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POTENTIAL *IN VITRO* SYNERGISTIC INTERACTION BETWEEN CHITOSAN AND THE ANTIFUNGAL *MELALEUCA ALTERNIFOLIA* (TEA TREE) ESSENTIAL OIL

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Mycoses are among the most widespread cutaneous and mucosal infections in humans; triazole antifungal agents currently on the market are effective but they can cause adverse reactions and development of resistance, so that novel approaches to treatment of fungal infections are needed. The essential oil of *Melaleuca alternifolia*, also known as tea tree oil and commonly used as topical natural antiseptic, is being considered a safe and effective alternative to conventional antifungal drugs in treating human mycotic infections, especially onychomycosis and opportunistic oral candidosis.

Chitosan, an aminopolysaccharide obtained by partial deacetylation of chitin, has found several applications in food and pharmaceutical industries, due to its favourable properties such as harmlessness, biocompatibility, biodegradability and antimicrobial activity. In particular its antifungal activity, especially against phytopathogenic fungi, is well known, although to date its mechanism has not been fully elucidated.

The overall objective of our investigation was to investigate the anticandidal *in vitro* activity of chitosan and tea tree oil, both separately and together, and to verify if there is between these compounds a synergistic interaction potentially useful in topic antifungal formulations. To this purpose, we evaluated the anticandidal activity of chitosan against *Candida albicans* ATCC 10231 with standard microbiological assays (broth microdilution and killing time test) and we also determined the influence of pH value of the medium on this activity; then we evaluated the anticandidal potential of tea tree oil by using the same tests.

Our results demonstrated that:

- chitosan kills *Candida* at a concentration of 0.5 mg/mL
- its antifungal activity is affected by pH value of the medium (optimum pH 6.0)

- tea tree essential oil confirms to be a powerful antifungal agent, able to kill *C. albicans* in 5 hours at a concentration of 0,25%.

Tests aimed at evaluating a synergistic interaction between chitosan and tea tree oil are still in progress; our preliminary data do not seem to show the existence of this synergy but suggest that the presence of small amounts of chitosan can allow to reduce the required concentration of tea tree in a topical antifungal formulation.