



Antimicrobial activity of organic extract and essential oil of *Lippia graveolens* (Oregano mexicano) against *S. aureus* and *C. acnes* formulated in nanoemulsions

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Introduction

The indiscriminate use of oral antibiotics is a serious problem that occurs in the treatment of bacterial diseases on the skin and their irrational consumption causes the development of strains of bacteria resistant to them. Several skin conditions are usually caused by bacteria such as *Cutibacterium acnes*, *Staphylococcus aureus* and *Staphylococcus epidermidis*, which is why in recent years researchers have sought alternatives based on plant-derived extracts for the "natural" treatment of skin illness. Mexican oregano (*Lippia graveolens*) is a culinary spice commercialized in the Americas with the generic name of oregano, in fact, this is the name for all those plants that

The nanotechnological approach in the treatment of skin conditions has recovered clinical relevance in recent years, in this sense nanoemulsions have emerged as one of the nanotechnological systems with the greatest potential for the application of active ingredients on the skin, since they have a size (<400 nm) that allows them to penetrate efficiently through the skin and reach the dermis (where the hair follicle and the sebaceous gland are located) without having contact with the blood vessels, thus helping the essential oils to exert their action antimicrobial.

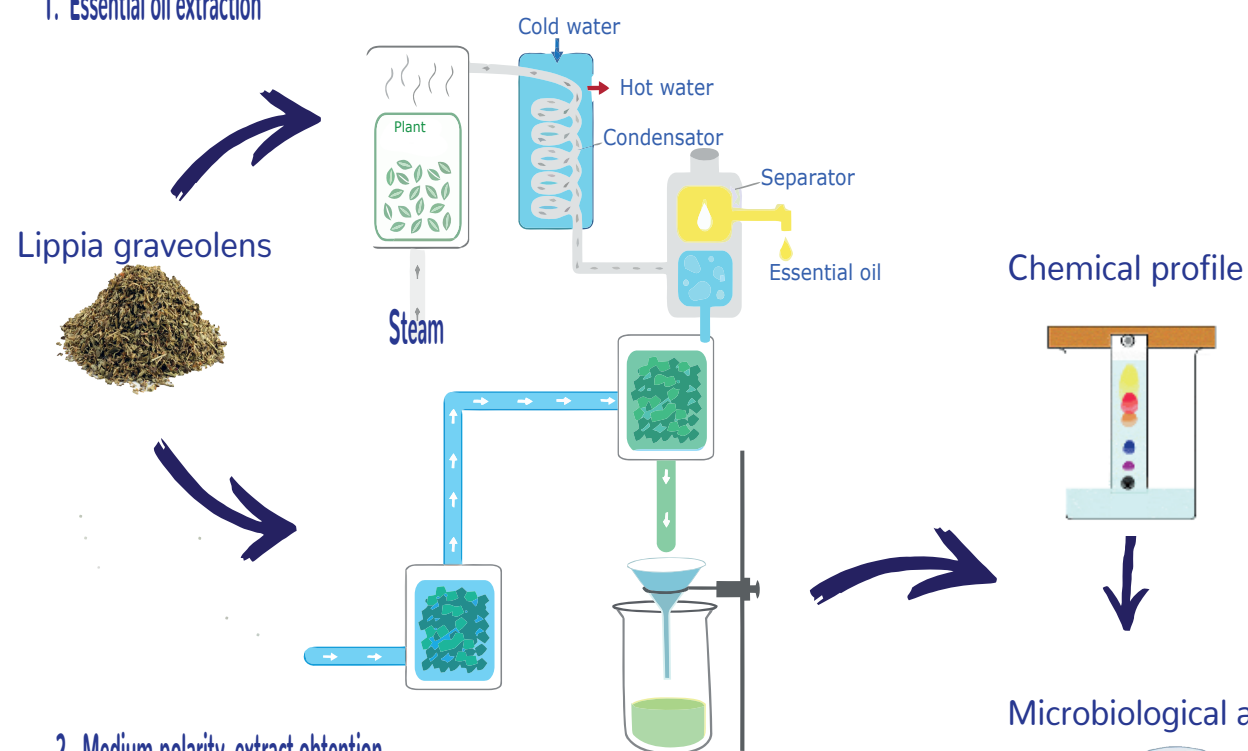
The aim of this work was to demonstrate the antimicrobial activity of the essential oil, the organic extract and its respective nanoemulsions of *Lippia* spp. a spice used in Mexican cuisine and with traditional uses for the treatment of infections.



Methodology

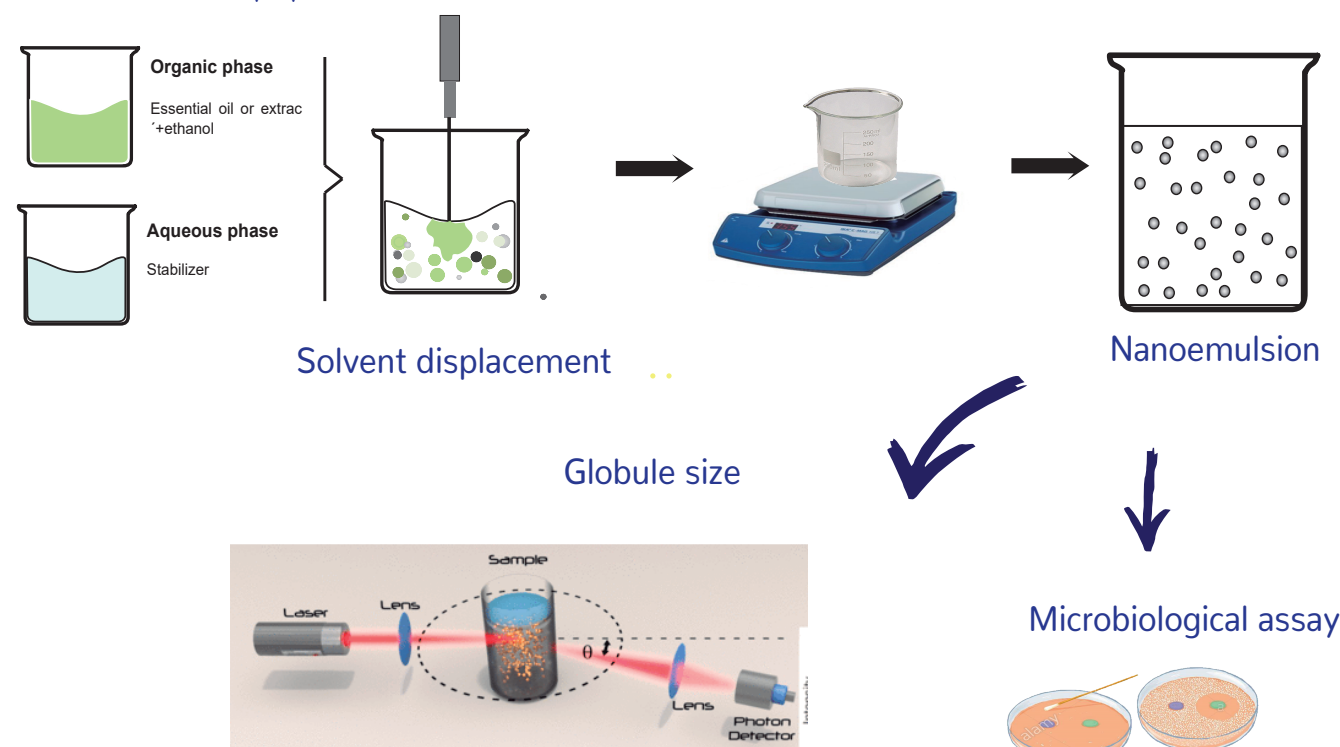
A Obtention of extracts & evaluation

1. Essential oil extraction



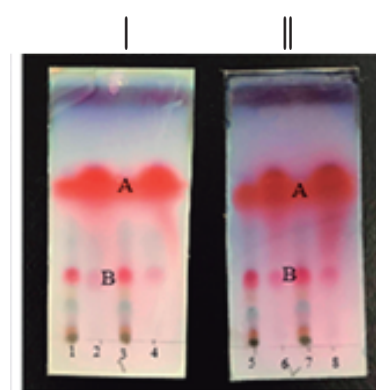
2. Medium-polarity extract obtention

B. Nanoemulsion preparation & evaluation

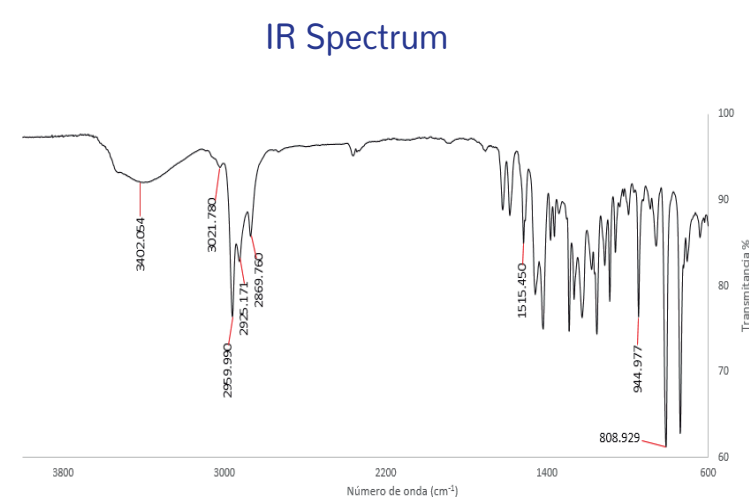


Results

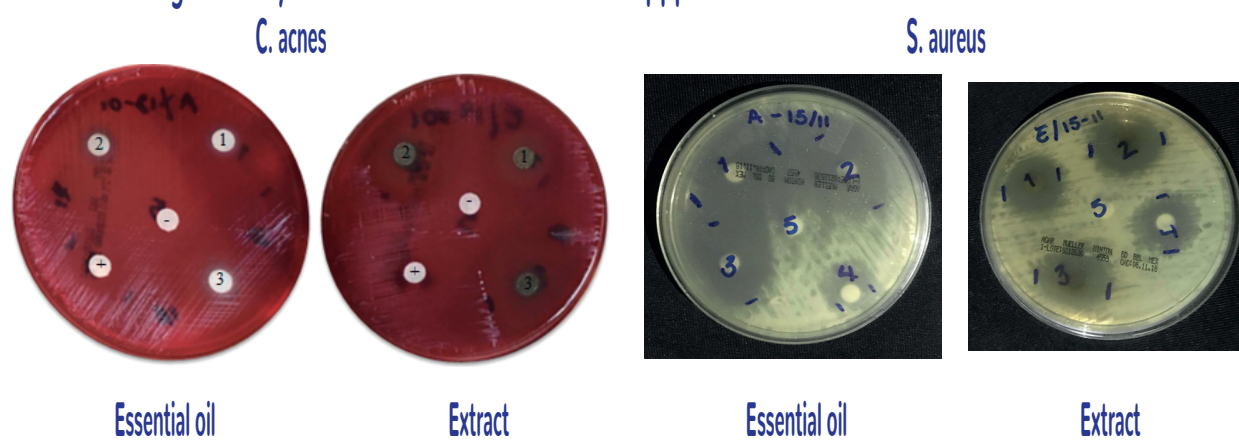
A. Chemical characterization of essential oil and extract



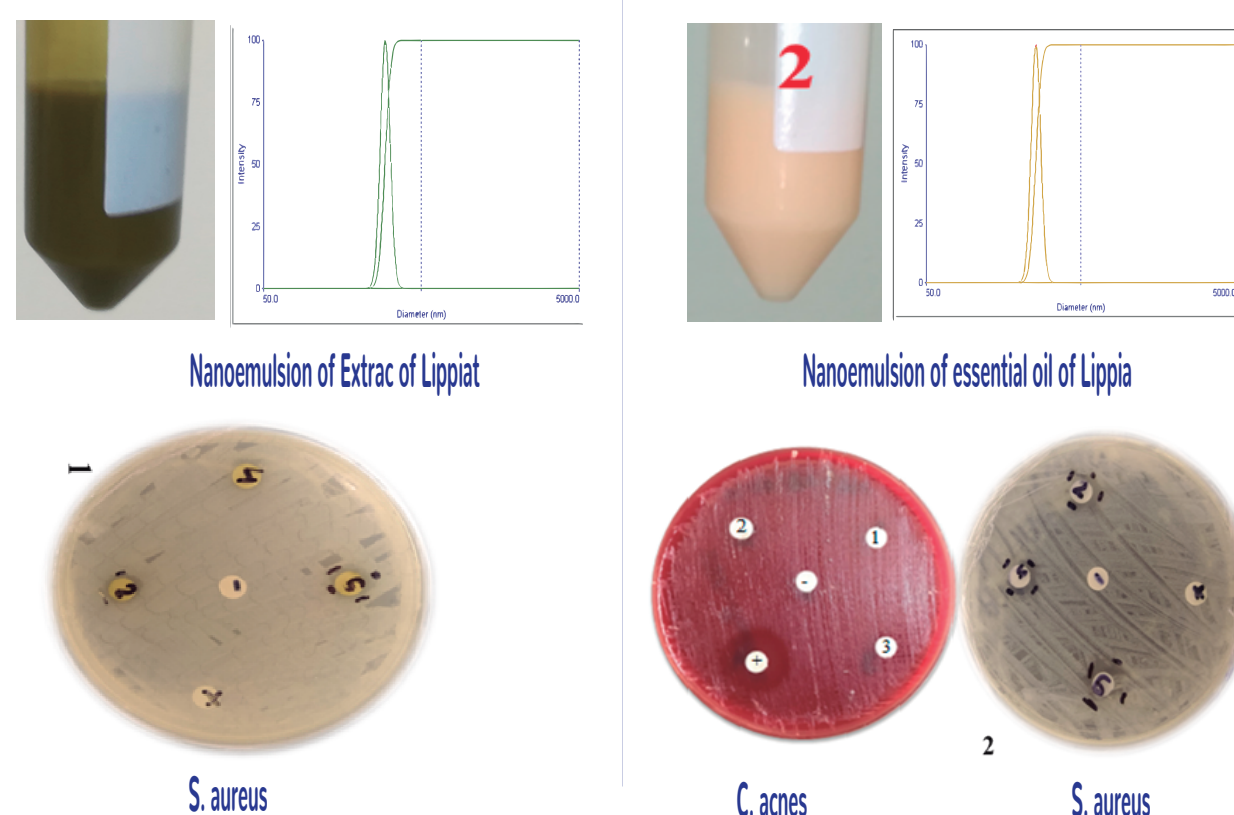
Thin layer chromatography plate . A: thymol; B: carvacrol. I) essential oil of and II) of extract of medium polarity of *Lippia*.



B. Microbiological assay of essential oil and extract of *Lippia*



C. Microbiological assay of nanoemulsions



Conclusions

Mexican origanum is composed of *Lippia graveolens*, the main compounds of the essential oil and the extract of medium polarity of *Lippia* were thymol and carvacrol with Rf of 0.62 and 0.33, respectively. Nanoemulsions of organic extract and essential oil of *Lippia* spp were satisfactory prepared by solvent displacement method, the selection of the stabilizer is elementary on the quality of nanoemulsion and their compatibility. Essential oil and the organic extract, both were found to have antimicrobial activity against *C. acnes* and *S. aureus*, however, nanoemulsions of essential oil and organic extract did not shown superior activity in vitro against *C. acnes* and *S. aureus*.

References

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- Machado, M., Dinis, A. M., Salguero, L., Cavaleiro, C., Custódio, J. B. A., & Do Céu Sousa, M. (2010). Anti-Giardia activity of phenolic-rich essential oils: effects of *Thymra capitata*, *Origanum virens*, *Thymus zygis* subsp. *sylvestris*, and *Lippia graveolens* on trophozoites growth, viability, adherence, and ultrastructure. *Parasitol Res*. 106, 1205-1215.