# PENGARUH KOMBINASI ASAM MALAT DAN ASAM GALAT SEBAGAI BAHAN *BLEACHING* TERHADAP KEKASARAN PERMUKAAN EMAIL GIGI

## INTISARI

*Bleaching* merupakan tindakan kuratif yang dilakukan untuk mengatasi perubahan warna pada gigi. Teknik *bleaching* dilakukan melalui aplikasi bahan kimiawi berbasis peroksida pada permukaan gigi yang berubah warna. Namun, penggunaan agen pemutih kimiawi dapat menimbulkan efek samping pada lapisan gigi seperti peningkatan kekasaran permukaan gigi. Peningkatan kekasaran permukaan memudahkan pelekatan bakteri pada email gigi yang akan berakibat kepada peningkatan prevalensi karies gigi. Penelitian ini mengeksplorasi bahan alternatif yang dapat digunakan sebagai bahan *bleaching* yang dapat meminimalisir dampak negatif yang ditimbulkan Tujuan penelitian ini adalah untuk mengetahui pengaruh aplikasi kombinasi asam malat dan asam galat sebagai bahan *bleaching* terhadap kekasaran permukaan email gigi.

Delapan belas gigi premolar rahang atas maupun rahang bawah dengan mahkota utuh dan bebas karies digunakan sebagai spesimen. Pewarnaan gigi dilakukan dengan perendaman pada larutan kopi selama 14 hari. Spesimen secara acak dibedakan menjadi tiga kelompok perlakuan, yaitu karbamid peroksida 10%, asam malat 1%, dan kombinasi asam malat 1% dengan asam galat 1%. Bahan *bleaching* diaplikasikan 6 jam per hari selama 14 hari. Spesimen disimpan dalam inkubator dengan suhu 37$^{o}$C. Pengukuran kekasaran permukaan email gigi dilakukan menggunakan alat *Surface Roughness tester*. Dilakukan uji normalitas *Shapiro-Wilk* serta uji homogenitas *Levene's Test*. Dipilih uji ANAVA satu jalur untuk mengetahui perbedaan rata – rata antarkelompok perlakuan.

Hasil uji Shapiro Wilk menunjukan data tidak terdistribusi normal sedangkan uji Levene test menyatakan data terdistribusi homogen. Uji Kruskall Wallis menyatakan tidak terdapat perbedaan bermakna terhadap peningkatan kekasaran permukaan antara kelompok perlakuan karbamid peroksida 10%, asam malat 1% dan kombinasi asam malat 1 dan asam galat 1%.

**Kata kunci:** *bleaching*, karbamid peroksida 10%, asam malat 1%, asam galat 1%, kekasaran permukaan email gigi

# EFFECT FROM COMBINATION OF MALIC ACID AND GALLIC ACID AS A BLEACHING AGENT ON TOOTH ENAMEL SURFACE ROUGHNESS

## *ABSTRACT*

Bleaching is a curative procedure performed to treat discolored teeth. The bleaching technique is carried out by applying peroxide-based chemicals to the discolored tooth surface. However, the use of chemical whitening agents can cause side effects on tooth coating such as increased tooth surface roughness. Increased surface roughness facilitates the attachment of bacteria to tooth enamel which will result in an increase in the prevalence of dental caries. Therefore, it is necessary to explore alternative materials that can be used as bleaching agents that can minimize the negative impacts. The purpose of this study was to determine the effect of the application of a combination of malic acid and gallic acid as a bleaching agent on the roughness of the tooth enamel surface.

Eighteen maxillary and mandibular premolars with intact and caries-free crowns were selected as specimen. The discoloration was performed by immersion in coffee solution for 14 days. Specimens were randomly divided into three treatment groups: 10% carbamide peroxide, 1% malic acid, and a combination of 1% malic acid with 1% gallic acid. Bleaching agents were applied six hours per day for 14 days. The specimens were stored in an incubator at 37$^{o}$C. Measurement of tooth enamel surface hardness was performed using a Surface Roughness tester. Shapiro-Wilk normality test and Levene's Test homogeneity test were conducted. One-way ANOVA test was chosen to determine the mean differences between treatment groups.

Results of the Shapiro-Wilk test showed the data were not normally distributed, while the Levene Test showed the data had a homogeneous variance. Kruskal Wallis test showed there was no significant difference in the decrease of enamel surface hardness between groups of 10% carbamide peroxide, 1% malic acid, and a combination of 1% malic acid and 1% gallic acid.

**Keywords:** bleaching, carbamide peroxide 10%, malic acid, gallic acid, enamel surface roughness.