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# *DEVELOPMENT AND STABILITY EVALUATION OF LEMONGRASS ESSENTIAL OIL MICROEMULSIONS FOR POTENTIAL ANTIMICROBIAL USE*

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Microemulsions are promising systems for the encapsulation of essential oils, enhancing their stability, solubility, and potential pharmaceutical applications. This study aimed to develop microemulsions containing *Cymbopogon citratus* (lemongrass) essential oil, registered in SisGen (No. A389682), and to evaluate their physical stability and antimicrobial potential. Based on the construction of a pseudoternary phase diagram, different surfactant/oil ratios were tested to optimize the system. After evaluating the various ratios, the 7:3 (surfactant:oil) ratio was selected as the most suitable, consisting of Tween 80 and PEG-40. Two formulations were selected based on their macroscopic characteristics: ME10 and ME13. The emulsions were subjected to accelerated stability studies at different temperatures (25°C, 4°C, and 40°C) and times (T0, T5, T30, T60, and T90 days), with particle size, polydispersity index (PDI), and zeta potential evaluated by dynamic light scattering (DLS). The ME10 formulation maintained a particle size below 100 nm during the first 30 days, while ME13 exceeded this limit in the same period, reaching 161.15 nm, indicating loss of stability and loss of microemulsion characteristics. In the microbiological stage, antimicrobial activity was evaluated against *methicillin-resistant Staphylococcus aureus* (MRSA), ATCC 43300, using the spread plate technique. Samples were incubated with the microorganisms for 20 minutes prior to plating. Growth inhibition was observed for ME10 from the concentration of 20 µg/mL, while for ME13 inhibition occurred only from 30 µg/mL. The ME10 formulation promoted the greatest reduction in microbial load compared to ME13. These findings reinforce the feasibility of the developed microemulsions as pharmaceutical carriers with potential antimicrobial activity..

***Keywords:*** *Microemulsion, Cymbopogon citratus, methicillin-resistant Staphylococcus aureus (MRSA),*