

## INTISARI

Resin komposit sangat sering digunakan dalam bidang kedokteran gigi sebagai material restorasi gigi. Akhir-akhir ini, resin *short fiber reinforced-composite* (FRC) diperkenalkan sebagai material restorasi pada area dengan tekanan tinggi, terutama gigi posterior. *Silk fiber Bombyx mori* digunakan pada penelitian ini sebagai penguat pada resin komposit karena memiliki sifat mekanis yang baik. Penelitian ini bertujuan untuk mengetahui pengaruh alkalisasi dan fraksi volumetrik *silk fiber* terhadap kekuatan fleksural FRC.

*Silk fiber Bombyx mori* didapatkan dari Perhutani, Pati, Indonesia. Sampel dibagi menjadi 2 grup alkalisasi (4% dan 8%). Alkalisasi *silk fiber* dilakukan melalui proses *scouring* dengan NaOH, hidrolisis ( $H_2SO_4$  30%), dan pengeringan. Selanjutnya, *silk fiber* ditambahkan pada matriks resin. Sampel kemudian dibagi lagi berdasarkan fraksi volumetrik *fiber* yang ditambahkan, yaitu 0%, 5%, 10%, dan 15%. Sampel tiap kelompok adalah 4 spesimen (n=4). Kekuatan fleksural diuji dengan *Universal testing machine*. Data di analisis dengan *two-way ANOVA* ( $p < 0,05$ ) dan uji *post hoc LSD* ( $p < 0,05$ ).

Hasil penelitian menunjukkan rerata kekuatan fleksural (MPa) kelompok alkalisasi 4% adalah  $166,41 \pm 44,70$  (0%),  $69,88 \pm 37,76$  (5%),  $96,67 \pm 40,00$  (10%), dan  $104,57 \pm 10,09$  (15%); sedangkan rerata kekuatan fleksural (MPa) kelompok alkalisasi 8% adalah  $166,41 \pm 44,70$  (0%),  $80,49 \pm 18,78$  (5%),  $110,17 \pm 26,92$  (10%), dan  $154,75 \pm 19,67$  (15%). Analisis statistik *two-way ANOVA* menunjukkan adanya pengaruh fraksi volumetrik *fiber* terhadap kekuatan fleksural FRC. Kesimpulan penelitian ini fraksi volume *silk fiber* sampai dengan 15% meningkatkan kekuatan fleksural FRC. Tidak ada pengaruh persentase alkalisasi terhadap kekuatan fleksural FRC dan tidak ada interaksi antara persentase alkalisasi dan fraksi volume *fiber* terhadap kekuatan fleksural FRC.

**Kata kunci:** *silk fiber*; *fiber reinforced composite*; alkalisasi; fraksi volume; kekuatan fleksural.

## ABSTRACT

*Composite resins are widely used in dentistry to restore dental caries. Recently, short fiber reinforced-composite resins (FRC) are widely used for high stress areas, especially in posterior teeth. Bombyx mori silk fiber is under research to be reinforced in dental composite resin as it has good mechanical properties. This study aims to obtain the effects of alkalization and volume fraction of silk fiber on the flexural strength of FRC.*

*Bombyx mori silk fibers were obtained from Perhutani, Pati, Indonesia. Samples were divided into 2 groups of alkalization (4% and 8%). The alkalization of silk fibers was conducted through the scouring process in NaOH, hydrolysis (30% H<sub>2</sub>SO<sub>4</sub>) and drying. Silk fibers were then reinforced in a resin matrix. The samples were then subdivided based on reinforcement of fiber volume fractions, which was 0%, 5%, 10% and 15%. Each group of samples consisted of 4 specimens (n=4). Flexural strength was measured by using Universal testing machine. Data were analyzed by two-way ANOVA (p<0.05) and post hoc LSD test (p<0.05).*

*The result showed the flexural strength (MPa) means of 4% alkalization group were 166.41±44.70 (0%), 69.88±37.76 (5%), 96.67±40.00 (10%), and 104.57±10.09 (15%); while the flexural strength (MPa) means of 8% alkalization group were 166.41±44.70 (0%), 80.49±18.78 (5%), 110.17±26.92 (10%), and 154.75±19.67 (15%). Statistical analysis by ANOVA indicated there was an effect of fiber volume fraction on the flexural strength of FRC. It can be concluded that volume fraction of silk fiber up to 15% increased flexural strength of FRC. However, there was no effect of alkalization percentage on the flexural strength of FRC and there was no interaction between alkalization percentage and fiber volume fraction with flexural strength of FRC.*

**Keywords:** *silk fiber; composite resins; alkalization; volume fraction; flexural strength*