

INTISARI

Perawatan ortodonti cekat menggunakan braket keramik dapat meningkatkan pelekatan plak karena kekasaran permukaan braket. Obat kumur berbahan nonetanol dan etanol dapat menurunkan pelekatan plak, akan tetapi berdampak pada kekuatan pelekatan braket. Penambahan aplikasi bahan deproteinase dari enzim bromelin diharapkan dapat meningkatkan kekuatan bahan adhesif terhadap email. Penelitian ini bertujuan untuk mengevaluasi pengaruh aplikasi bromelin terhadap kekuatan tarik dan skor *Adhesive Remnant Index* (ARI) braket keramik pada simulasi penggunaan obat kumur nonetanol dan etanol.

Penelitian menggunakan 30 premolar pascaekstraksi dibagi dalam enam kelompok perlakuan ($n=5$), yang mencakup kontrol dan aplikasi bromelin 10%, dengan variasi larutan perendaman (saliva buatan, obat kumur nonetanol, dan etanol). Evaluasi kekuatan tarik dilakukan menggunakan *universal testing machine*, sedangkan skor ARI dianalisis melalui stereomikroskop dan SEM. Data penelitian dianalisis menggunakan *two-way ANOVA*, dilanjutkan dengan uji *post-hoc Tukey*, skor ARI dianalisis dengan uji *Scheirer Ray-Hare*.

Hasil penelitian menunjukkan bahwa aplikasi bromelin secara signifikan meningkatkan kekuatan tarik braket ($p<0,05$). Rerata kekuatan tarik braket keramik pada kelompok bromelin perendaman saliva buatan ($7,43\pm 0,35$ MPa), nonetanol ($6,15\pm 0,43$ MPa), etanol ($5,67\pm 0,28$) MPa, sementara kelompok kontrol perendaman saliva buatan ($6,17\pm 0,29$ MPa), nonetanol ($4,85\pm 0,36$ MPa), etanol ($4,98\pm 0,36$ MPa). Skor ARI pada kelompok bromelin didominasi skor 3, sementara pada kelompok kontrol didominasi skor 2. Skor ARI kelompok bromelin berbeda secara signifikan dibandingkan kontrol ($p<0,05$). Kesimpulan penelitian ini aplikasi bromelin 10% efektif dalam meningkatkan kekuatan tarik dan *adhesive remnant index*. Hal tersebut membuktikan efektivitas bromelin dalam meningkatkan kekuatan pelekatan braket pada permukaan email pada simulasi penggunaan obat kumur nonetanol maupun etanol.

Kata kunci: kekuatan tarik, bromelin, obat kumur, braket keramik.

ABSTRACT

Fixed orthodontic treatment using ceramic brackets increases plaque retention due to the roughness of the bracket surface. Mouthrinse are recommended during orthodontic treatment. The use of mouthrinses containing nonethanol and ethanol based during orthodontic treatment has been associated with a reduction in bracket bond strength. The application of deproteinizing agents such as bromelain—a proteolytic enzyme—has been proposed to enhance the adhesion of composite resin to enamel. This study aimed to evaluate the effect of bromelain application on the tensile bond strength and Adhesive Remnant Index (ARI) of ceramic brackets under immersion conditions in nonethanol-based and ethanol-based mouthrinses.

Thirty extracted premolars were assigned to six treatment groups (n=5), comprising control and 10% bromelain-applied groups, each exposed to artificial saliva, ethanol-based, or non-ethanol-based mouthrinses. Tensile bond strength was measured using a universal testing machine, while ARI scores were evaluated using stereomicroscopy and scanning electron microscopy (SEM). Data were analyzed using two-way ANOVA followed by Tukey's post-hoc test for tensile strength, and the Scheirer-Ray-Hare test for ARI scores.

Results showed that bromelain application significantly enhanced tensile bond strength ($p < 0.05$). The highest mean value was observed in the bromelain-saliva group (7.43 ± 0.35 MPa), followed by bromelain-non-ethanol (6.15 ± 0.43 MPa) and bromelain-ethanol (5.67 ± 0.28 MPa). In comparison, the control groups showed lower values: saliva (6.17 ± 0.29 MPa), non-ethanol (4.85 ± 0.36 MPa), and ethanol (4.98 ± 0.36 MPa). ARI scores in the bromelain groups were predominantly score 3, indicating more adhesive remaining on the enamel, while control groups mostly showed score 2. The difference in ARI scores between groups was statistically significant ($p < 0.05$). In conclusion, the application of 10% bromelain effectively improves tensile bond strength and adhesive remnant index. Both increase adhesive retention at the enamel interface in both nonethanol-based and ethanol-based mouthrinse conditions.

Keywords: tensile bond strength, bromelain, mouthrinse, ceramic brackets.