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Determination of compounds present in Essential Oils with anti-fungal activity by GC-MS: production of a safe and efficient anti-fungal treatment through encapsulation

Pires, Bruno[1,2]; Rosado, Tiago[1,2,3,]; Rodilla, Jesus[4,5*]; Luís, Ângelo[1,2]; Gonçalves, Joana[1,2]; Simão, Ana[1,2];Soares, Sofia[1,2];Catarro, Gonçalo[1,2]; Santos, Amélia[5]; Menezes, Delfina[6]; Parracho, Fausta[6]; Belino, Nuno[7]; Passarinha, Luís[1,2,8];Gallardo, Eugenia[1,2,3]

[1]Centro de Investigação em Ciências da Saúde, Faculdade de Ciências da Saúde da Universidade da Beira Interior (CICS-UBI), Covilhã, Portugal; [2]Laboratório de Fármaco-Toxicologia-UBIMedical, Universidade da Beira Interior, Covilhã, Portugal; [3]Centro Académico Clínico das Beiras (CACB) – Grupo de Problemas Relacionados com Toxicofilias, Covilhã, Portugal; [4]Fiber Materials and Environmental Technologies (FibEnTech), Universidade da Beira Interior, Covilhã, Portugal; [5]Departamento de Química, Faculdade de Ciências, Universidade da Beira Interior, Covilhã, Portugal; [6]Blossom Essence, Parkurbis - Parque de Ciência e Tecnologia, Covilhã, Portugal; [7]Departamento de Ciência e Tecnologia Têxteis, Universidade da Beira Interior, Covilhã, Portugal; [8]Associate Laboratory i4HB - Institute for Health and Bioeconomy, Faculdade de Ciências e Tecnologia, Universidade NOVA, Caparica, Portugal; [9]UCIBIO–Applied Molecular Biosciences Unit, Departamento de Química/Departamento Ciências da Vida, Faculdade de Ciências e Tecnologia, Universidade NOVA de Lisboa, Caparica, Portugal
*rodilla@ubi.pt

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Essential Oils (EO) have been used since ancient times for medicine. Plantar bromhidrosis is a condition that can appear when sweat combines with microorganisms, such as fungus, on our skin, shoes, and socks. Compounds present in some EO might reveal anti-fungal properties, which may help fight this condition[1]. The main objective of this work was to characterize the compounds present in a chosen EO blend while also encapsulating it within β-cyclodextrin (β-CD) nanoparticles. The compounds present inside the nanoparticles were also characterized and this complex will later be used to create textiles that can be applied in anti-fungal treatments.Quantification of the volatile compounds present in the EOs was performed by a GC-MS analytical equipment from Agilent Technologies with a HP-5 MS capillary column (30m x 0.25-mm I.D., 0.25-µm film thickness). The injection port temperature was set at 250 ºC while the transfer line temperature was set to 280 °C. The oven temperature ramp started at 40 °C for 5 min, after which a 5°C/min rate up to 250 °C was applied and held for another 5 min. 1 µL of sample extracts was injected in split mode (50:1). The physicochemical characterization was performed by X-ray diffractometry (XRD). The main compounds present in blend were Alpha-Pinene, 1,8-Cineole, L-Menthone, Menthol and Thymol with percentages around 6,08%, 27,26%, 5,00%, 7,34% and 14,24% respectively. A total of 3,26% of the main compounds present in the EO blend was incapsulated in the β-CD, with Menthol and Thymol presenting the highest complexation percentage.XRD analysis allowed us to compare the pattern of inclusion complexes with those of the pure crystalline β-CD. The disappearance of the peak 4,7º and peak 9,2º and the appearance of a new peak at 15º and 18º after complexation, is associated with the transformation of the β-CD cage type packaging into a channel type packing, which strongly proves the formation of the EO- β-CD inclusion complex.

1. Nazzaro et al. *Pharmaceuticals* **2017**, *10*, 86. https://doi.org/10.3390/ph10040086

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