ABSTRACT

Acrylic resin is commonly used to fabricate denture base however it has disadvantage on its mechanical properties. Reinforcement materials are often added into acrylic resin to overcome the drawbacks. Sisal fibre can be made into micro size. Micro sisal particle was used as filler to reinforce the denture base. This research was done to study the effect of micro-sized sisal particles added into acrylic resin denture base on the tensile strength.

Sisal fibre (Balittas, Indonesia) was made into micro size through scouring (NaOH 6%), bleaching (H_2O_2 3%), acid hydrolysis (H_2SO_4) and drying. The size of micro sisal particles was evaluated with SEM. Micro sisal particles were mixed with the acrylic resin powder at a ratio of 30%:70% (w/w). Acrylic resin (Dentsply Standard Pack QC-20, England) with the ratio of 1:3 (liquid:powder) was used to make two groups of samples with the size (63.5x10x2.8mm): control (unfilled) and micro sisal reinforced with eight samples in each group. Tensile strength of samples was tested by using Universal Testing Machine. Data was analysed with independent t-test ($p<0.05$).

The SEM showed the size of sisal particles in the range of 20-350µm. Data showed a mean and standard deviation of the tensile strength of conventional acrylic resin and micro-sized sisal particles reinforced acrylic resin was 36.74±0.31 N/mm^2 and 16.04±0.29 N/mm^2 respectively. Independent t-test resulted a significant difference ($p<0.05$). It can be concluded that tensile strength of acrylic resin was reduced after micro-sized sisal particles were added into acrylic resin.

Keywords: micro sisal, acrylic resin, SEM, tensile strength

INTISARI

Resin akrilik biasanya digunakan untuk membuat basis gigi tiruan namun memiliki kelemahan pada sifat mekaniknya. Bahan penguat sering ditambahkan ke dalam resin akrilik untuk mengatasi kelemahan. Serat sisal dapat dibuat menjadi ukuran mikro. Partikel mikro sisal digunakan sebagai filler untuk memperkuat basis gigi tiruan. Penelitian ini dilakukan untuk mengetahui effect of micro-sized sisal particles added into acrylic resin denture base on the tensile strength.

Sisal serat (Balittas, Indonesia) dibuat menjadi ukuran mikro melalui scouring (NaOH 6%), bleaching (H_2O_2 3%), asam hidrolisis (H_2SO_4) dan pengeringan. Ukuran partikel mikro sisal dilihat dengan SEM. Partikel mikro sisal dicampur dengan polimer pada rasio 30%:70% (w/w). Acrylic resin (Dentsply Standard Pack QC-20, Inggris) dengan rasio 1:3 (cairan:serbuk) digunakan untuk membuat dua kelompok sampel dengan ukuran (63,5x10x2,8mm): kontrol (unfilled) dan micro sisal reinforced acrylic resin dengan delapan sampel di masing-masing kelompok. Kekuatan tarik spesimen diuji dengan menggunakan Universal Testing Machine. Data dianalisis dengan menggunakan independent t-test ($p<0,05$).

Uji SEM menunjukkan ukuran partikel sisal di kisaran 20-350μm. Data menunjukkan nilai rata-rata dan standar deviasi dari kekuatan tarik resin akrilik konvensional dan partikel mikro sisal reinforced resin akrilik adalah 36,74±0,31 N/mm^2 dan 16,04±0,29 N/mm^2 masing-masing. Hasil uji independent t-test menunjukkan perbedaan yang signifikan ($p<0,05$). Kesimpulan dapat dinyatakan bahwa kekuatan tarik dari resin akrilik berkurang setelah partikel sisal berukuran mikro yang ditambahkan ke dalam resin akrilik.

Kata kunci: mikro sisal, resin akrilik, SEM, kekuatan tarik