

INTISARI

Semen kalsium fosfat telah banyak digunakan sebagai bahan pengganti tulang, salah satu contohnya yang biokompatibel dan bioaktif adalah semen *alpha tricalcium phosphate* (α -TCP). Semen α -TCP memiliki kelebihan mudah teresorbsi di dalam tubuh, namun memiliki kondisi relatif susah *setting*. Ketika semen α -TCP dicampurkan dengan cairan, maka akan terjadi reaksi *setting* melalui disolusi presipitasi menghasilkan *calcium deficient hydroxyapatite* (CDHA). Waktu setting semen α -TCP dipengaruhi oleh beberapa faktor, antara lain rasio serbuk dan cairan, temperatur, pencampuran dan spatulasi, dan lain sebagainya, salah satunya yaitu jenis cairan sebagai campuran serbuk α -TCP.

Pada penelitian ini, dua cairan yang berbeda digunakan untuk mengamati pengaruhnya terhadap waktu *setting*. Cairan yang digunakan dalam penelitian yaitu *distilled water* dan susu sapi yang banyak mengandung ion fosfat. Serbuk semen sebanyak 500 mg dicampur dengan cairan sebanyak 250 μ L di atas *glass plate*. Setelah pengadukan selama 1 menit pada suhu ruang, pasta dimasukkan ke dalam cetakan Teflon dengan tinggi 2,5 mm dan diameter 10 mm. Waktu *setting* inisial pada suhu 37°C diukur dengan jarum *Gillmore*.

Rerata dan standar deviasi waktu *setting* semen α -TCP yang dicampur dengan susu sapi sebesar $64,06 \pm 4,20$ menit, sedangkan rerata dan standar deviasi waktu *setting* semen α -TCP yang dicampur dengan *distilled water* sebesar $93,81 \pm 4,86$ menit. Uji T tidak berpasangan menunjukkan adanya perbedaan yang bermakna antara waktu *setting* semen α -TCP pada pencampuran dengan susu sapi dan *distilled water*. Dengan demikian dapat disimpulkan bahwa waktu *setting* semen α -TCP pada penggunaan cairan susu sapi lebih pendek daripada pada penggunaan *distilled water* disebabkan oleh kandungan ion fosfat pada susu sapi.

Kata kunci: α -TCP, susu sapi, fosfat, *distilled water*, waktu *setting*, jarum *Gillmore*, disolusi, presipitasi

ABSTRACT

Calcium phosphate cement has been widely used as bone substitute material, an example of which is biocompatible and bioactive is alpha tricalcium phosphate cement (α -TCP). The α -TCP cement is resorbed easily in the body, but has relatively difficult setting conditions. When α -TCP cement is mixed with liquid, there will be a setting reaction through dissolution and precipitation, produces calcium deficient hydroxyapatite (CDHA). Setting time of α -TCP cement is affected by several factors, such as ratio of powder and liquid, temperature, mixing and spatulation, and so forth, one of which is the type of liquid as a mixture of α -TCP powder.

In this study, two different liquids were used to observe their effects in the setting time. The liquids used in the study were distilled water and cow's milk containing phosphate ions. An amount of 500 mg cement powder was mixed with 250 μ L liquid on the glass plate. After 1 min of mixing at room temperature, the paste was put into a Teflon mold with a height of 2.5 mm and an inner diameter of 10 mm. Initial setting time was determined with Gillmore needles.

Mean and standard deviation of the setting time of α -TCP cement mixed with cow's milk was 64.06 ± 4.20 min, whereas mean and standard deviation of the setting time of α -TCP cement mixed with distilled water was $93,81 \pm 4,86$ min. Unpaired T test showed a significant difference between the setting time of α -TCP cement mixed with milk and distilled water. It can be concluded that the setting time of α -TCP cement on the use of cow's milk was shorter than the one with distilled water which is caused by the content of phosphate ions in cow's milk.

Keywords: α -TCP, cow's milk, phosphate, distilled water, setting time, Gillmore needle, dissolution, precipitation