Assessment of amount of wettability alterations in polyether impression materials subjected to immersion disinfection: An in-vitro study

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ABSTRACT:
Background: Intercocclusal recording materials are used to transfer the interocclusal relationship from patient mouth to the lab. These are impression plaster, compound wax, resin, metal oxide paste, rubber base, and silicone materials.1 Any inaccuracy in the interocclusal record leads to occlusal errors in the final prosthesis. To minimize the necessity of occlusal adjustments, the chosen material should accurately capture the interocclusal relationship. Failure to capture an accuracy lead to a time-consuming chair-side adjustments, the need for remounting casts and possible refabrication of prosthesis.3 There is a paucity of information with respect to the effect of immersion disinfection on the wettability. In most of the available wettability studies, glutaraldehyde is used as immersion disinfectant; other chemical disinfectants such as phenol, sodium hypochlorite and iodophor have hardly been evaluated.5 Therefore, the objective of this in vitro study was to evaluate the wettability changes of Impregum soft, after immersing in different disinfectant solutions for a period of 10 min and 30 min, respectively.

MATERIALS & METHODS
The present study was conducted in the department of prosthoendontics of the dental institution and included assessment and comparison of mechanical strength of various elastomeric dental materials. A total of 90 samples of polyether impression material were prepared. Each sample was flat and disc shaped measuring 32 mm in diameter and 3 mm in thickness. The four disinfectant solutions used were 5.25% phenol, 5% sodium hypochlorite and 0.05% iodophor. Six readings were taken of each of the 90 examples, and the mean of the six readings was figured to acquire the last perusing for every example. All the results were compiled on an excel sheet. Results were analysed by SPSS software. Chi-square test and student t test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS: In the sodium hypo, phenol and Iodophor group, the mean contact angle at 10 minutes time was found to be 24.12, 28.41 and 22.65 degrees respectively. Significant results were obtained while comparing the contact angles in between various study groups.

CONCLUSION: Out of all polyether impression material, 0.05% iodophor appears to be a safe choice of immersion disinfection.

Key words: Disinfection, Immersion, Iodophor.

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example. The mechanical stage was balanced until the point when the unequivocal modified picture of the drop was unmistakably noticeable through the eye bit of the goniometer. The view through the eye piece demonstrated a flat hub that was acclimated to the surface of the specimen and a vertical hub that was changed in accordance with frame a digression to the bended surface of the drop. The contact edge was outwardly measured by utilizing the protractor and micrometer sizes of the goniometer from the level surface of the impression material to a line that framed a digression with the drop at the purpose of the strong fluid interface. This technique was rehashed by putting a drop of wetting fluid at six unique locales over the surface of each specimen. The readings were taken inside 1 min after the drop was set. Six readings were taken of each of the 90 examples, and the mean of the six readings was figured to acquire the last perusing for every example. All the results were compiled on an excel sheet. Results were analysed by SPSS software. Chi-square test and student t test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

Table 1 shows the mean of contact angles (degree) of various study groups. In the sodium hypo, phenol and Iodophor group, the mean contact angle at 10 minutes time was found to be 24.12, 28.41 and 22.65 degrees respectively. Significant results were obtained while comparing the contact angles in between various study groups.

Table 1: Mean of contact angles (degree) of various study groups

<table>
<thead>
<tr>
<th>Group</th>
<th>10 mins time</th>
<th>30 mins time</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>21.02</td>
<td>21.02</td>
<td>0.02*</td>
</tr>
<tr>
<td>Sodium hypo</td>
<td>24.12</td>
<td>24.25</td>
<td></td>
</tr>
<tr>
<td>Phenol</td>
<td>28.41</td>
<td>28.35</td>
<td></td>
</tr>
<tr>
<td>Iodophor</td>
<td>22.65</td>
<td>21.92</td>
<td></td>
</tr>
</tbody>
</table>

*: Significant

DISCUSSION

In the present study, we observed that immersion disinfection with 0.05% Iodophor for 10 min and 30 min did not alter the wettability of Impregum soft. Shetty SR et al assessed wetting characteristic of four brands of addition silicon materials subjected to immersion disinfection using four different disinfectants. Among the non-disinfected specimens, the lowest contact angle was recorded for Aquasil ultra (21.63), followed by Imprint II (29.06), Aquasil LV (44.10) and Take 1 (44.55). While 5.25% phenol increased the contact angle of all the silicon materials; 0.05% Iodophor increased the angle of Take 1 and Imprint II and 0.5% sodium hypochlorite increased the angle of Imprint II and decreased for Aquasil ultra. However, 2% glutaraldehyde did not significantly change the contact angle of any of the four impression materials. Lepe X et al used the Wilhelmy technique for deriving wetting properties of 5 addition silicone materials (Clinician’s Choice Affinity, Clinician’s Choice Superhydrophilic [experimental], Kerr’s Take One, 3M’s Imprint II, and Dentsply’sAquisil LV) and 2 polyether materials (ESPE’s Permadyne Garant and Impregum Garant). Conditions included a control with no disinfection (0 hours), as well as (1/2) hour of immersion disinfection in a full-strength solution of 2% acid glutaraldehyde disinfectant (Banicide). Weight changes before and after disinfection and weight loss in air were measured over an 18-hour period to detect imbibition and mass change over time. The data were analyzed with a 1-way analysis of variance at alpha=0.05, with n = 3 for advancing (ACA) and receding (RCA) contact angles and n = 2 for imbibition and mass change. Statistical significant differences in wettability (P<.001) were found among non disinfection control groups, as well as among (1/2)-hour disinfection groups. Polyethers were the most wettable materials overall. Impregum Garant polyether demonstrated significantly lower RCA for the control (48.4 degrees) and at (1/2) hour of disinfection (51.8 degrees). The 2 polyethers and Take One lost mass, whereas Aquasil LV gained mass in air; however, all materials exhibited some degree of imbibition during disinfection. Within the limitations of this study, the 2 polyether materials tested exhibited significantly lower ACA’s and RCA’s compared with the 5 addition silicones tested. Imbibition for the 2 polyether materials was significantly higher (P<.001). Polyether materials lost significantly more (0.6% to 0.8%) and Aquasil LV gained significantly more (0.6%) mass in air.

Davis BA et al determined the dimensional change and wettability for three addition silicones and a polyether impression material after disinfection by immersion for two 30-minute cycles in 2% acid-potentiated glutaraldehyde. Contact angles of water on disks were measured on a goniometer. Dimensional change was determined by change in distance between two reference lines. Contact angle (degree) and dimensional change (percent) of five samples were measured after 0-, 30-, 60-, and 1,440-minute intervals of storage in air and disinfectant. The contact angle in air increased for two addition silicones and remained constant for the remaining materials. In disinfectant, the contact angle increased for all four materials, with the contact angle of the polyether increasing the least. In air, dimensional change decreased significantly for an addition silicone and a polyether. In disinfectant, the dimensional changes of the addition silicones were not significant, but the polyether increased in dimension after 1,440 minutes. Two 30-minute cycles of disinfection in 2% acid-potentiated glutaraldehyde reduced wettability, but had little effect on the dimensional change of the addition silicones and polyethers tested.
CONCLUSION
From the above results, the authors concluded that out of all polyether impression material, 0.05% iodophor appears to be a safe choice of immersion disinfection.

REFERENCES

Source of support: Nil
Conflict of interest: None declared

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