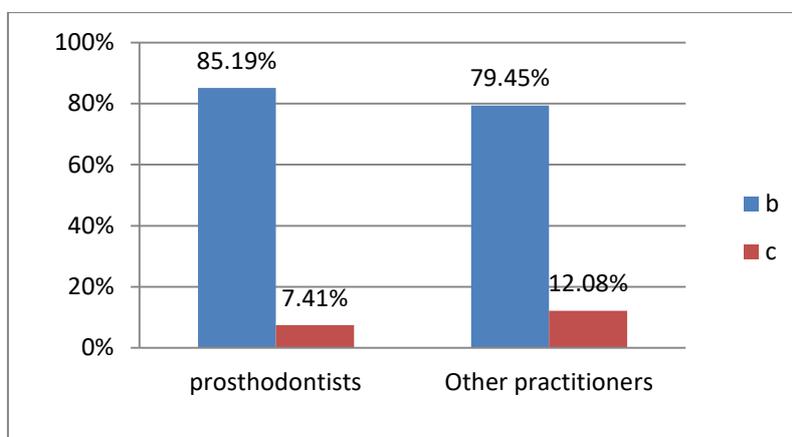


Figure 2: Graph showing the type of impression tray being used by the practitioners in %.

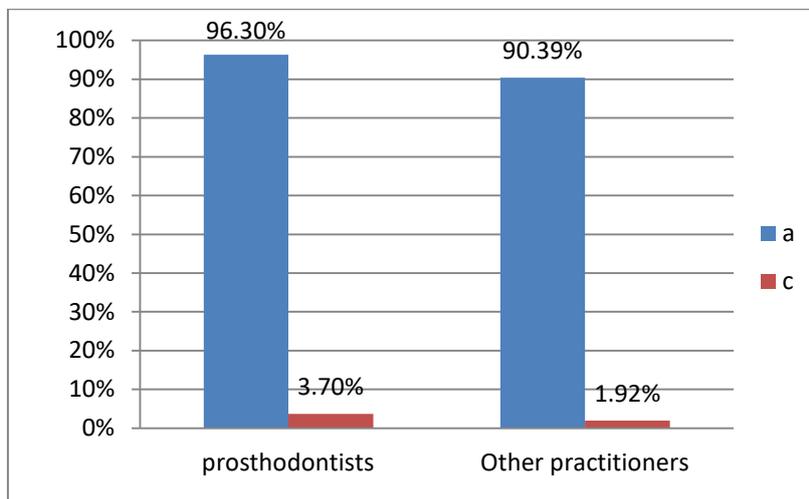


Fig-3: Graph showing the usage of gingival retraction materials by the practitioners in %.

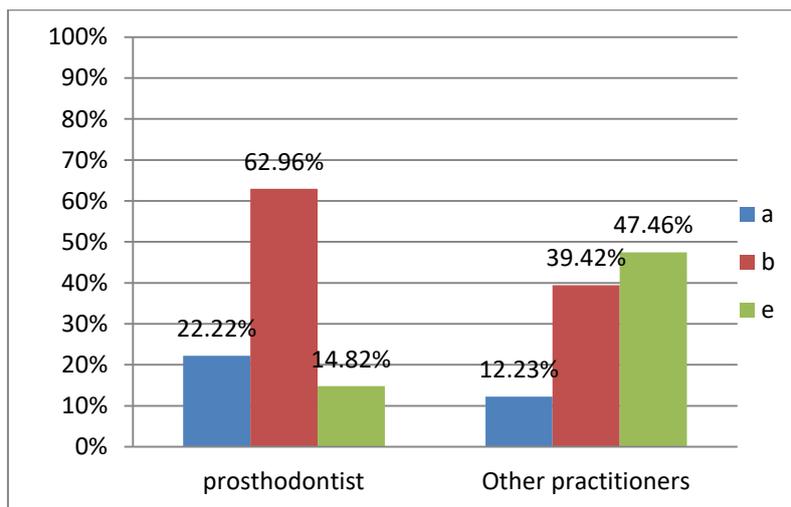


Fig-4: Graph showing the impression material being used by the practitioners in %.

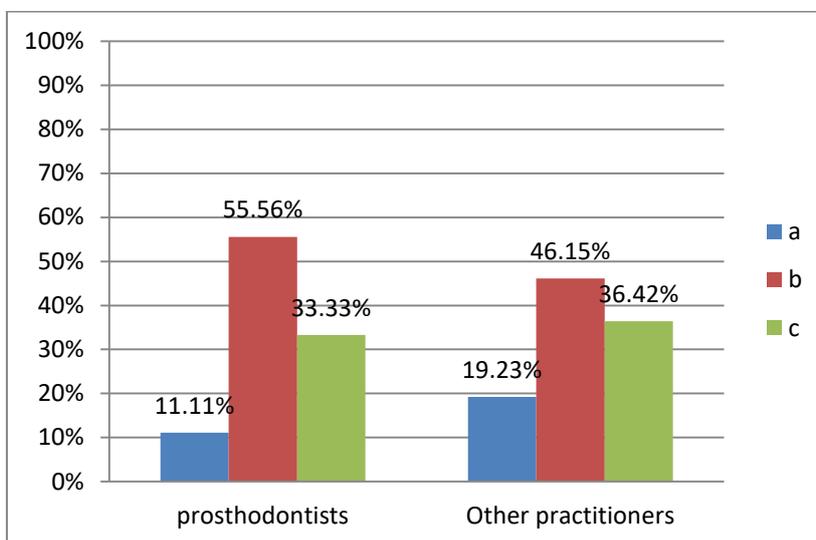


Fig-5: Graph showing the impression technique being followed by the practitioners (in %) for elastomeric impression materials.

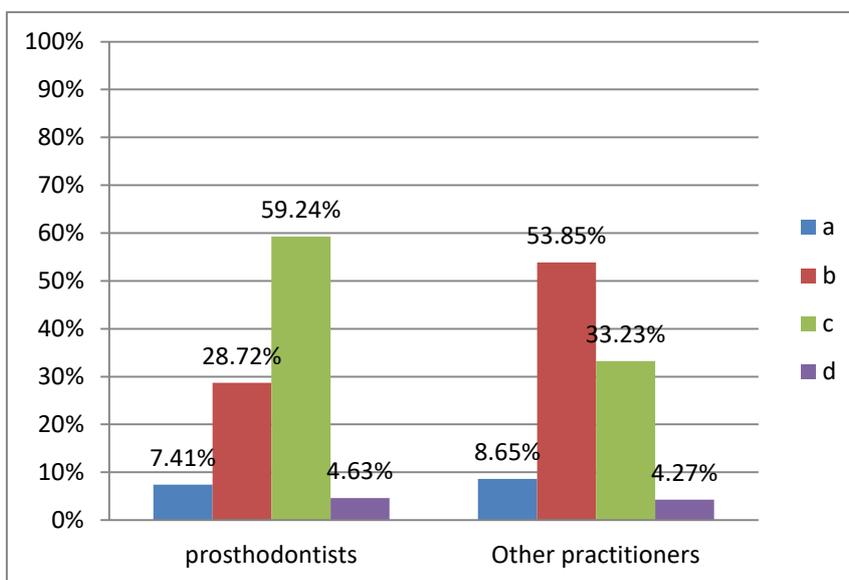


Fig- 6: Graph showing the material used for pouring the impressions by the practitioners in %.

## DISCUSSION

The questionnaire consisting of 10 questions were assessed in general, and it was found that ideal and latest materials and techniques were followed by most of the Prosthodontist. General practitioners did not follow recommended materials and techniques.

Diagnostic impressions are essential step for treatment planning in fixed partial denture. The diagnostic casts give idea about occlusocervical dimension of edentulous spaces, relative alignment and angulation of proposed abutment teeth, detailed analysis of the occlusal plane and occlusion. Tooth preparation can be rehearsed on the casts. And diagnostic waxing procedures allow evaluation of the eventual outcome of proposed treatment [2].

The choice of impression materials influences tray selection. Reversible hydrocolloids require special water-cooled trays, whereas irreversible hydrocolloid and elastomeric impressions are made with prefabricated impressions trays. Impression tray must be rigid to reduce associated distortion. Retention is provided by perforations, rimlocks and adhesives. Special tray are the best impressions trays. Special tray improves the accuracy of elastomeric impressions by limiting the volume of the material, thus reduces stresses during removal and thermal contraction. The impression trays used by many practitioners are the full arch impression trays. The full arch impression tray can records full arch with proper control over setting time. The partial arch tray is not good choice for fixed partial denture, as it will not allow proper mounting and further fabrication of prosthesis. The dual arch impression tray can be used when the number of prepared teeth is limited to one or two, when the patient can repeatedly close in maximum intercuspation with the tray in place and when the patient has existing anterior guidance. Plastic trays should not be used because they are too flexible and narrower than the buccolingual arches of most patients. This results in flexure during impression making and distortion on removal [3].

When the preparation margins extend subgingivally, the adjacent gingival tissues must be displaced laterally to allow access and to provide space for adequate impression materials thickness. This may require enlarging the gingival sulcus through mechanical, chemical or surgical means and must be done without jeopardizing periodontal health. Mechanical displacement is most effectively achieved by placement of a cord( impregnated with a chemical agent. The advantage of cord is that it is inexpensive and can achieve varying degree of retraction. Cords can be painful and uncomfortable to the patient. Caustic chemicals such as sulphuric acid, trichloroacetic acid, zinc chloride, 8% racemic epinephrine, aluminium chloride, aluminium sulphate, ferric sulphate can be effectively used for gingival retraction. Alternatively paste system can be used in conjunction with direct pressure. Expa-syl is a paste used for gingival retraction that opens sulcus, physically

displacing the tissues and leaving the field dry, for impression making. It is painless when used on a healthy periodontium [4-5]. Absence of bleeding or oozing allows achieving a perfectly dry sulcus [6]. An electrosurgery unit can be used for tissue removal before impression making, but disadvantages are mucosal necrosis and loss of osseous structure [7].

Elastomeric impression materials have excellent properties as impression materials. Polyvinyl siloxane also known as addition silicones is extremely popular among general practitioners. They have excellent physical properties and handling characteristics. It is dimensionally stable, can record fine detail and can be poured at the convenience of the operator. Addition silicone has the best elastic recovery of all available impression materials [8]. Amongst the hydrocolloid, laminate technique, that is , agar alginate technique, is better than using agar or alginate individually as agar will record the prepared teeth accurately and the remaining arch is recorded with alginate [9]. Alginate is most commonly used by general practitioners, as elastomeric impression materials are expensive.

For the technique of impression making, the single-phase technique is faster and easier to use. The putty reline with spacer techniques require the use of spacer and is faster than using the putty reline without the spacer. Polyethylene sheet can be used as a spacer , as it prevents penetration of the putty in to the inter-proximal areas. Elastomeric impression materials are most accurate when used with a uniform bulk of 1.5 mm to 2.5 mm [10]. The closed mouth technique, also called the dual arch technique, is popular for making impressions for single units and less expensive restorations made to conform the existing occlusion [11].

The impressions should be poured in type IV stone because of its higher mechanical properties as compared to type III stone.

## CONCLUSION

The ideal materials, technique and armamentarium are required for the long-term success of treatment for fixed partial denture. Recommended impression materials and techniques were used by Prosthodontists. General practitioners do not follow ideal materials and techniques. If the ideal procedure is not followed, it will lead to compromised fit of the final prosthesis and failure of the treatment.

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