Pengaruh Penambahan Pati Ubi Kayu Pada Bahan Cetak Alginat Terhadap Stabilitas Dimensi (Mirna Febriani)

The Effectiveness Of Tofu Liquid Waste As A Natural Phytoestrogen For Mandibular Bone Of Ovariectomized Rats (Meilia Aquina, Nur Permatasari)

Effect Of Panax Ginseng Extract For The Increased Number Of Fibroblasts Cells After Tooth Extraction (Ferdian Rizky Hutomo, Nur Permatasari, Kartika Andari Wulan)

Effect Of Led Exposure Time On The Temperature Rise, Depth Of Cure And Microhardness Of Nanohybrid Composite Resin (Olivia Nazia Komala, Ednaisa Badianto, Yosi Kusuma Eriwati, Siti Triaminingsih)

The Decrease In Number Of Blood Polymophonuclear (Pmn) To Periapical Radiographs Dose Of radiation exposure (Amni Adlina, Wasiolah)

The Efficacy Of Glass Ionomer Hybrid As Orthodontic Brackets Adhesives To Inhibit Calcium Released Of The Enamel (Rina Sutjiati)

Hubungan Antara Status Gizi Dengan Status Erupsi Gigi Molar Tiga (Normayanti Sukma, Ana Medawati)

The Effect Of Immunoglobulin-Y Anti Streptococcus Mutans On The Protein Expression Of Streptococcus Mutans Isolated From Caries And Caries-Free Subjects (Rizky Aditya Irwandhi, Endang Winlati Bachtiar, Mindya Yuniahighest)

Uji Temperatur Air Pencampur Terhadap Setting Time Bahan Cetak Kulit Buah Manggis (Garcinia Mangostana) (Dilan Vosi Arinawati, Audi triawan)

Pengaruh Ekstrak Antaman (Centella Asiatica) Dihandingkan Dengan Ibuprofen Terhadap Kadar Histaster Titis (Yadha Perwira Putra, Enis Reni Yuslianti)

The Growth Of Body Length And Weigh Of Male Wistars Supplied With anchovies (stolephorus sp.) Additional diet (Tecky Indriana)

Expression Of Heat Shock Protein (Hsp) 25 At Compression And Tension Area During Alveolar Remodeling (Muhammad Nurul Amin)

SP Transcription Family Involve In Tooth Development? (Ivan Arie Wahyudi)

Restorasi Estetik 1 Kali Kunjungan Dengan Penggunaan Pasak Pada Kasus Fraktur (Any Setyawati)

Perawatan Crossbite Anterior Pada Masa Gigi Bercampur Menggunakan Incline Plane Lepasan (Tita Ratya Utari, Nova Abdillah)
The Efficacy Of Glass Ionomer Hybrid As Orthodontic Brackets Adhesives To Inhibit Calcium Released Of The Enamel

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Abstract

Background: Composite resins are predominantly used to bond orthodontic brackets onto teeth. These can lead to calcium released of the enamel surrounding the brackets. Purpose: To observe calcium release during the use of adhesives which release fluoride Method: This experimental study was designed to determine the calcium released after soaking in the acid solution. This in vitro study used fully extracted human premolars (20 teeth were bonded with glass ionomer, and 20 teeth were bonded with glass ionomer hybrid). Half of the teeth in each group were treated with fluoride application and the other half were not treated fluoride application topically. Calcium released of the enamel was evaluated using Spectrophotometer. Result: The results showed that there was a significant difference between glass ionomer group without and with fluoride application (p<0.005), and there was not significant difference (p>0.005) in the group of glass ionomer hybrid without and with fluoride application topically. Conclusion: The adhesive glass ionomer hybrid could prevent calcium released with or without the usage of sodium fluoride.

Key words: topical application, adhesive bracket, calcium released.

Efektifitas Bahan Perekat Breket Ortodonti Gelas Ionomer Hibrid Dalam Mencegah Pelepasan Kalsium Pada Enamel

Abstract


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The study was an experimental laboratory conducted using the method of the post test only control group design. The sample consisted of 40 first premolar teeth of upper jaw extracted for orthodontic treatment, 20 teeth attached using hybrid glass ionomer (Fuji Ono), and the rest were attached using glass ionomer (GC Fuji J). Half of the 40 samples were provided with fluoride topical application (NaF 0.2%).

**Materials and Methods**

The study was an experimental laboratory conducted using the method of the post test only control group design. The sample consisted of 40 first premolar teeth of upper jaw extracted for orthodontic treatment. 20 teeth attached using hybrid glass ionomer (Fuji Orto), and the rest were attached using glass ionomer (GC Fuji J). Half of the 40 samples were provided with fluoride topical application (NaF 0.2%).
Subsequently, all of the samples were immersed in acid solution, and after thirty days all of the samples were observed for their calcium release using Spectrophotometer Atomic Absorption.

Results

The result of the study on the mean of calcium release in each group is figured as follows:

Table. The mean of calcium release from teeth after one month immersion (% Ca)

<table>
<thead>
<tr>
<th>ADHESIVE MATERIAL</th>
<th>MEAN OF CALCIUM RELEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FO without application</td>
<td>0.2562</td>
</tr>
<tr>
<td>FO with application</td>
<td>0.2461</td>
</tr>
<tr>
<td>GO without application</td>
<td>0.3917</td>
</tr>
<tr>
<td>GO with application</td>
<td>0.3090</td>
</tr>
</tbody>
</table>

Figure: The mean of calcium release from teeth after one month immersion (% Ca).
The level of calcium release on hybrid glass ionomer cement between those with and without fluoride application varied p=0.3204 (p>0.05) that statistically was not significant. In the other hand, the calcium release on the enamel of the teeth in the hybrid glass ionomer group between those with application and without application varied p=0.0044 (p<0.05) that was statistically significant. While the difference of calcium release on the enamel of the teeth between hybrid glass ionomer with fluoride application and glass ionomer with fluoride application varied p=0.0008 (p<0.05) that was statistically significant. The calcium release between hybrid glass ionomer cement without fluoride application and glass ionomer without application valued p=0.0033 (p<0.005) that was significantly significant.

Discussion

Based on the statistic t-test, there is no significant difference between hybrid glass ionomer cement with and without fluoride application, it occurs due to fluoride release of hybrid glass ionomer cement as the main factor. It is the same as Vorhies' study although using different method that the depth of mineral released in Fuji Orto adhesive material shows no significant difference between those with and without fluoride application. Silverman reports that hybrid glass ionomer cement, Fuji Orto, releases fluoride increasingly on the first day up to the 400th day, therefore, the fluoride release from the material becomes the main factor so that not affect its mineral release. Calcium release between hybrid glass ionomer and glass ionomer cement shows significant difference between both groups with and without topical application material. It is due to fluoride release in hybrid glass ionomer cement is more than glass ionomer cement. Ogaard reveals that enamel crystal, after fluoride application, will partly absorbed by enamel surface by forming fluoride depot. During the subsequent remineralisation, some of the fluoride will be released in line with the increase of fluoride level in the solution, fluoride is capable to stimulate fluorapatite or fluorhydroxiapatite formation. This change occurs when the fluoride is on the enamel surface (CaF2) and functions to decrease the amount of mineral losing during demineralisation process, and in the same time it also stimulates mineral residual on the enamel surface that subsequently binds to structure of apatite crystal and causes it enduring to dissolvability.

Conclusion

The level of calcium release on hybrid glass ionomer cement between those with and without...
fluoride application is nearly the same. In the other hand, the calcium release in glass ionomer is greater than hybrid glass ionomer both with and without fluoride application.

Reference:


