Role of denture adhesive on the incisive force in denture wearers

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Abstract

Objective: To evaluate the incisive force exerted by the complete denture wearers with use of denture adhesive and without denture adhesive.

Methodology: Eight patients with complete maxillary and mandibular dentures were selected. Using custom made gnathometer, incisive forces were measured before and after using denture adhesive. Three different brands of adhesives like Fixon (powder), Fixon (cream) and Denofit (cream) were used for the study.

Results: The mean incisive force without adhesive was 562.5 g, with Fixon powder it was 1056.2 g, with Fixon cream it was 2000 g and with Denofit cream it was 1368 g.

Conclusion: When denture adhesives are used great incisive force was required to dislodge the maxillary and mandibular complete dentures.

Innovative instruments

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Incisive force exerted by complete dentures is determined to a greater extent by retention of dentures. There are several factors responsible for retention of complete dentures that include adhesion, cohesion, interfacial surface tension, capillary action, atmospheric tension, and oral or facial musculature. All these factors do not act at the same time. Each factor is related to a particular dislodgement force. Retention and stability of complete dentures can be improved by tooth or implant supported over dentures or by using adhesives. The use of denture adhesives is not favoured by all the denture wearers and dentists. But adhesives definitely have an enhancing role on the bite force. Hence it was decided to evaluate the incisive force exerted through complete dentures with and without using denture adhesives.

Methodology:

Eight patients wearing maxillary and mandibular complete dentures were selected randomly to evaluate the incisive force. A gnathometer was designed and fabricated using a metal clip and self cure resin with a scale. Custom made gnathometer was calibrated in grams using an electronic spring balance (Fig 1). Gnathometer was placed between the upper and lower incisors and patient was instructed to bite until the dentures were dislodged (Fig 2). The dentures were then washed and the adhesive was applied to the tissue surface of maxillary and mandibular dentures (Fig 3). Fifteen minutes after the reinsertion of dentures, gnathometer testing was undertaken. Same procedure was repeated for three different brands of adhesives (Fig 4). Three different brands of adhesives used for the incisive force measurement were Fixon-powder (ICPA Health Products Ltd, India), Fixon – cream (ICPA Health Products Ltd, India), and Denofit – cream (Dent Aids, India).
Table 1: Incisive force exerted by patients with and without adhesive (Grams)

<table>
<thead>
<tr>
<th>SI No of patients</th>
<th>Without adhesive</th>
<th>Fixon powder</th>
<th>Fixon cream</th>
<th>Dentofit cream</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500</td>
<td>1250</td>
<td>1500</td>
<td>1750</td>
</tr>
<tr>
<td>2</td>
<td>500</td>
<td>1000</td>
<td>3000</td>
<td>1500</td>
</tr>
<tr>
<td>3</td>
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<td>4</td>
<td>500</td>
<td>800</td>
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<td>1500</td>
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<tr>
<td>5</td>
<td>600</td>
<td>1500</td>
<td>3000</td>
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<td>6</td>
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<td>7</td>
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<td>1000</td>
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</tr>
<tr>
<td>8</td>
<td>600</td>
<td>900</td>
<td>2500</td>
<td>900</td>
</tr>
<tr>
<td>Mean</td>
<td>562.5</td>
<td>1056.2</td>
<td>2000</td>
<td>1368</td>
</tr>
<tr>
<td>SD</td>
<td>157.6</td>
<td>307.6</td>
<td>760.9</td>
<td>396</td>
</tr>
</tbody>
</table>

Table 2: ANOVA – Incisive force between and within the groups

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares (SS)</th>
<th>Mean SS</th>
<th>F</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td></td>
<td>8694062.500</td>
<td>2898020.833</td>
<td>11.253</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>28</td>
<td>7210625.000</td>
<td>257522.321</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>15904687.500</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*denotes significant difference

Statistical Analysis:

Analysis of Variance (ANOVA) was used for the statistical analysis. Table 2 and 3 are the results of ANOVA and p-value. Higher mean incisive force was recorded with Fixon Cream followed by Dentofit cream, Fixon powder and samples without adhesive respectively. The difference in mean incisive force was found to be statistically significant between the groups (P<0.001), as shown in table 2. The difference in mean incisive force was found to be statistically significant between samples without adhesive and Fixon cream (P<0.001), samples without adhesive and Dentofit cream (P<0.05) as well as between Fixon powder and Fixon Cream (P<0.01). No significant differences were observed between the other pairs, as shown in table 3.

Discussion:

Incisive force when applied to the complete dentures act as major dislodging elements. Most of the patients feel confident with denture adhesives during mastication. The adhesives can resist dislodgement of dentures especially when incisive force is applied. In the present study denture adhesives have improved the biting forces by two to three times. Without adhesive, a stable denture could exert incisive force of 562.5±157.6g. With adhesive powder it increased to 1056.2±307.6g and with two brands of creams it increased 1368±396g to 2000±760.9g. The study has proved that incisive biting force will improve with dentures if denture adhesives are used.

Results:

Table 1 shows the incisive force exerted by patients with and without adhesives. The mean incisive force (fig 5, 6) without adhesive was 562.5±157.6g, with Fixon powder it was 1056.2±307.6g, with Fixon cream it was 2000±760.9g, with Dentofit cream it was 1368±396g.

Conclusions:

- Denture adhesives improved the incisive biting force
- Of the three adhesives, maximum incisive force was observed with fixon cream, followed by dentofit cream and fixon adhesive powder
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Fig 1. Custom made Gnathometer and spring balance used for calibration

Fig 2. Gnathometer placed between dentures

Fig 3. Adhesive applied on the tissue surface of the dentures

Fig 4. Adhesives used for the study

Fig 5: Mean Incisive Force recorded in the groups

Fig 6: Dispersion plot showing force recorded in the groups

References:


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5. Tarib et al, Masticatory efficacy and bite force in complete dentures: a study of denture adhesive Hong Kong Dent J 2010;7:67-7


Dr. U V Gandhi, President IPS, Dr.Rangarajan, Secretary IPS, Dr. K Chandrasekharan Nair, Dr. Vahini Reddy, Dr. Divya Hegde, Dr. Srividya S, Dr. Sadhvi K V at the Preconference workshop on “How to make an Obturator”, a ‘Sthreeshakti’ initiative, Department of Prosthodontics, AECS Maaruti College of Dental Sciences and Research Centre, conducted at A B Shetty Memorial Institute of Dental Sciences, Derlakatte, Mangalore during 14th IPS PG students convention, July 26th – 29th 2012.