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Analisis Pengaruh Agen Antibakteri, Suhu Pengadukan, dan Scale Up Produksi terhadap Efektivitas Fast Release Fluoride Varnish = The Effect of Antibacterial Agents, Mixing Temperature, and Production Scale Up on the Effectiveness of Fast Release Fluoride Varnish

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Abstrak

Di Indonesia, 92,6% anak berusia 5-9 tahun mengalami karies gigi. Karies gigi terjadi karena reaksi Streptococcus mutans dengan karbohidrat di mulut sehingga terbentuk asam yang dapat menghancurkan struktur mineral gigi. Terapi fluor berupa fluoride varnish dapat menghambat pertumbuhan bakteri Streptococcus mutans dan mampu meremineralisasi gigi dengan efektivitas hingga 77%. Tujuan penelitian ini adalah mengetahui pengaruh variasi jenis agen antibakteri, variasi suhu pengadukan, dan scale up terhadap zona inhibisi bakteri Streptococcus mutans, pelepasan ion fluor, dan pH fluoride varnish yang dihasilkan. Formulasi fluoride varnish yang digunakan terdiri atas rosin terhidrogenasi, etanol 99,7%, natrium fluor, tween 80, minyak perasa peppermint, DCPD-Xylitol, dan ekstrak agen antibakteri bahan alam. Jenis agen antibakteri terbaik adalah ekstrak daun sirih merah 0,1 g/mL dengan zona inhibisi bakteri Streptococcus mutans sebesar 14,22 mm. Suhu pengadukan optimal fluoride varnish terpilih pada tahap scale up adalah sebesar 90ºC. Kecepatan pengadukan optimal fluoride varnish terpilih pada tahap scale up adalah 1000 rpm. Jumlah pelepasan ion fluor fluoride varnish hasil scale up adalah 263,29 mg/L setelah 240 menit pengujian. Persen penyimpangan jumlah ion fluor fluoride varnish hasil scale up terbaik dengan hasil skala lab terbaik adalah sebesar 4,36%. Nilai rata-rata pH seluruh sampel fluoride varnish yang diteliti berada di atas pH kritis fluorapatit sehingga remineralisasi dapat terjadi.
..... In Indonesia, 92.6% of children aged 5-9 years have dental caries. Dental caries occurs due to the reaction of Streptococcus mutans with carbohydrates in the mouth which forms acids capable of destroying the mineral structure of teeth. Fluoride therapy in the form of fluoride varnish can inhibit the growth of Streptococcus mutans and is able to remineralize teeth with an effectiveness of up to 77%. The purpose of this study was to determine the effect of variation in the type of antibacterial agent, variation in mixing temperature, and production scaling up on the inhibition zone of Streptococcus mutans, the fluoride ions release, and the pH of the fluoride varnish produced. The fluoride varnish formulation consisted of hydrogenated rosin, 99.7% ethanol, sodium fluorine, tween 80, peppermint flavoring oil, DCPD-Xylitol, and extracts of natural antibacterial agents. The best type of antibacterial agent is 0.1 g/mL red betel leaves extracts with a zone of inhibition of Streptococcus mutans bacteria of 14.22 mm. The optimal mixing temperature of the best fluoride varnish at the scale up stage is 90ºC. The optimal fluoride varnish mixing speed selected at the scale up stage is 1000 rpm. The amount of fluoride ions release from the best fluoride varnish at the scale up stage was 263.29 mg/L after 240 minutes of testing. The percentage deviation of the amount of fluoride ions release from the best fluoride varnish at the scale up stage compared with lab scale was 4.36%. The average pH value of all fluoride varnish samples researched was above the critical fluorapatite pH meaning that remineralization can occur.