

## INTISARI

Semen ionomer kaca (SIK) konvensional merupakan tumpatan kedokteran gigi yang memiliki kekuatan *tensile* lemah. Kekuatan *tensile* SIK konvensional dapat ditingkatkan dengan penambahan bahan memiliki kekuatan *tensile* kuat yaitu serat alami sisal. Serat sisal diberi perlakuan alkalisasi dan diolah hingga berukuran mikro agar diperoleh penambahan kekuatan yang optimal. Penelitian ini bertujuan mengetahui pengaruh penambahan sisal berukuran mikro teralkalisasi dalam meningkatkan kekuatan *tensile* SIK konvensional.

Penelitian menggunakan serat sisal (*Agave sisalana*), larutan NaOH 6%, CH<sub>3</sub>COOH 2%, H<sub>2</sub>O<sub>2</sub> 3%, H<sub>2</sub>SO<sub>4</sub> 30%, akuades, dan SIK konvensional tipe II. Serat sisal (20 g) dipotong ( $\pm 2$  mm), dilanjutkan *scouring* dengan mereaksikan serat dalam larutan NaOH 6% (3 jam/65°C), dinetralkan dengan CH<sub>3</sub>COOH 2% (2 jam/65°C), ditiriskan, dicuci, dan dikeringkan. Selanjutnya *bleaching* dengan merendam serat dalam H<sub>2</sub>O<sub>2</sub> 3% (3 jam/45°C), ditiriskan, dicuci, dan dikeringkan. Selanjutnya hidrolisis asam dengan mereaksikan serat dalam H<sub>2</sub>SO<sub>4</sub> 30% (1 jam/70°C), ditiriskan, dicuci, dan dikeringkan. Serat sisal yang telah diproses diuji dengan *scanning electron microscope* (SEM), kemudian silanisasi dan dikeringkan selama 24 jam. Serat (3% w/w) dicampurkan dalam serbuk SIK, diaduk dengan *liquid* SIK, dimasukkan ke dalam cetakan sampel dan tutup dengan *selluloid strip* hingga *setting*. Setelah 24 jam, sampel direndam dalam akuades (24 jam/37°C), diuji kekuatan *tensile* dengan *universal testing machine*. Data kekuatan *tensile* dianalisis menggunakan *independent t-test*.

Rerata dan simpangan baku kelompok kontrol dan perlakuan berturut-turut 7,45 $\pm$ 0,43 MPa dan 8,53 $\pm$ 0,32 MPa. Hasil uji *independent t-test* menunjukkan kenaikan tidak bermakna ( $p > 0,05$ ). Penelitian ini menunjukkan bahwa penambahan sisal mikro teralkalisasi berpengaruh terhadap kekuatan *tensile* semen iomer kaca konvensional walaupun tidak bermakna.

**Kata kunci :** semen ionomer kaca, kekuatan *tensile*, serat sisal, *Agave sisalana*, alkalisasi

## ABSTRACT

Conventional glass ionomer (GIC) cement is a dental filling material which has a low tensile strength. The tensile strength of conventional GIC could be increased by adding materials that have a higher tensile strength such as sisal natural fibers. Sisal fiber undergo alkaline treatment and processed into micro-sized to obtain optimal strengthening. This study aims to determine the effect of the addition of alkalinized micro sisal in increasing tensile strength of conventional GIC.

Materials used for this study was sisal fiber (*Agave sisalana*), 6% NaOH solution, 2% CH<sub>3</sub>COOH, 3% H<sub>2</sub>O<sub>2</sub>, 30% H<sub>2</sub>SO<sub>4</sub>, aquadest, and conventional GIC type II. Sisal fiber (20 g) was cut into pieces ( $\pm 2$  mm) followed with scouring by reacting the fiber in 6% NaOH solution (3 hours/65°C), then neutralized with 2% CH<sub>3</sub>COOH (2 hours/65°C), drained, washed, and dried. The bleaching was then carried out by soaking the fiber in 3% H<sub>2</sub>O<sub>2</sub> (3 hours/45°C), drained, washed, and dried. Next, the process of acid hydrolysis by reacting the fiber in 30% H<sub>2</sub>SO<sub>4</sub> (1 hour/70°C), drained, washed, and dried. Sisal fibers that have been processed were tested with scanning electron microscope (SEM), silanized, and dried for 24 hours. Fiber (3% w/w) mixed in GIC powder, stirred with GIC liquid, put into sample molds, and covered with selluloid strips until set. After 24 hours, the sample immersed in distilled water (24 hours / 37 ° C), then the tensile strength was tested with universal testing machine. Tensile strength data were analyzed using independent t-test ( $p < 0.05$ ).

The mean and standard deviation of the control and treatment groups were  $7.45 \pm 0.43$  MPa and  $8.53 \pm 0.32$  MPa, respectively. The independent t-test results showed a no significant increase between groups ( $p > 0.05$ ). This study shows that the addition of alkalinized micro sisal insignificantly effecting the tensile strength of conventional glass iomer cement.

**Keywords :** glass ionomer cement, tensile strength, sisal fiber, *Agave sisalana*, alkalinization