

**ANTIBACTERIAL AGENT – LOADED
WATER-IN-OIL-IN-WATER (W/O/W) EMULSION**

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ABSTRACT

In this study, a water-in-oil-in-water (W/O/W) emulsion incorporated with an antibacterial agent using polyglycerol polyricinoleate (PGPR), whey protein isolate (WPI) and lecithin as emulsifying agents under ultrasonication was prepared. Micrographs of the emulsions formed showed small droplet sizes with an average range of 0.07 – 8.7 μm which indicates that the emulsification process was effective. However the emulsion was only stable for 7 days. Natural and synthetic antibacterial agents were then loaded into the W/O/W emulsion. A solution of chlorhexidine gluconate (CHG) was chosen as the synthetic antibacterial agent to be loaded into the W/O/W emulsion because of its established stability and antibacterial efficacy against Gram – positive and Gram – negative bacteria. On the other hand, *Psidium guajava* (guava) was chosen as the natural antibacterial agent to be loaded because of its abundance and folkloric use to treat wounds. The CHG – loaded emulsion showed a mean zone of inhibition equal to 11.3 ± 2.1 mm against *Staphylococcus aureus* and 12.0 ± 1.0 mm against *Escherichia coli*. The *Psidium guajava* (guava) – loaded emulsion on the other hand showed no inhibitory activity which suggests that the bioactive component of the guava may have been destroyed during sonication process. The results of this study showed that a synthetic antibacterial agent loaded - W/O/W emulsion was more effective than the natural antibacterial agent loaded – W/O/W emulsion.

Keywords: W/O/W emulsion, stability, ultrasonication, antibacterial agents, antibacterial activity.