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PREVALENCE OF TYPES OF SECONDARY IMPRESSION TECHNIQUES USED BY DENTISTS IN COMPLETE DENTURE PATIENTS- A RETROSPECTIVE STUDY

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ABSTRACT

Impression making is an important part of replacement of the teeth. In complete dentures, secondary impression techniques play a major role in the fabrication of the prosthesis, as they help in recording accurate borders and extension on the impression. Recording the secondary impression plays a major role in the retention, resistance and support. The aim of this study was to assess the prevalence of types of secondary impression techniques used by dentists in complete denture patients. This was a cross sectional study containing sample size of 200. This study was conducted in a university setting. Data was collected from a digital case sheet record and categorised into mucocompressive, mucostatic and selective pressure techniques. Data was then entered in MS Excel Sheets and statistically analysed using IBM SPSS Version 20.0 and graphically represented. Selective pressure impression techniques (42.3%) was the most prevalent type used among dentists. Impression techniques play a major role in the fabrication of denture for its retention, resistance and support.

Keywords: Complete denture, Retention, Secondary impression techniques, Stability

INTRODUCTION

A dental impression is defined as a negative replica or a positive digital image display of the intraoral anatomy. Secondary impression techniques can be done in one or two steps. This procedure is done after border moulding which is recording the sulcus depth accurately. It is done either by using a resinous wax or a monophase elastomer (Joglekar and Sinkford, 1968; Minagi *et al.*, 1988; Loh, 1997). The two step procedure commonly preferred by dentists is the border moulding, followed by final impression (Friedman, 1957; Chaffee, Cooper and Felton, 1999). Secondary Impression procedure uses different materials and techniques according to the biology of the tissues.

They are grouped into three types namely the mucocompressive, mucostatic and selective pressure techniques. Other types include the functional impression and neutral zone technique (Addison, 1944; Cagna, Massad and Schiesser, 2009).Commonly used materials are the polyether, addition silicone and zinc oxide eugenol (Boucher, 1951; Daou, 2010). Elastomers and fluid wax can also be used to record the impression. The main goal of a prosthesis is to maintain the oral health, comfort , esthetics and function

(Bell, 1968). Impression procedure should be within the patients tolerable limits with the tissues (Drago, 2003). Disinfection of the impression is necessary to remove all the blood stains and saliva from the patient's mouth and chemical disinfection is important (Jain *et al.*, 2018).
The main factors that prevent the dislodgement of the denture is the retention and stability. This is directly related to patients compliance in wearing dentures.

Mucostatic Technique
This technique records the mucosa in its static position. This requires no pressure against the tissues.

Mucocompressive Technique
This technique records the tissues in their functional form to achieve stability and occlusal function. This technique uses pressure and therefore can result in the resorptive changes in the tissues.

Selective Pressure Technique
This technique, unlike the other two, uses minimal pressure and the pressure varies on the denture base seat and transfers load only to the selected areas on the denture seat. Standardising the finger pressure is not possible. Hence, thixotropic material can be used for making impressions. This technique results in preserving the resiliency of mucosa, tissues and long trajectories. Therefore, final impression plays a major role in the fabrication of complete denture prosthesis.

Teeth selection plays a major role in the complete denture fabrication which is a major part of recording the smile line in completely edentulous patients. Studies have been conducted where the width of maxillary central incisor can be determined using the intraoral and extraoral factors which helps in teeth selection (Jyothi *et al.*, 2017). Periodontal assessment of the patients is necessary in complete denture patients who are willing for fixed denture replacements whereas it is not necessarily needed in temporary partial denture patients (Rbds and Ganapathy, 2016). Secondary infections caused by staphylococcus aureus can be seen in complete denture patients who have poor oral health maintenance and prolonged infections can lead to cellulitis and other complications in the oral cavity (Selvan and Ganapathy, 2016; Vijayalakshmi and Ganapathy, 2016) Herbal products such as aloe vera are known for its anti inflammatory effects beside the topical and systemic drugs. Ayurveda is another traditional form of therapy used by people used in treating diseases (Subasree and Murthykumar, 2016; Bokadia, Priya and Ariga, 2018). The oral and systemic health of the individual in assessing the type of treatment plan for the patient because implant supported overdentures require blood testing in checking the levels of hemoglobin for implant placement and the growth factor concentrated growth factors which helps in platelet aggregation in clotting. Anemia results in low hemoglobin and therefore the individual becomes systemically weak enough to accept the blood loss during the implant placement procedures (Malay, Duraisamy and Brundha, 2018; Prakash, Ganapathy and Mallikarjuna, 2019). Therefore the aim of the study was to determine the prevalence of secondary impression techniques used by dentists in CD patients.

MATERIALS AND METHODS

Study Design
This was a cross sectional study containing a sample size of 200 subjects. The study was conducted in a university setting. The pros of this study was the similar ethnicity and cons of the study were the geographic limitations, trends and other locations cannot be accessed. The time period of this study was from June 1, 2019 to April 1, 2020 and ethical approval was given by the ethics committee. This study was reviewed by 2 reviewers. There was no sorting process and all the data was included. The internal validity was the small sample size and external validity was the homogenisation and cross comparison.

Data Collection and Tabulation

Data was collected from a digital case sheet record. These data were then verified by one reviewer and coding was done in MS Excel Sheet. This data was then imported to SPSS for statistical analysis by variable definition process.

Analytics

The data was then coded in MS Excel Sheet. The statistical tests used were the inferential tests (chi square test) and the descriptive statistics. Statistical software used was the SPSS by IBM. The independent variables were age and gender. The dependent variables were the types of secondary impression techniques - mucocompressive, mucostatic and selective pressure. Data was transferred to the host computer, where the analysis and graphical illustration were done by SPSS Version 20.0.

RESULTS AND DISCUSSION

Majority of the subjects belonged to the 55-65 years age group (53.0%), whereas 47.0% of subjects belonged to the 66-80 years age group (Figure 1). Majority of the subjects were males (62.8%) followed by females (37.2%)(Figure 2). Selective pressure impression technique was more predominant (42.3%), followed by mucocompressive technique and mucostatic technique with 36.8% and 20.9% respectively (Figure 3). Mucostatic impression techniques (55.1%) were prevalent among the 55-65 years age groups, whereas selective pressure impression techniques (48.5%) were prevalent among the 66-80 years age groups. However, the 55-65 years age group had a higher percentage than other groups, this was not statistically significant (Pearson chi-square test,P=0.782 ,P >0.05) (Figure 4). Selective pressure impression technique was predominant in males (69.7%), whereas, mucostatic impression technique was predominant in females (44.9%). However, selective pressure impression techniques had a higher percentage than other techniques, this was not statistically significant. (Pearson chi-square test; P=0.135 ,P >0.05) (Figure 5).

Secondary or final impression in a complete denture patient plays a major role in fabrication of the denture. Secondary impression is recorded generally with a wash material like zinc oxide eugenol or non-eugenol impression paste. Light body elastomers can be used (van Noort, 2007). Alginate should not be used as it is a bulk impression material and hence used only for recording the primary impression. A survey conducted in the UK suggested that zinc oxide eugenol was used by 42% whereas 39% preferred to use elastomers for impression making (Petropoulos and Rashedi, 2003). Fixed partial dentures which are commonly done in replacement of missing teeth require tooth reduction which can lead to gingival damage during the gingival retraction techniques in impression making (Jain and Nallaswamy, 2018). Implant supported over dentures require the complete veneer crowns where there can be marginal discrepancy noted (Ganapathy *et al.*, 2016; Jain, Ranganathan and Ganapathy, 2017). Implant screws undergo surface modifications and the best type is the threaded type of implant design, but cement retained crown can undergo fatigue loss in due course of time (Ajay *et al.*, 2017). Selective pressure techniques used were of 2 types-Bouchers technique and Halperians technique. In bouchers technique, 1mm relief area is given on the basal surface and the tray is trimmed short of 2mm from the sulcus. In Halperians technique, 1mm of relief is given in peripheral extensions of the custom tray (Behnoush and Vicki, 2003). The other techniques used resulted in compromised health of tissues whereas selective pressure technique had high prevalence among the dentists as they record the stress bearing areas under pressure and non stress bearing areas under minimum pressure and hence gained much importance. Relief areas are given using spacers, few of them are the Levin, Rudd and Morrow, Boucher, Sharry and they addicted the different spacer designs to provide space for impression material to flow through it. The complete denture secondary impression should be recorded to minimise the distortion of the ridge and border tissues, failure of which can result in poor retention and stability (Klein and Broner, 1985). Implant supported overdentures are also used in completely edentulous patients (Ganapathy, Kannan and Venugopalan, 2017; Duraisamy *et al.*, 2019). Previously our team had conducted various research studies based on clinical trials over the past 5 years (Ashok *et al.*, 2014; Venugopalan *et al.*, 2014; Ashok and Suvitha, 2016; Basha, Ganapathy and Venugopalan, 2018; Kannan and Venugopalan, 2018). This can be controlled by using

fluoridated water and fluoridated toothpaste and regular dental checkups in order to reduce the caries progression (Kabilan *et al.*, 2018).

CONCLUSION

Major reasons for loss of teeth are due to high caries prevalence and poor oral health maintenance by the patient. Within the limitations of this study being the geographic limitations, future scope of this study, we aim in achieving the objectives of retention, stability, esthetics, support and preservation of the ridge by accurate recording of the impression. Therefore, it can be concluded that the most accepted theory is the selective pressure impression technique, as it helps in displacing the ability of supporting tissues and transferring load over selected areas of the denture seat.

AUTHOR CONTRIBUTIONS

Author 1 (Anupama Deepak) carried out the retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 and 3 (Dhanraj and M. Jeevitha) aided in the conception of the topic, participated in the study design, statistical analysis and supervised in preparation of the manuscript and helped in study design and coordinated in developing the manuscript. All the authors have equally contributed in developing the manuscript.

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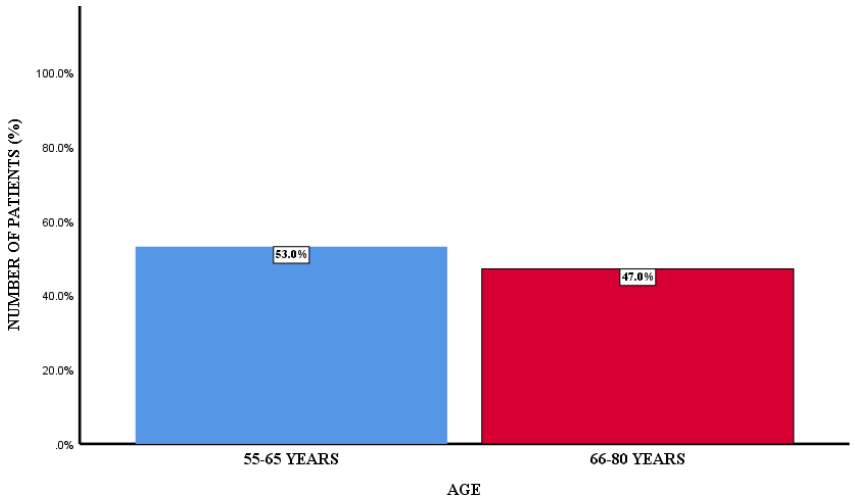

Figure 1: Bar chart represents the study subjects based on Age, where X-axis represents age groups of the subjects and Y-axis represents the number of patients in percentage. Majority of the subjects (53.0%) belonged to the 55-65 years age group (blue) whereas 47.0% of subjects belonged to the 66-80 years age group (red).

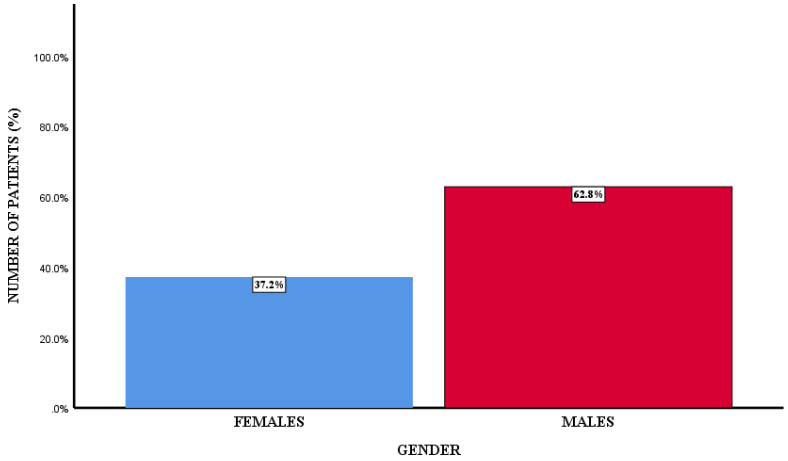

Figure 2: Bar chart represents the study subjects based on Gender, with the X-axis representing the gender of the subjects and Y-axis representing the number of patients in percentage. Majority of the subjects were males (62.8%) followed by females (37.2%) .

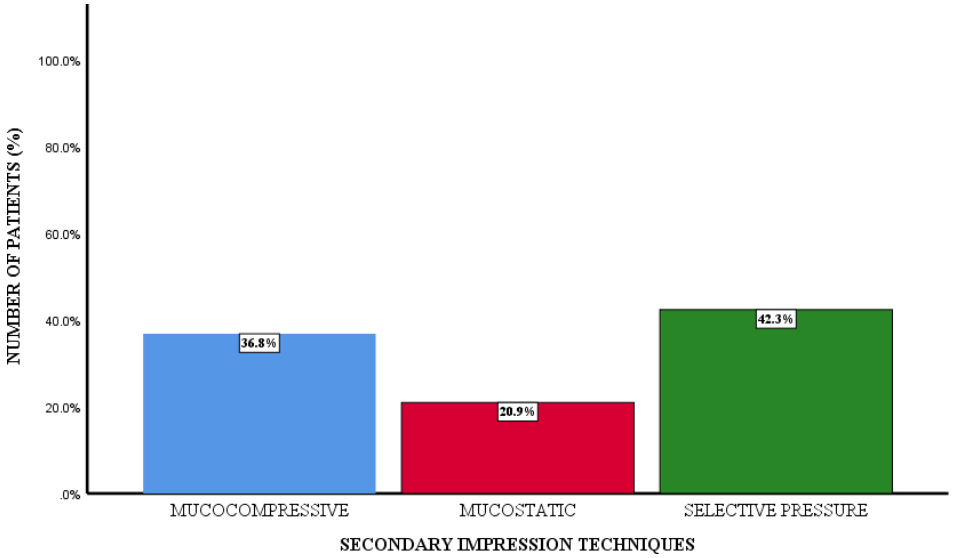

Figure 3: Bar chart represents study subjects based on secondary impression techniques, with X-axis representing the secondary impression techniques and Y-axis representing the number of patients in percentage. Selective pressure technique (42.3%) was more predominant (green), followed by mucocompressive technique (blue) (36.8%) and mucostatic technique (red) (20.9%).

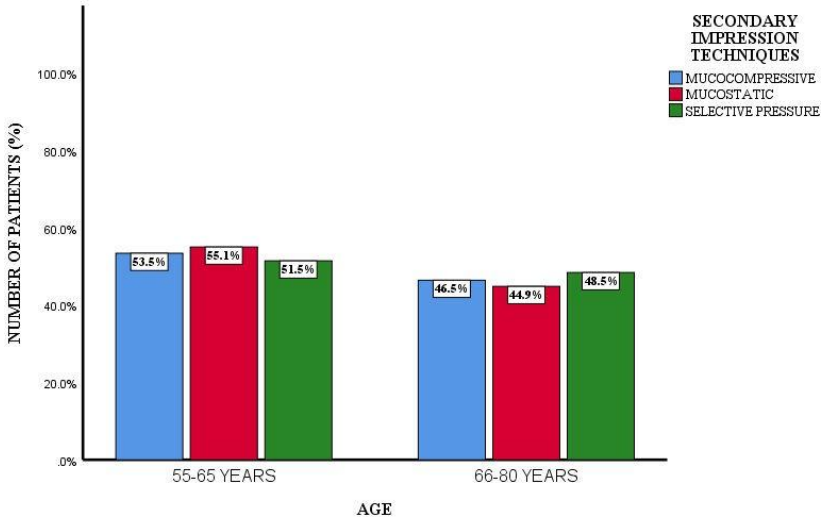

Figure 4**:** Bar chart represents association between Age and secondary impression techniques. X-axis represents the age groups of the subjects and Y-axis represents the number of patients in percentage. Mucostatic impression techniques (55.1%) were prevalent among the 55-65 years age groups (red), whereas selective pressure impression techniques (48.5%) were prevalent among the 66-80 years age groups (green) with a Pearson chi-square test value,P=0.782, P >0.05,which was not statistically significant, which means there was no significant association between age and the type of secondary impression techniques used.

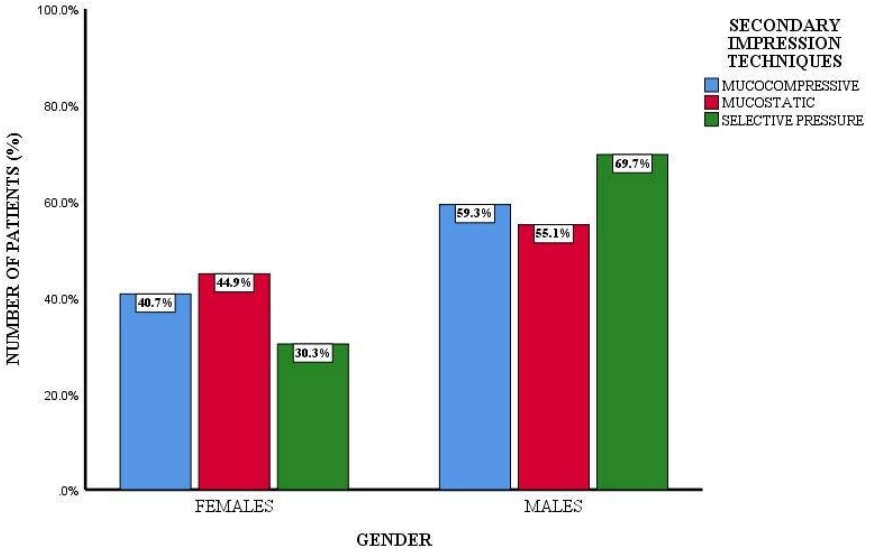

Figure 5: Bar chart represents the association between Gender and secondary impression techniques. X-axis represents gender of the subjects and Y-axis represents the number of patients in percentage. Selective pressure impression technique was predominant in males (69.7%)(green), whereas mucostatic impression technique was predominant in females (44.9%)(red) with a Pearson chi-square test value, P=0.135, P >0.05, which was not statistically significant, which means there was no significant association between gender and the type of secondary impression techniques used.