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A study on Verbascum thapsus using microbiological and phytochemical methodologies

Anna-Maria

Ireland

With increasing research (Atanasov et al., 2015) on botanicals there is a need for robust analysis to address issues of quality, safety, and activity/efficacy (Govindaraghavan & Sucher, 2015, Qu et al., 2018). More specifically, there is a need to identify and characterise the factors that significantly affect the analytical results both from the botanical and methodological viewpoint. A factorial design approach (Gunst et al., 2009) (2 x 3 and 2 x 5 levels) was used to characterise the impact of factors including those affecting the processing, analytical method, and storage (Åhman et al., 2020) of crude extracts of V. thapsus (of Serbia, Great Britain (GB), Turkey or Ireland (West Cork) (WC) origan) against S aureus ATCC 29213/ 25923 and other selected bacteria. The in vitro well diffusion assay was used to measure the efficacy of the crude extracts.As a methodological factor, the brand of agar (Fluka, Acumedia and Oxoid) used had one of the most significant effects, where samples on only the Acumedia and Oxoid agar showed efficacy (there was no inhibition zone for the Fluka agar). Process factors, extraction temperature (room temperature and 50OC) and solvent concentration (100, 80, 50 and 25% EtOH,100% Water) are main effects but with significant interaction. Thus, efficacy depends on the temperature, solvent combination. For example, factor combinations for Serbian origin V. thapsus (Figure 1)) room temperature (extraction) and the most polar solvents (25% EtOH and 100% Eater) had statistically significant efficacy. However, these results were not replicated for the GB and WC origin crude extracts where no activity was observed for both these solvent concentrations. Finally, temperature (of storage) was not a significant main effect, but time was. The phytochemical profile (Thin Layer Chromatography)was consistent across repeat and replicate crude extracts of V. thapsus of Serbian, GB, and WC origin.

Biography

Anna-Maria Keaveney has expertise in the clinical application of and evaluation (quality and safety) of Botanicals/ Natural products. She has written a book chapter on analytical techniques (Keaveney, A.-M., Furey, A., & Lucey, B. (2020). Approaches to Analytical Techniques – Characterizing Phytochemicals in Verbascum spp. In Herbs, Spices and Medicinal Plants (pp. 129-175)). Her PhD focused on Verbascum thapsus in order to assess issues affecting identification, characterising factors affecting microbiological activity and Thin Layer Chromatography (TLC) based phytochemical profile.

anna-maria.keaveney@cit.ie

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