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Antimicrobial activity of *Syzygium aromaticum* extract loaded on Oral Thin Film against *Streptococcus mutans*

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Structured Abstract

Background: *S. aromaticum* or clove, consists of various biological compounds that contribute to its diverse biological activities. Products in the market that are used to treat dental caries have some limitations as the designs are inconvenient. For example, capsules are hard to swallow, while gel products are easily washed away by saliva. Thus, Oral Thin Film (OTF) is an effective option. This study aims to investigate the antimicrobial properties of *S. aromaticum* against *S. mutans*. The next objective is to formulate an ideal thickness of OTF containing *S. aromaticum* extract. Lastly, to determine the extended-release properties of *S. aromaticum* extract containing film.

Methods: Different concentrations of *S. aromaticum* extract were investigated to determine MIC value using microbroth dilution method. From the MIC value, *S. aromaticum* extract was loaded on the OTF mixture, fabricated *S. aromaticum* extract containing film by using the solvent casting method. The thickness of dried OTF containing *S. aromaticum* extract was then before the film dissolved in Simulated Salivary Fluid (SSF) for 24 h, 12 h, and 6 h. The disintegrated film was then centrifuged, and the aliquot obtained was loaded in an agar well to determine the extended-release properties of *S. aromaticum* extract OTF by measuring the zone inhibition produced on *S. mutans* lawn culture.

Results: The *S. aromaticum* extract MIC value against *Streptococcus mutans* is 5 mg/ml. The thickness of *S. aromaticum* containing the film was 0.01 ± 0.01 mm, which is ideal for preventing mouthfeel. Additionally, adding S. aromaticum extract to OTF produced a yellow film, a bright color that could attract pediatric patients. The film also showed extended-release properties as longer disintegration times, which is at 24 h resulted in a greater zone of inhibition

Conclusion: In conclusion, this study established that OTF is important in drug delivery systems as it offers a prolonged therapeutic effect and enhance the effectiveness of *S. aromaticum* extract in *S. aromaticum* containing film, inhibiting *S. mutans*. Hence potentially preventing dental caries.

Keywords: *S. aromaticum*, *S. mutans*, Oral Thin Film (OTF), dental caries, antimicrobial effect.

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