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BOOK OF ABSTRACTS

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New adulteration pattern of *Boswellia* extracts

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Frankincense is a drug obtained from species of the genus *Boswellia*. The religious and medical application of *Boswellia* dried exudates is deeply rooted in human culture. The medical application of frankincense extract is supported by current pharmacological investigations, especially in the treatment of inflammatory related conditions, such as osteoarthritis [1]. Quality criteria of extracts applied for medical and food purposes are defined in Pharmacopoeias (USP-NF and Ph. Eur.) by setting up a minimal level of 1% for marker compounds 3-*O*-acetyl-11-keto-β-boswellic acid (AKBA), 11-keto-β-boswellic acid (KBA), respectively. Frankincense extract in food supplements is mostly characterised by its total boswellic acid content determined by acid-base titration. The availability of *Boswellia* extract is limited due to specific ecological niche of species and increasing demand for agricultural land. These conditions might result in adulteration of *Boswellia* containing products. The American Botanical Council has already published a Laboratory Guidance Document in 2022. The guidance provides botanical, genetic and chemical methods for characterisation of *B. serrata* resins and extracts.

The aim of our work was to analyse *Boswellia* extracts produced for industrial purposes and used as ingredients in food supplements. Fourteen extracts were purchased from China and Europe. USP *Boswellia* extract was used as standard. The AKBA and KBA content was determined by HPLC (Ph. Eur. 10). The total boswellic acid content was determined by acid-base titration. The carboxylic acid content of the extracts was screened and quantified using new targeted UHPLC-HRMS method.

The total boswellic acid content of the extracts was determined by acid-base titration. Although, the 67–95% total boswellic acid content was in accordance with amounts declared on the label; the HPLC measurement confirmed minimum 1% AKBA and ABA contents in two products. Targeted UHPLC-HRMS method was used to screen and quantify possible adulterants (malic acid, benzoic acid, oxalic acid, tartaric acid, citric acid) responsible for the acidic content of the extracts. Citric acid was detected in 10 out of 14 extracts in which the citric acid content was between 6% and 11%.

Based on our measurements we found that high ratio of frankincense extracts did not meet the criteria set up in Pharmacopoeias. Our results might suggest a new adulteration pattern for *Boswellia* extract: which is the addition of citric acid to extracts to set up the acidic content of the final product.

References

[1] Ganpeng, Y, et al. *BMC Complement Med Ther* **2020,** 20(1):225. doi: 10.1186/s12906-020-02985-6

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