

Evaluation of chitosan and carbopol gel with *Melaleuca alternifolia* oil against pathogenic microorganisms

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Introduction: Carbopol and chitosan are substances commonly used in the base formulation of mucoadhesive gels. Carbopol is an anionic synthetic polyacrylic polymer while chitosan is a cationic gelling of natural origin, used in formulations of natural products. There is a great interest in the development of mucoadhesive gels to treat oral or vaginal pathologies, especially which caused by microorganisms. In order to treat these kinds of pathologies, several natural compounds had been evaluated in the last years. One of these is *Melaleuca alternifolia*, commonly known as tea tree oil, that has a long history of use as a topical antiseptic and, in recent times, has gained a reputation as a safe, natural and effective antiseptic. Considering the broad spectrum of antimicrobial action, this work proposed to develop a new topical formulation focusing to treat oral and vaginal candidiasis. **Objective:** The main objective of the present project is to evaluate the antimicrobial activity of *Melaleuca alternifolia* oil and to determine the best concentration to use this oil in a mucoadhesive formulation obtained with two different excipients (i) carbopol and (ii) chitosan. The gels obtained were evaluated against several kinds of *Candida* "in vitro". **Methods:** *Melaleuca alternifolia* essential oil was obtained from Australia. The antimicrobial activities were evaluated by macro and microdilution methods using appropriate culture medium for each microorganism studied. The sample was evaluated against *Staphylococcus aureus*, *Escherichia coli*, *Candida albicans*, *C. parapsilosis* and *C. glabrata*. To determine the minimal bactericidal concentration (MBC) the content of the vessels were inoculated in solid medium by 24hs. The gels were obtained using (i) carbopol 940 (1%) and trietanolamine (qs pH 6.0) and (ii) chitosan and acetic acid (qs pH 5.0). Both were used propylene glycol (humectant), potassium sorbate (preservative), EDTA (and finally, 0,25% w/v of *Melaleuca alternifolia* oil. The "in vitro" antifungal activities of both gels were done dissolving each gel in the YPD top agar and, after solidification, "drop outting" the inoculum (10^6 cels/ml) and the serial 10 fold dilutions. After incubation of 24hs (30°C) the results were evaluated. **Results:** All microorganisms evaluated were susceptible to *Melaleuca alternifolia* oil. The higher value of MBC obtained was 1,56 mg/ml to *E. coli*. Both gels presented anti-*Candida* effects, but chitosan gel was the best formulation considering antimicrobial activity "in vitro". **Conclusion:** Besides having mucoadhesive properties and be a natural product, chitosan is known by antimicrobial activity (SILVA, *et al.*, 2006), which explain our better results against the microorganisms tested, associated with *Melaleuca* that is also known by antiseptic uses. So, it is very interest use this kind of materials to develop new medicines to treat diseases, mainly to regions of the body that is too much humid, like oral mucosa and vaginal mucosa, because it is hard to maintain any substance in such condition.

Keywords: *Melaleuca alternifolia* oil, mucoadhesive gel, chitosan

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