Original article

Clinical study to evaluate and compare the masticatory performance in complete denture wearers after using two adhesives: A Clinical Report

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ABSTRACT:

Purpose-The purpose of this study was to assess the effect of the use of two different forms of denture adhesives on the masticatory performance in conventional complete denture wearers.

Material and methods: Twenty individuals who were edentulous patients were selected for this study. A new maxillary and mandibular complete dentures were fabricated and given to the patients for adaption. After an adaptation period, patients masticatory performance analysis was done. The participants were randomly divided and assigned to 2 protocols: protocol 1, denture adhesive 1 (Fixon cream) use during the first 15 days, followed by no use of denture adhesive over the next 15 days (washout); protocol 2, denture adhesive 2 (Fixon powder) use for the 15 days. Almonds were selected as test food and the chewed food was poured on sieves. Both filter and filtrate were collected and was centrifuged. Masticatory performance was expressed in percentage by dividing the volume of particles passing through the sieve by the total volume particles recovered.

Result- No significant difference was found between the two different forms of denture adhesives.

Conclusion- No difference was found in masticatory performance with the use of cream or powder denture adhesive.

Keywords- complete denture, denture adhesive, masticatory performance.

INTRODUCTION

The most important function of the complete denture is to restore masticatory function in those individuals who have lost their natural teeth. Therefore improving retention and stability of dentures is of considerable interest in prosthetic dentistry. Approaches to the problem over the years have included overdentures, implants and denture adhesives. Although adhesives are used by millions of denture wearers and are advocated as an over-the-counter product by many professionals, their use has not been generally accepted as adjunct to treatment by the dental profession.

Some professionals and denture wearers consider adhesives a useful aid to denture retention, stability, and function, whereas others view them as a poor substitute for a proper fitting prosthesis. Both historical and scientific reasons may underlie the relatively negative view of denture adhesives by the profession. First, some textbooks have expressed concern that the use of a denture adhesive might promote tissue changes, including residual ridge bone resorption and, therefore, might have a negative effect on occlusion, especially in poorly fitting dentures. Second, although both qualitative and quantitative evidences exist to support the claim that an adhesive improves denture retention (resistance to movement in the vertical plane), there is virtually no evidence that an adhesive improves denture stability (resistance to movement in the horizontal plane). There are also few quantitative data on the
effects of an adhesive on denture retention and stability during normal functional activities such as chewing, swallowing, and speaking.

In addition to these issues, other important question related to the performance of a denture adhesive remain unanswered. One concerns the effect of an adhesive as a function of the fit of the denture. Does an adhesive improve retention and stability of poorly fitting and well fitting dentures alike or does the effect decrease as the fit of the denture improves? A second question concerns the duration of the improvement, in terms of both the “time to effect ” that is, if and when a significant improvement occurs after application, and the “time of effect,” or how long the improvement lasts after an adhesive is applied.

This study used quantitative method to determine the effect of two different denture adhesive forms on masticatory performance.

AIM AND OBJECTIVES

Aim:- A clinical study to evaluate and compare the masticatory performance in complete denture wearers after using two adhesives: a clinical report

Objectives:

1. Evaluation of masticatory performance in complete denture using denture adhesive cream (Fixon) .
2. Evaluation of masticatory performance in complete denture using denture adhesive powder (Fixon) .
3. Comparison of Masticatory performance in complete denture wearers after using two adhesives.

MATERIALS AND METHODS

The present study was conducted in the Department of Prosthodontics, Sharad Pawar Dental College, Wardha, India.

Patient Selection Criteria:

Total of 20 completely edentulous patients (male-12 & female-8) undergoing complete denture treatment were selected for the study.

Inclusion criteria:

1. Patients with well-formed residual ridge.
2. Adequate interridge space.
3. Patient with good neuromuscular control.
4. Without any temporomandibular disorders.

Fabrication of complete denture for the study

For each individual patient, maxillary and mandibular conventional acrylic complete dentures were fabricated. For the study each patient wearing complete denture underwent two protocol. The prostheses were inserted and required adjustments were done A control period of 30 days for functional adaptation was allowed. In the duration of 30 days the intaglio surface and occlusion of the complete denture were adjusted to correct any compression areas. The adjustments were done till the time it was necessary and no sign of tissue injury or any complaint is observed by the patient.

All the individuals were given instructions related to complete denture such as insertion, removal, maintenance and cleaning.

After the 30-day adaptation period, the masticatory performance of the participants followed the Protocols.

Protocol-1 patients were given denture adhesive cream (Fixon) for first 15 days, followed by no use of any form of denture adhesive for next 15 days (washout period) for second protocol.

After the 15 days washout period patients were called for Protocol-2 in which patients were given denture adhesive powder (Fixon) for 15 days.

For protocols 1 and 2, the masticatory performance was assessed immediately after the periods of denture adhesive use, with almonds as the natural test food. Three test portions of 3gm each were given to each participant.
measured and used for masticatory performance analysis. Each portion was chewed with 20 masticatory strokes. After the specified number of chewing cycle, the chewed food was collected in in glass container, for more accurate readings, each patient received 50 mL of water to rinse and remove the remaining particles, which also were collected in a container. Same procedure was performed for all three portions.

To separate liquid and chewed material, filter paper was adapted on the sieve(2mm) and then 500 mL of water was poured over the sieve and stirred with a glass rod to break clumps & eliminate any saliva present in the chewed particles.

Then both filter and filtrate were collected and transferred to the graduated centrifugal tubes. The tubes were centrifuged for 3 minutes at 1500 rpm. The volume of test food was recorded. The total volume of the taste food recovered was determined by adding the volumes of both the filter and filtrate.

Same procedure was performed for both the forms of denture adhesives.

Masticatory performance in this study has been quantitated by dividing the volume of test food passing through the sieve by the total volume of the taste food recovered. The fraction is expressed in a percentage for the evaluation of masticatory performance.

RESULT:
The values were obtained and statistical analysis of these tabulated values was done to evaluate and compare the masticatory performance in both the groups.
All the statistical calculations were done. The descriptive and inferential statistical analysis has been carried out in the present study. The student t-test (unpaired) has been used for intergroup analysis.

The results obtained from the study are shown in the table no 1 , 2 and graph no.1
The masticatory performance values were noted for all the patients after placing complete denture and using two different forms of denture adhesives.

The analysis of result showed no significant difference in the masticatory performance with use of denture adhesive cream and denture adhesive powder. No significant difference (p<0.001) was found between the two groups.

Table 1: Distribution of study participants based on gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total no of participants n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12(60)</td>
</tr>
<tr>
<td>Female</td>
<td>8(40)</td>
</tr>
</tbody>
</table>

Table 2: Comparison of mean scores for masticatory performance among two groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Masticatory Performance Mean(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder adhesive</td>
<td>36.71(3.4)</td>
</tr>
<tr>
<td>Cream adhesive</td>
<td>38.04(3.4)</td>
</tr>
<tr>
<td>t value</td>
<td>-1.227</td>
</tr>
<tr>
<td>p value</td>
<td>0.228</td>
</tr>
</tbody>
</table>

(p< 0.05 - Significant*, p < 0.001 - Highly significant**)
**Masticatory Performance**

![Bar chart showing Masticatory Performance](image)

- **Powder**: Mean (SD) = 36.71
- **Cream**: Mean (SD) = 38.04

**Fig. 1**

![Figure 2](image)

**Fig. 2**
DISCUSSION
The benefits of denture adhesives in well-fitting complete denture wearers also have been reported by Munoz et al.16 The researchers observed improvements in retention and stability, and the participants had a significant movement reduction while eating an apple after denture adhesives application. Hasegawa et al17 also observed that a denture adhesive in cream form reduced complete dentures movement during mastication. Most studies have tested the physical properties of complete dentures with different denture adhesives, especially with regard to retention and stability because successful complete denture performance is determined by retention, stability, and existing support.18 However, objective analysis of masticatory performance with complete denture also is of importance to simulate usage through a functional method.
In the present study, no difference was found between the masticatory performance after the use of cream or powder denture adhesive. Kapur7 assessed the masticatory performance of ill-fitting complete dentures with 3 denture adhesives and also observed no difference among the adhesives. In spite of the lack of studies that associate masticatory performance analysis with the use of denture adhesives, selection is highly subjective. Previous studies reported that these products are effective in increasing complete denture retention, regardless of the brand or form of presentation.19,20 Therefore, when considering similar effects, the patients can choose an adhesive based on personal preference.

CONCLUSION:
Within the limitations of the present study, it was concluded that the use of the two different forms of denture adhesives that is cream and powder tested & did not show any difference in the masticatory performance of conventional complete denture wearers.

REFERENCES: