

INTISARI

Serat sisal, salah satu jenis serat alam, merupakan salah satu bahan yang dapat digunakan sebagai bahan pengisi *glass ionomer cement* (GIC). Sifat serat sisal yang keras dan kasar serta ukuran serat dalam skala nano dapat berpengaruh terhadap sifat fisik dan mekanik GIC. Penelitian ini bertujuan mengkaji pengaruh penambahan *nanofiber* sisal terhadap kekerasan dan kekasaran permukaan GIC konvensional.

Penelitian dilakukan terhadap 96 sampel GIC+*nanofiber* sisal berbentuk *disk* (diameter 6 mm, tinggi 2 mm). Masing-masing pengujian (kekerasan dan kekasaran permukaan) terdiri atas kelompok kontrol dan 5 kelompok perlakuan (penambahan *nanofiber* sisal sebanyak 0,2%; 0,4%; 0,6%; 0,8%; 1%). Material yang digunakan adalah *nanofiber* sisal serta GIC tipe 2 (Fuji II, GC, Jepang). Kekerasan GIC diuji menggunakan *microhardness tester* (Shimadzu, Japan), kekasaran permukaan diuji menggunakan *stylus profilometer* (Starett SR300, USA). Data yang diperoleh dianalisis menggunakan uji Kruskal-Wallis dan *post hoc* Mann-Whitney (kekerasan), serta uji ANOVA satu jalur dan *post hoc* Tamhane (kekasaran permukaan), dengan tingkat kepercayaan 95% ($p < 0,05$).

Dalam penelitian ini didapatkan rerata kekerasan untuk GIC dengan penambahan *nanofiber* sisal 0,2%, 0,4%, 0,6%, 0,8%, 1% secara berturut-turut, adalah sebagai berikut $83,41 \pm 1,49$; $74,30 \pm 1,58$; $64,94 \pm 2,25$; $59,30 \pm 6,57$; $51,59 \pm 3,99$ VHN. Kekasaran permukaan pada GIC dengan penambahan *nanofiber* sisal 0,2%, 0,4%, 0,6%, 0,8%, 1% secara berturut-turut, adalah sebagai berikut $1,03 \pm 0,37$; $0,96 \pm 0,28$; $0,42 \pm 0,09$; $0,41 \pm 0,06$; $0,36 \pm 0,05$ μm . Hasil uji Kruskal-Wallis menunjukkan *rank mean* kekerasan GIC dengan penambahan *nanofiber* sisal 0,2%, 0,4%, 0,6%, 0,8%, 1% secara berturut-turut adalah sebagai berikut 36,00; 29,88; 19,50; 17,06; 7,31. Uji ANOVA satu jalur terhadap variansi kekasaran permukaan GIC dengan penambahan *nanofiber* sisal 0,2%, 0,4%, 0,6%, 0,8%, 1% menunjukkan nilai $F=9,755$ ($p < 0,05$) yang berarti berpengaruh bermakna. Kesimpulan penelitian ini adalah penambahan *nanofiber* sisal menurunkan kekerasan dan kekasaran permukaan *glass ionomer cement* konvensional.

Kata kunci : *nanofiber* sisal, kekerasan, kekasaran, *glass ionomer cement*

ABSTRACT

Sisal fiber, one of the natural fiber types, is one of the materials used as the filler of *glass ionomer cement* (GIC). The features of hard and rough sisal fiber as well as the fiber size in nano scale may affect the physical and mechanical features of GIC. The present research aimed to analyze the effect of adding sisal nanofiber to the hardness and surface roughness of conventional GIC.

The research was conducted to 96 samples of GIC+*nanofiber* sisal in the form of *disk* (diameter 6 mm, height 2 mm). Each of the test (the hardness and surface roughness) consisted of control group and 5 treatments group (the addition of *nanofiber* sisal was 0.2%; 0.4%; 0.6%; 0.8%; 1%). The material used was *nanofiber* sisal and GIC type 2 (Fuji II, GC, Japan). The hardness of GIC was tested using *microhardness tester* (Shimadzu, Japan), the surface roughness was tested using *stylus profilometer* (Starett SR300, USA). The obtained data was analysed using Kruskal-Wallis test and *post hoc* Mann-Whitney (hardness), also one line ANOVA test and *post hoc* Tamhane (surface roughness), with trusty level of 95% ($p < 0.05$).

In this research, the obtained hardness average for GIC by adding *nanofiber* sisal of 0.2%, 0.4%, 0.6%, 0.8%, 1% sequently was 83.41 ± 1.49 ; 74.30 ± 1.58 ; 64.94 ± 2.25 ; 59.30 ± 6.57 ; 51.59 ± 3.99 VHN. The surface roughness of GIC by adding *nanofiber* sisal of 0.2%, 0.4%, 0.6%, 0.8%, 1% sequently was 1.03 ± 0.37 ; 0.96 ± 0.28 ; 0.42 ± 0.09 ; 0.41 ± 0.06 ; 0.36 ± 0.05 μm . The result of Kruskal-Wallis test showed that *rank mean* of hardness of GIC by adding *nanofiber* sisal of 0.2%, 0.4%, 0.6%, 0.8%, 1% sequently was 36.00; 29.88; 19.50; 17.06; 7.31. The one line ANOVA test on the variant of surface roughness of GIC by adding *nanofiber* sisal of 0.2%, 0.4%, 0.6%, 0.8%, 1% showed the score of F was 9.755 ($p < 0.05$) meant significantly affected. The conclusion of the current research was that the adding of *nanofiber* sisal reduced the hardness and surface roughness of conventional *glass ionomer cement*.

Keywords: sisal nanofiber, hardness, roughness, glass ionomer cement