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doi: 10.14232/syrpharmacognosy.2021.a1

Antimicrobial potential of extracts and essential oils from different varieties of Marjoram

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Species belonging to the genus *Origanum* from the family Lamiaceae are used since ancient times as spices, medicinal, aromatic, and ornamental plants. *Origanum majorana* L. (syn. *Majorana hortensis* Moench), commonly known as sweet marjoram, is native to the Mediterranean region and cultivated in many countries of Asia, North Africa, and Europe. *O. majorana* is known for its antimicrobial, antioxidant, antidiabetic, hepatoprotective, antiulcer, anti-inflammatory, and antitumor activities [1]. Different types of terpenoids (mono-, di and triterpenes), and phenolic compounds (phenolic acids, hydroquinones, and flavonoids), are the most abundant constituents detected in sweet marjoram to date [2]. The present study aims to investigate marjoram, its essential oil, chemical compounds, and possible activities against bacteria, fungus, and other microorganisms, alone or synergized with other materials. Previously only the essential oil was studied in detail for these activities [3], but non-volatile compounds effective against microorganisms were not identified. Two samples of 'Hungarian' and one of 'Egyptian' varieties were involved in our investigations. Essential oils were obtained by steam distillation, and extracts of different polarities were prepared by a solvent-solvent partition of the MeOH extracts. Besides the dried leaves, stems were also extracted and subjected to essential oil distillation. The antimicrobial evaluation of 15 extracts and essential oils was made by disk diffusion and broth dilution methods against 9 bacterial and 1 fungal strains. Preliminary TLC tests showed no substantial differences in chemical profiles of the three samples of marjoram. The highest antibacterial activities were detected for the CHCl₃ fraction of a Hungarian variety against *Staphylococcus aureus*, *S. aureus* MRSA, *S. epidermidis*, and *Candida albicans*.

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Acknowledgements:

The author is grateful for Livia Vidács, Szilvia Batki (Department of Pharmacognosy, University of Szeged), and Gabriella Spengler (Department of Medical Microbiology and Immunobiology, University of Szeged) for determination of the antibacterial activities. Thanks, are also extended to Prof. Éva Németh (Department of Medicinal and Aromatic Plants, Szent István University) and Ferenc Okvátovity (Bátya), who provided the plant materials.

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