Microencapsulation of some essential oils, and their antimicrobial activity properties.

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This study is extended in many years, from 2010 and continues to be one of our main research line in nanotechnology impact in herbal drugs. We have taken into consideration, essential oils obtained from medicinal and aromatic plants, because they are often applied for their antimicrobial, antinflammatory and skin whitening properties. Current topical applications of these volatile compounds turn out to be complicated because of their chemical and physical properties, which are major problems for their therapeutic uses; Therefore, we have studied their microencapsulation in polymers such as β-cyclodextrine and hydroxy-propyl β-cyclodextrine which could be the solution to the problems of stability, evaporation and controlled release.
Herbal plants are collected from different zones of Albania. The essential oils from albanian medicinal plants, such as *Satureja montana*, *Thymus vulgaris*, *Origanum vulgare*, *Myrtus communis*, *Rosmarinus officinalis*, *Thymus capitatus* and *Salvia officinalis,* are obtained by hydrodistillation in a Clevenger type apparatus. Chemical composition of isolated essential oils is determined by gas GC/MS and GC/FID methods.
Complexes of β-cyclodextrine and essential oils are prepared by co-precipitation method with the four ratios oil: β-cyclodextrine as follows 5:95, 10:90, 15:85 and 20:80 (w/w) in order to determine the effect of the ratio on the inclusion efficiency of β-cyclodextrin for encapsulating oil. The essential oils were tested for antimicrobial activity before and after microencapsulation. The antimicrobial test is done by the disc diffusion method using suspension of *P. vulgaris, E. coli, S. aureus, C. albicans* and dermatophytes such as *M. gypseum*, *M. canis, A. cajetani, T. violaceum, T. mentagrophytes, E. floccosum, T. r ubrum, T. tonsurans, B. cinerea and P. oryzae* . Negative controls were set up with equivalent quantities of DMSO. In addition, positive controls discs such as Cefuroxime, Ciprofloxacine, Tetracycline and Nystatin were used for comparison.
Encapsulation of essential was found to be more efficient to ratios oil:β-cyclodextrine 20:80 and the retention oil in ratio 15:85. Evaluation of biological activity after encapsulation lead to the conclusion that the antibacterial and antifungal activity are almost at the same range, even higher because of the slow releasing of essential oil from the complex. This fact was observed in some ratios, 10:90 and 20:80 (oil:β-cyclodextrine)
In conclusion these essential oils can be complexed in β-cyclodextrine in optimal ratios and can be applied in dermatological formulations due to their low risk of skin sensitizing and high antibacterial and antifungal activity they demonstrated after encapsulation. Further investigation is going on with systemic formulation with complexed essential oils which can be a very useful solution in many patients.

References

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