

# IMPRESSION TECHNIQUES AND MATERIALS USED FOR FABRICATION OF COMPLETE DENTURE. A SURVEY

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## ABSTRACT

*In 2013, a survey of Pakistani dental graduates was conducted to determine which techniques and materials are currently prevalent in the teaching of initial and final impression procedures and custom tray fabrication for complete dentures in the undergraduate clinical curriculum.*

*A questionnaire was prepared and distributed among 150 dentists belonging to different regions of the country. The questionnaire consisted of multiple choice questions. All responses remained anonymous.*

*The results highlighted that majority of dental schools were following the traditional approach. Impression compound was used by 93% of the respondents. Self cure acrylic resin was used by 92% for making custom tray. Majority of the respondents (97%) were using Zinc oxide eugenol to record final impression.*

*The findings from this study showed that impression technique and material used in the fabrication of complete denture in the existing prosthodontic curriculum require modification in order to raise the standard of under graduate dental program.*

**Key Words:** Curriculum Survey, Undergraduate removable prosthodontics, Complete denture impression technique.

## INTRODUCTION

Edentulism is a worldwide problem, which exists among population older than 65 years estimated to be between 7 and 69%. In order to compensate the deficiency of missing teeth most of the edentulous patients are provided with complete dentures.<sup>1</sup> Recent dental demographics shows the presence of a large population of patients who are fully edentulous and require treatment.<sup>2</sup> This indicates that the skills and knowledge to treat edentulous patients will be essential in the decades to come. Therefore removable prosthodontic curriculum should be assessed frequently by dental schools in order to meet the requirements of the community. Prosthodontic curriculum surveys are valuable tools in evaluating prosthodontic education.<sup>3</sup>

Impression making is an essential step in fabrication of complete dentures.<sup>4</sup> Success of complete dentures largely depends on accuracy of impression. Based on the particular condition, dentist needs to select material and technique of impression for success of complete denture therapy.<sup>5</sup> Impression making is still widely debatable area of complete denture construction.<sup>7</sup> Theories of impression making have evolved through trial of variety of materials and methods. Introduction of new materials has lead to evolution of newer techniques in impression making.<sup>5</sup>

In the last decade many studies have suggested using newer elastomeric materials for final impressions to replace older and more traditional materials. The justification for using newer elastomeric material for final impression is the materials better mechanical and physical properties such as ease of handling, superior detail reproducibility, ability to construct multiple casts from one impression, better elastic recovery and stability.<sup>6</sup>

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A review of the literature revealed that no recent survey of the impression materials and techniques used for fabrication of complete denture has been conducted in Pakistan. The aim of the survey was to identify the current trends in complete denture impression making and to determine which techniques and materials are taught in Pakistani undergraduate clinical prosthodontics.

## METHODOLOGY

A questionnaire was prepared and distributed among 150 dental graduates practicing in Peshawar, Islamabad, and Abbottabad. Dental graduates represented dental colleges located in different regions of the country. Majority of the respondents were those dentists who had graduated in the last three years. The questionnaire was comprised of nine multiple choice questions pertaining to techniques and materials used in the fabrication of complete denture taught in dental schools as part of prosthodontic curriculum. The survey asked the respondents to circle the option that apply to their technique. The option of providing specific answer other than the listed choices was available for some questions. All responses remained anonymous throughout the survey. Only five questions relating to the fabrication of custom tray and initial and final impression for complete denture were chosen for the present study.

### Questionnaire

**Instructions:** The following questions relate to the materials and techniques used in the fabrication of complete denture taught in dental school as part of prosthodontic curriculum. Please circle the responses that apply to your technique. In case of many options more than one answer may be selected. All data collected will be kept confidential. Thank you for your cooperation.

- Which impression material did you use for initial impression for fabrication of complete denture?  
Compound impression material  
Alginate  
Silicon  
Others (please)
- Did you use custom tray for making final impression of edentulous arches?  
Yes  
No

- Which material was used for fabrication of custom trays?

Visible light cured composite resin material  
Self cure acrylic resin  
Other (please specify)

- Did you use spacer in the custom tray?

Yes  
No

- Which impression material did you use for final impression during fabrication of complete denture?

Vinyl silicone light bodied  
Zinc oxide eugenol/eugenol free  
Alginate  
Polyether  
Mono phase Polysulphide  
Other (please specify)

## RESULTS

It was observed that 93% of the respondents used impression compound to record primary impressions. 6% used irreversible hydrocolloid alginate. One respondent reported that he used silicone impression material to record impression for complete denture in prosthodontic curriculum. 97% of the practitioners reported that they used to fabricate custom tray for final impressions while 3% replied in negative. Overwhelming majority of the respondents (92%) reported that they used self cure acrylic resin for making custom tray while 4% each used to make custom tray from light cure or heat cure resin. About 37% respondents reported that they used spacer in custom tray while remaining 63% did not use spacer. For making final impression about 97% reported that they used ZnO eugenol impression paste while 3% used to take final impression in alginate impression material.

## DISCUSSION

Impression making is a critical step in denture fabrication.<sup>4</sup> Impressions are made with a wide variety of materials and techniques.<sup>8</sup> The objectives of an impression are to provide retention, support and stability for the denture.<sup>9</sup> The major part of the denture

is constructed outside the mouth. This is accomplished on a precise replica of denture bearing tissues which is known as cast. The cast is made from an impression of edentulous mouth.<sup>7</sup>

During the survey it was observed that 93% use impression compound while 6% use alginate. This is in contrast to the studies carried out in other parts of the world where irreversible hydrocolloid (alginate) is the primary material of choice as preliminary impression for many programs (87%).<sup>3</sup> In UK it was reported in a survey that 99% of dental graduates give preference to alginate as primary impression material. During another survey in dental schools of USA 74% preferred alginate to record primary impression. In Northern India a survey indicated that alginate was used by 71% to make primary impression and 29% use impression compound.<sup>4</sup>

Impression compound is used relatively little these days as other materials are preferred.<sup>8</sup> The drawbacks associated with impression compound is that it can be reused due to its thermoplastic nature and since it cannot be sterilized properly it can be a potential health hazard if used repeatedly. Moreover compound impression material is non elastic when set and so will not record under cuts accurately.<sup>9</sup> Another limitation of impression compound is that it can only be used with non perforated stock trays which are not easily available nowadays and also the operator may burn the soft tissue of the patient inadvertently during its manipulation.

The material of choice for most dentists is now a high viscosity alginate impression material.<sup>9</sup> High viscosity alginate impression material act as mucocompressive which is desirable feature for preliminary impression. Alginate cannot be used repeatedly because chemical reaction is involved during its setting. It can be used with perforated trays which are easily available in the market.

The use of custom tray to record correct secondary impression is a vital step in complete denture fabrication which could influence the final result. It was found in the current survey that about 97% of the respondents used custom trays. This finding coincides with the findings from a dental school survey in USA which showed that 98% of schools use custom tray for making final impression of edentulous arches.<sup>10</sup> In UK in a survey conducted found that 75% general dentist use custom trays. In another survey in Northern India it was observed that 85% of the practitioner use custom tray.<sup>4</sup>

Majority of the practitioners reported that they used self cure (chemical cure) acrylic resin for making custom trays. The limitations associated with self cure acrylic resin material include polymerisation shrinkage and stress relaxation that may influence the final outcome. In addition the monomer (methyl methacrylate) present in self cure acrylic resin is an irritant material. Some studies also suggest that there should be time interval between making and use of custom trays. These reports indicate that the self cure acrylic resin does not fulfill the criteria for the ideal custom tray material.<sup>11</sup>

Visible light cured resins have been developed on the basis of cross linked dimethacrylates and are thus free of MMA and benzyl peroxide.<sup>1</sup> These possess high strength and rigidity.<sup>12</sup> In addition visible LC acrylic resin mixing of materials is not required which eliminate any errors in fabrication and also no heat production is noticed. Moreover LC resin material possesses better handling properties and also is time saving. Light cure acrylic resin tray material as an alternative to tray material has been introduced in the curriculum of dental schools since 1990.<sup>11</sup> According to a survey conducted at dental schools in US, 98% use custom trays for secondary impression while 70% are using the visible LC resin material for making custom tray.<sup>3</sup>

Base plate wax having thickness of 1mm is placed on the cast to provide space in the tray for final impression.<sup>9</sup> Many studies have suggested the use of spacer on the denture bearing area with vertical tissue stops which is contrary with the findings of the present study since spacer was not used by 63% of the dental graduates.

Secondary or final impression is recorded by using custom tray. Secondary impression may be recorded using zinc oxide eugenol paste, hydrocolloid or a non aqueous elastomer.<sup>13</sup> The current survey showed that the majority of the graduates (97%) have been using zinc oxide eugenol as a material for final impression in undergraduate clinical prosthodontic. This indicates that zinc oxide eugenol is used as final impression material for fabrication of complete denture in the prosthodontic curriculum. ZOE is mucostatic and easily adopts to the soft tissues due to water based system. It therefore provides detailed reproduction of the soft tissues without causing displacement of the soft tissues. Major drawback of ZOE is that it becomes rigid after setting and therefore is not capable of recording undercuts.<sup>8</sup> which limits its application to non undercut areas.

Only 3% reported use of alginate as a material for final impression. Alginate should not be used as it bulk impression material.<sup>4</sup> The surface reproduction of alginates is not as good as with agar or elastomer.<sup>8</sup>

According to a survey conducted in 1969 in US, zinc oxide eugenol was the most popular (85%) final impression material for complete dentures<sup>6</sup> but in 1993 a similar survey showed that 48% of the schools were using polysulphide as material of choice for complete denture final impression.<sup>10</sup> In another survey in UK the findings were almost same. This statistics clearly indicate that there is increasing trend of using new material instead of traditional material such as ZOE.

In US survey conducted in 2003 shows that polysulphide was the most popular impression material (64%) followed by polyvinylsiloxane (26%) and polyether (5%) and only a small percentage using zinc oxide eugenol (10%) or alginate (1%)<sup>6</sup> while a study conducted in 2013 showed that that most commonly used material for the final impression was polyvinylsiloxane (PVC) (42%), and the second most commonly used impression material was polysulphide (32%). Similarly another survey conducted in 2005 in US showed that majority were using non aqueous elastomeric impression. Some advantages of using elastomeric impression materials are ease of manipulation and handling, sufficient working and setting time and development in the properties of this material.<sup>13</sup>

## CONCLUSION

A survey of complete denture initial and final impression was conducted to identify the techniques and material taught in prosthodontic curricula of Pakistani dental schools. Impression compound is being used by most of the dental schools as a material for preliminary impression. Nearly all of the dental schools were using zinc oxide eugenol for final impression. Self cure resin was used by most of the schools for making custom trays. Majority of the techniques and materials taught in the Pakistani dental schools are traditional and outdated. The current undergraduate prosthodontic curriculum pertaining to complete denture need revision and modification in order to meet the international standards and to make it more relevant to modern practice. Recent advancements in the discipline of prosthodontics should be taken into account while reforming prosthodontic curriculum.

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## Conflict of interest

The authors declare that they have no conflict of interest.

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