

Association between Clinical and Subjective Analysis of Denture Adhesives on Retention of Maxillary Complete Dentures: A Comparative Study

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ABSTRACT

Background and objectives: Adequate retention is a basic requirement for the acceptance of complete dentures. There are occasional situations in which many patients frequently resort to the use of denture adhesives. Because of limitations of many techniques to measure retention and its sensitivity, this study was planned to evaluate and compare the clinical and subjective analysis of bite force until denture dislodgement (BFDD) required to displace an existing maxillary complete denture without and with the use of denture adhesive in patients, with the help of customized autoclavable gnathometer which facilitates simple measurement of BFDD of the maxillary denture.

Materials and methods: A total of 20 edentulous subjects (14 males and 6 females) with age ranging from 50 to 76 years were randomly selected for the study. For the study purpose, following groups were made:

Group I—Subjects whose BFDD was recorded for existing complete denture without denture adhesive.

Group II—Subjects whose BFDD was recorded for existing complete denture with denture adhesive.

The BFDD measurements and subjective experiences were recorded. The data obtained were statistically analyzed using analysis of variance (ANOVA) for different time intervals and Student's t-test for group-wise comparison.

Results: The results of the present study showed that consistent improvements were observed in BFDD when adhesive was used, for all time intervals from the baseline to T2 followed by a decline from T4 to T8. The p-value was highly significant ($p < 0.001$, HS) at all time intervals for existing complete dentures. When comparison was made between clinical and subjective analysis, this study confirmed expected improvement in retention of maxillary complete denture persisting throughout the procedure, which was predicted by clinical study. Also, measured BFDD values were less for female subjects compared with male subjects.

Conclusion: The results of the present study showed that the BFDD values increased by denture adhesive application. Hence, it can be recommended that denture adhesive use can provide increased retention and psychological comfort for the subjects.

Keywords: Bite force, Denture adhesive, Gnathometer.

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INTRODUCTION

Optimal outcome of complete denture treatment depends on the successful integration of the prosthesis with the patient's oral functions and psychological acceptance of the dentures by the patient. These parameters require that patients perceive their dentures as stationary or well retained during function and that the prosthesis and their effects on the face meet the esthetic and psychodynamic requirements of the patient.¹

There are occasional situations in which it is not possible to obtain the desirable optimal retention like improper denture base extensions, compromised denture supporting hard and soft tissues, which include excessive ridge resorption, developmental abnormalities, etc. In these instances, different mechanical aids to retention like springs, suction chambers, suction rubber disks, and magnets are used. Since these mechanical aids cause some ill effects to the surrounding tissues, many patients frequently resort to the use of denture adhesives. Denture adhesives are used to increase the retention and stability of the complete denture, which in turn will improve the chewing and masticatory ability and also provide psychological comfort to the patient.²⁻¹²

Hence, this clinical *in vivo* study was planned, which illustrates the essential distinction between clinical and subjective assessment of denture adhesive that can be used to improve complete denture retention by recording BFDD of a maxillary complete denture with the help of customized autoclavable gnathometer that facilitates simple measurement.

MATERIALS AND METHODS

A total of 20 edentulous subjects (14 males and 6 females) reported to the Department of Prosthodontics whose age ranged from 50 to 76 years, who were in normal health,

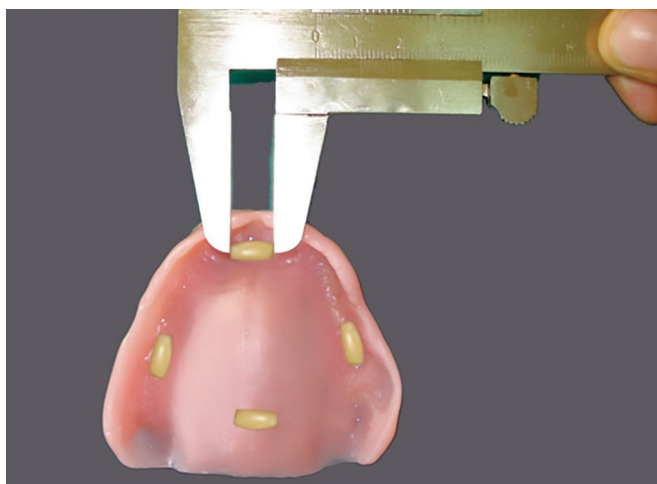


Fig. 1: Denture adhesive application on fitting surface of maxillary complete denture



Fig. 2: Recording of BFDD values in patient's mouth using gnathometer

without systemic problems, not under any medication, nonfasting, having class I ridge relationship were randomly selected for the study. All the selected subjects were not satisfied with the retention of their existing complete dentures and have either used denture adhesive once or were unaware of it. Hence, they were explained about the procedure of denture adhesive application, aim of the study, and informed consent was obtained from all the patients. Ethical clearance was obtained from the ethical clearance committee of the institution.

For study purpose, the following groups were made:

- Group I: Subjects whose BFDD was recorded with existing complete denture without denture adhesive (Baseline).
- Group II: Subjects whose BFDD was recorded with existing complete denture with denture adhesive at different time intervals.

Before beginning of the study, all the subjects were given instructions about the use of denture adhesive, and demonstrations were given following manufacturer's instruction. For group I, BFDD of the maxillary dentures was recorded without the use of denture adhesive as baseline.

For the group II subjects, prior to the application of denture adhesive, the dentures were removed, cleaned, and dried. The selected study material "Fittydent" denture adhesive, which is in the form of cream, was then applied to the maxillary denture on the fitting surface. Each strip of approximately 1 cm adhesive was placed at the anterior, posterior, right, and left areas on intaglio surface of maxillary complete denture (Fig. 1). The excess lengths of the denture adhesive strip were cut and removed with a sharp instrument. Then dentures were placed in the oral cavity and allowed for initial 1 hour for the denture adhesive to attain its properties.

For each subject, by using customized autoclavable gnathometer, BFDD measurements were recorded thrice

for every time interval of 1st, 2nd, 4th, 6th, and 8th hours following the application of denture adhesive, i.e., at 11 am, 12 pm, 2 pm, 4 pm, and 6 pm (Fig. 2). After the 2nd hour following the application of denture adhesive, i.e., after 12 pm, the patients were allowed for intake of food and water. On each occasion, the subjects were allowed for 3 minutes to reseat their denture by bringing their mandibular denture into occlusion with maxillary denture teeth between recordings.

Using the predesigned pro forma, individual patient information was recorded. The data obtained were statistically analyzed using ANOVA for different time intervals and Student's t-test for group-wise comparison.

The present study was aimed to record BFDD in subjects wearing the existing maxillary complete dentures without (baseline) and with (at different time intervals) the use of denture adhesive. Totally, 20 complete edentulous subjects of age ranging from 50 to 76 years, who were not satisfied with retention of their existing dentures were tested. Using customized autoclavable "gnathometer," the maximum BFDD was measured.

The results are expressed as mean and standard deviation (SD) values. The changes in BFDD values are tested by Student's paired t-test and repeated ANOVA. The obtained values are tabulated and statistically analyzed.

The results of the present study showed consistent improvement in BFDD mean values when a denture adhesive was used for all time intervals from the baseline (mean 5.76 N and 9.88 N) to maximum during T2 (mean 39.89 N and 46.11 N) followed by a gradual decline from T4 (mean 33.78 N and 38.65 N) to minimum during T8 (mean 19.16 N and 21.78 N) respectively, for groups I and II subjects (Table 1 and Graph 1).

For the subjective analysis of retention, a questionnaire was prepared and patients were asked to answer as per their opinion:

Questionnaire

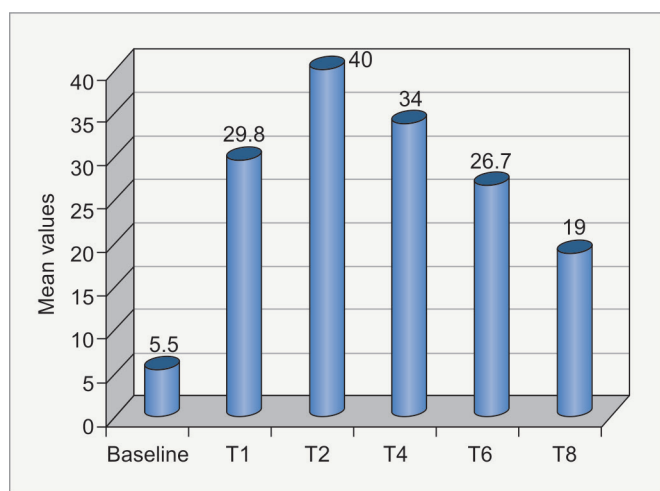
1. Have you ever tried denture adhesive?
 - a. Yes
 - b. No
2. If not, why?
 - a. Was not aware of it
 - b. Nobody advised
 - c. Thought not required
 - d. Others
3. If yes, information was obtained from
 - a. Dentist
 - b. Friends/Relatives
 - c. Media/others
 - d. Others
4. Using denture adhesive since
 - a. 3 months
 - b. 6 months
 - c. 1 year
 - d. More than 1 year
5. Form of denture adhesive used:
 - a. Powder
 - b. Cream
 - c. Strips
 - d. Combinations
6. Reason for use of denture adhesive
 - a. Difficulty in chewing
 - b. Difficulty in speech
 - c. Loose dentures
 - d. Others
7. Did application of denture adhesive improve chewing?
 - a. No improvement
 - b. To certain extent
 - c. To a large extent
 - d. Improved greatly
8. Did application of denture adhesive improve phonation (speech)?
 - a. No improvement
 - b. To a certain extent
 - c. To a large extent
 - d. Improved greatly
9. Did application of denture adhesive improve retention?
 - a. No improvement
 - b. To a certain extent
 - c. To a large extent
 - d. Improved greatly
10. How long the dentures were retentive?
 - a. 2 hours
 - b. 4 hours
 - c. 6 hours
 - d. 8 hours
11. Did application of denture adhesive reduce denture wobbling?
 - a. No
 - b. To a certain extent
 - c. To a large extent
 - d. Reduced greatly
12. Did application of denture adhesive improve comfort and confidence?
 - a. No
 - b. To a certain extent
 - c. To a large extent
 - d. Reduced greatly

Table 1: Mean of BFDD values recorded in groups I and II subjects wearing existing set of complete dentures without and with use of denture adhesive

Group	Time of assessment	Mean	SD
Group I	Baseline (without denture adhesive)	5.76	4.42
Group II	T1	29.17	10.26
	T2	39.89	10.58
	T4	33.78	15.36
	T6	26.75	15.52
	T8	19.16	13.53

DISCUSSION

Adequate retention is a basic requirement for the acceptance of complete dentures. It is very difficult to obtain the desirable optimal retention in some conditions due to improper denture base extensions, compromised denture supporting hard and soft tissues that include excessive ridge resorption, developmental abnormalities, etc. In such situations, the use of different mechanical denture



Graph 1: Bite force until denture dislodgement values of existing dentures

retention aids like springs, suction chambers, suction rubber disks, and magnets, etc., can cause ill effects to supporting tissues. Hence, many patients frequently resort



to the use of denture adhesives to increase the retention and stability of the complete denture, which in turn will improve the chewing and masticatory ability and also psychological well-being of the patient.¹³⁻²⁰

Results of this subjective analysis demonstrated significant differences between the groups I and II subjects and were very favorable for denture adhesive (Fittydent) used for the study. Through this study, many patients who were not aware of denture adhesives gained knowledge about denture adhesive and its proper usage. This study confirmed expected improvement in retention of maxillary complete denture persisting throughout the procedure, which was predicted by clinical study. In regard to denture retention, stability, speech, and mastication, subjects were very much satisfied with denture adhesive application, which added up to their psychological well-being by improved comfort and confidence.

CONCLUSION

In conclusion, within the limitations of this comparative study, the results demonstrated that the use of denture adhesive enhanced increase in BFDD for the existing dentures, both clinically and subjectively. Maximum BFDDs recorded by the existing dentures with adhesive were significantly higher than the forces in existing denture without the use of a denture adhesive. This could be explained by increased adhesiveness of denture surface area of existing dentures when compared with that of without denture adhesive (baseline). Also, six female subjects showed a decreased BFDD values compared with 14 male subjects at all time intervals from baseline to T8. Since the instrument used for this study was custom-made, further research is needed to determine its reproducibility and predictability and to interpret the BFDD units in comparison to the universal unit like Newton (standardization).

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