

**CLINICAL EFFICACY OF A DENTURE ADHESIVE IN COMPLETE MAXILLARY DENTURES- A PILOT STUDY****Dr. Pankaj Datta\*<sup>1</sup>, Dr. Sonia Datta<sup>2</sup>, Shailesh G. Vyas<sup>3</sup> and Anupama Singh<sup>4</sup>**<sup>1</sup>Professor & Head, Department of Prosthodontics, Inderprastha Dental College & Hospital, Sahibabad, Ghaziabad.<sup>2</sup>Associate Professor, Department of Public Health Dentistry, Inderprastha Dental College & Hospital, Sahibabad, Ghaziabad.<sup>3,4</sup>Dabur Research & Development Centre, Dabur India Limited, Ghaziabad, India.**\*Corresponding Author: Dr. Pankaj Datta**

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**ABSTRACT**

**Introduction:** Complete denture retention is one of the most frequent problems encountered by the patients in cases with compromised denture bearing area. Denture adhesive can be used as a substitute for these patients. However the efficacy of these adhesive varies with different forms being available in the market. Also the duration upto which these adhesives remain effective also varies. The present study was undertaken to determine the clinical efficacy of test adhesive in improving the retentive strength of complete maxillary dentures in the given subjects. **Materials and Methodology: Study design:** A 7 days clinical trial involving 10 edentulous subjects wearing complete maxillary dentures. **Study setting:** The study was done in the OPD of Department of Prosthodontics, Inderprastha Dental College & Hospital, Ghaziabad. The study group was duly informed about the study and written consent was taken from them before their participation in the study in order to prevent any inconvenience and to ensure full cooperation. The study period was between 01.08.16 to 15.11.16. **Results:** Gender wise distribution of Study Population was 6 Males (60.00%), 4 Females (40.00%) and the mean age of study population (in years) was  $66.60 \pm 2.06$  (Age range 60 – 80 years). **Conclusion:** Within the limitations of the present study, it can be concluded that the retentive strength of maxillary complete denture significantly increases after application of denture adhesives. Freshmint denture adhesive was effective in improving retention of the complete maxillary dentures.

**KEYWORDS:** Denture Adhesives, 'Customized' Gnathometer, complete maxillary dentures, retention, Retentive strength.

**INTRODUCTION**

For the success of complete denture prosthesis, adequate retention is of paramount importance. Retention can be defined as "That quality inherent by the prosthesis acting to resist the forces of dislodgment along the path of placement." There are multiple factors responsible for providing retention and preventing the displacement of denture away from the supporting tissues such as anatomic factors (size and quality of denture bearing area), mechanical factors (undercuts), physical factors (adhesion, cohesion, interfacial surface tension, capillary attraction and atmospheric pressure), biological factors (intimate tissue contact) and physiological factors (quality and quantity of saliva). Out of all these factors, physical factors play the most important role in achieving complete denture retention. Adhesion refers to the physical attraction of unlike molecules for each other which is achieved through ionic forces between charged salivary glycoproteins and surface epithelium or acrylic resin.

Lack of complete denture retention is one of the most common problems encountered by the clinicians who may lead to fall of denture while speaking or doing any activity associated with the opening of jaws. This might also lead to inability to comminute food, reduced self confidence and satisfaction. Denture adhesive can be defined as a material used to adhere denture to the oral mucosa. It helps in improving the retention of the denture thus increasing the masticatory efficiency and therefore restoring the confidence of the patient. For quantifying the efficacy of adhesives, measurement of denture retention is needed so as to compare the retentive strength with and without adhesive. At present, there are several methods on hand to measure retention in a complete denture like magnetometer, gnathodynamometer or retentiometer.

The present pilot study was aimed at evaluating the efficacy of "Freshmint" denture adhesive in improving maxillary complete denture retention.

**Description of the test products/ Ingredients**

- Cellulose gum
- Mineral Oil
- Petroleum
- Beeswax
- Polymethylvinylether maleic acid Sodium-Calcium salt
- Polyethylene Oxide
- D & C Red #27 aluminium lake
- Tocopheryl acetate

**Study design**

A 7 days clinical trial was conducted involving edentulous subjects wearing complete maxillary dentures.

**Study setting:** The study was done in the OPD of Department of Prosthodontics, Inderprastha Dental College & Hospital, Ghaziabad. The study group was duly informed about the study and written consent was taken from them before their participation in the study in order to prevent any inconvenience and to ensure full cooperation. The study period was between August 2016 to November 2016. The study was approved by Institute Ethics Committee on 05/03/2016 (CTRI Reg No. CTRI/2018/04/013356).

**Study Participants:** The study population comprised 10 volunteers (6 males and 4 females) who gave a prior voluntary written consent and fulfilled the subject selection criteria.

**Inclusion Criteria:** Healthy patients of both genders in the age group 60-80 years of age.

1. Cases with single maxillary complete denture with natural dentition in mandibular arch; i.e. complete/partial (anterior teeth present). In cases of partial arch, anterior teeth should be present in mandibular arch.
2. Subjects wearing complete dentures for a minimum period of one year.
3. General good health
4. No systemic disease.

**Exclusion Criteria** were those not fulfilling the inclusion criteria as well as

1. Severely atrophied edentulous ridges of severe grade
2. Severely abused/ hypertrophied tissue covering the ridges
3. Subjects having lack of neuromuscular control (e.g. stroke and Parkinsonism)
4. Cases with Xerostomia
5. Maxillofacial defects which provide inadequate tissue support.

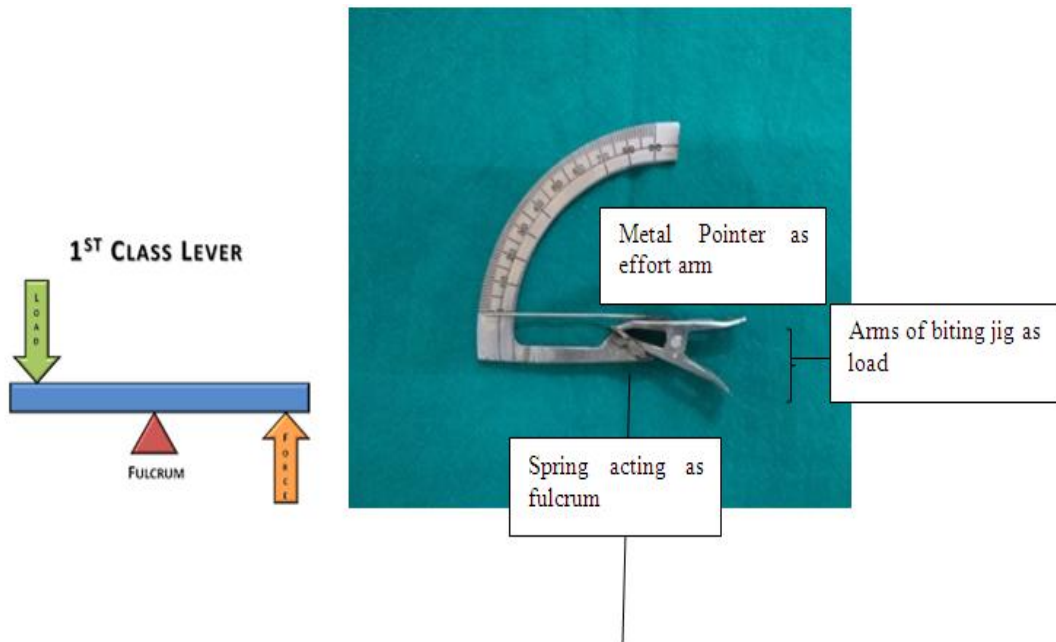
**Clinical Examination**

Routine materials and standard techniques were used for the fabrication of denture bases used in this study. Preliminary and final impressions were made for the

selected subjects. The denture bases were fabricated, using master cast made by boxing-in technique in heat cure acrylic resin using slow curing cycle. The bases were then finished and polished using accepted methods. The centre of bases were then marked by using a crossing point; obtained by two lines diagonally marked between Canine-Tubeoridity points.

Firstly, the maximum incisal force was measured without adhesive, using gnathometer. Then, the denture was removed, cleaned, and dried. Adhesive was applied in the denture, four strips of 1 cm at the frontal, dorsal, right, and left border of the hard palate. Strips were measured with a Boley gauge, and excess was cut off with a sharp instrument. The denture was replaced in the mouth and with a 3-min break to enable the patient to reposition the denture comfortably and habitually; the maximum incisal force was measured again. At day 7; post delivery of the new denture, when the patient was problem-free, the maximum incisal force of the new denture without and with denture adhesive were measured by the same prosthodontist following the same procedures.

The customized gnathometer used in the research is based on the principle of Class I lever, in which the spring acts a fulcrum, the load is applied on to the biting jig and the effort is made by the metal pointer as it moves in a semi-circular motion.



**Figure 1: Principle of Customised Gnathometer.**

**RESULTS**

The study was monocentric, single arm, open label, efficacy study. The duration of treatment was conducted for a period of 1 week on 10 subjects aged between 60-80 years (both inclusive) and included a total of 2 visits (Baseline, 1 week). The subjects who satisfy inclusion/exclusion criteria were enrolled after obtaining informed consent. All the subjects completed the study with no signs of adverse event/side effects during the study period. The gender wise distribution of Study

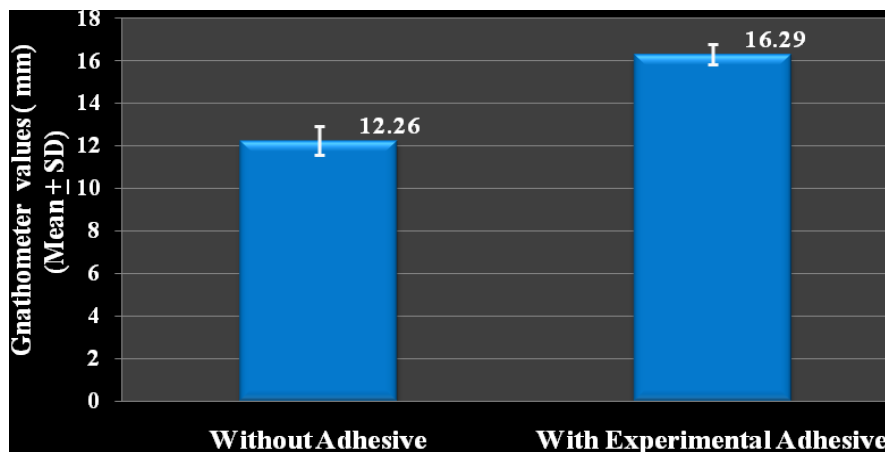
Population was – 6 Males (60.00%), 4 Females (40.00%) and the Mean Age of study population was (in years) is  $66.60 \pm 2.06$ .

The test denture adhesive increased significantly the complete maxillary dentures maximum dislodgement force over the control (without denture adhesive) in subjects. Denture adhesive was effective in improving retention of the complete maxillary dentures.

**Table 1: The means of Gnathometer values (maximum dislodgement forces) in study group.**

Study Group	Gnathometer value (in mm)		Paired 't' test	p - value
	Mean	SD		
Without Adhesive	12.260	0.6620	15.135	< 0.001 (VHS)
With Experimental Adhesive	16.290	0.4818		

SD – Standard Deviation, VHS – Very Highly Significant



**Graph 1: Gnathometer values signifying the retention in the complete maxillary dentures.**

## DISCUSSION

Loss of teeth has been associated with several socio-demographic, behavioural and medical factors. Complete edentulism leads to changes in food choices and nutritional changes that may contribute to medical problems which might affect an individual's general well-being. Lack of teeth can also have a negative impact on emotions and social well-being. Therefore rehabilitation of complete edentulism is of utmost importance for the wellbeing of an individual. Conventional complete dentures are often chosen as a treatment modality because of multiple factors such as cost, treatment time and patient's unwillingness to undergo surgical procedure and systemic factors etc. Although the fabrication of conventional complete denture may involve lower initial cost, it requires a continuous maintenance cost such as fracture repair, relining, lost individual teeth and polishing etc.

For the acceptance of complete dentures, adequate retention is of paramount importance. Adhesion of saliva to the mucous membrane and the denture base is achieved through ionic forces between charged salivary glycoproteins and the surface epithelium or acrylic resin. By promoting the contact of saliva to both the oral tissue and the denture base, adhesion works to enhance further the retentive forces of interfacial surface tension. Denture adhesives also referred to as adherents or fixatives, have long been recognized by denture wearers as a useful adjunct to denture retention, stability, and function. Denture adhesives are indicated in various situations like for stabilizing the trial bases, immediate dentures, patients with compromised supporting tissue, maxillofacial prosthesis, single complete denture cases etc. However, these adhesives should not be used in dentures with gross inadequacies as they do not suffice for the lack of clinical skills of the clinician.

The present study though gave us a lot of information about the effectiveness of denture adhesives in increasing the retentive strength. But, in the present study the retentive strength of only maxillary denture was determined and only single complete denture cases were considered. However with the retentive strength of mandibular denture can also be determined and compared with that of maxillary denture in subsequent research. Also, simulation of normal lifestyle of chewing food in between each time interval was not taken into consideration. The constant masticatory load on maxillary complete denture may have affected the retentive force of maxillary complete denture.

## CONCLUSION

Within the limitations of the study design along with the selection of a specific patient population group, it was found that the denture adhesives improved retention of the complete denture. The experimental denture adhesive increased significantly the complete maxillary dentures' maximum dislodgement force over the control (without denture adhesive) in study population. Freshmint denture

adhesive was effective in improving retention of the complete maxillary dentures. However, further research should be carried out on a larger population sample and adding few more parameters as mentioned earlier.

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