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Evaluation of cytotoxic and inflammatory properties of clove oil microemulsion in mice

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Clove oil is the essential oil of *Syzygium aromaticum* Merr. and L.M. It is widely used in pharmaceutical applications because of its biological potential including anesthetic, analgesic, anti-inflammatory, antibacterial and antioxidant properties [1]. The pharmacological efficacy is hindered by the high hydrophobicity of the essential oil; therefore, a thermodynamically stable microemulsion is an alternative attractive preparation for overcoming this problem [2]. However, high surfactant concentration used in microemulsion may cause toxicity and other disadvantage to the formulation. This study aimed to investigate the immunotoxic effects of clove oil microemulsion in mice.

The essential oil was isolated from clove bud using simultaneous steam-distillation. Chemical characterization was analyzed using gas chromatograph coupled to a mass spectrometer (GC–MS). The result showed that oil was composed of eugenol (96.11%), caryophyllene (1.34%) and naphthalene (0.63%). The amount of eugenol is related to that previously reported [3]. Clove oil microemulsion was formulated from the ternary phase diagram, constructed by using clove oil 10%w/w, Tween20 and distilled water (Fig. 1). Cytotoxic effect of the microemulsion was tested on murine peritoneal macrophages by XTT reduction assay. Inflammatory effect was evaluated by intraperitoneal injection in laboratory mice. The result demonstrated mild cytotoxic effect of clove oil microemulsion on peritoneal macrophages (21.71 ± 4.03%). It was found that the cytotoxicity was affected by vehicle substance where clove oil

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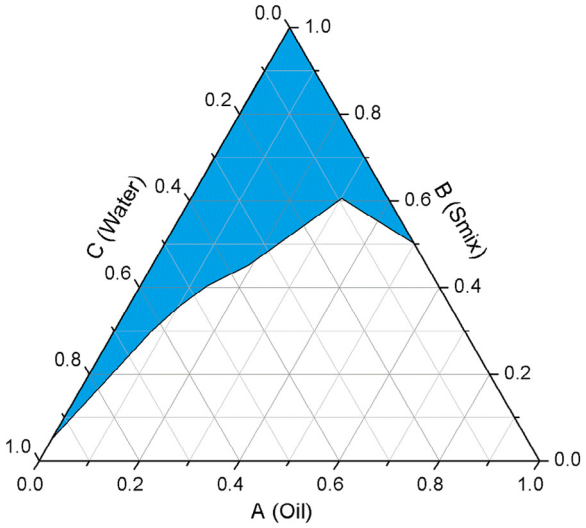

Fig. 1 – Ternary phase diagram of clove oil, Tween 20 and water.

showed no cytotoxic effect ($p > 0.05$). The current study shows that high surfactant concentration causes *in vitro* cytotoxicity [4]. However, it does not play a role in the inflammatory response in mice. Our results contribute to understanding the cytotoxicity and inflammatory ability of clove oil microemulsion which has a predictive value with regard to its safety. However, proper composition in pharmaceutical preparation and the pharmacological application needs to be further investigated.

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