

F. S. ROMOLO<sup>1</sup>, M. C. ROTOLO<sup>1</sup>, M. PELLEGRINI<sup>2</sup>, F. ROSATI<sup>1</sup>

<sup>1</sup> Legal Medicine Department, Università degli Studi di Roma "La Sapienza", Viale Regina Elena 336 - 00161 Rome, Italy

<sup>2</sup> Clinical Biochemistry Department, Istituto Superiore di Sanità, Viale Regina Elena 299 - 00161 Rome, Italy

**INTRODUCTION:** During the past decade, traditional systems of medicine have become a topic of global importance. The World Health Organization launched its first ever comprehensive traditional medicine strategy in 2002. The integration of traditional medicine into the national health care system is supported and its proper use is promoted but unregulated or inappropriate use of traditional medicines and practices can have negative or dangerous effects. The use of herbal medicines is rapidly spreading in industrialized countries, resulting in new toxicological problems.

**AIMS:** To ensure the proper and safe use of herbal medicines by practitioners and consumers, it is important to analyse the products on the market. Four herbal products, whose properties pose a risk of abuse, were analysed: 1) seeds of *Argyreia nervosa* (Hawaiian baby woodrose), 2) *Sceletium tortuosum* (Kanna), 3) *Mitragyna speciosa* (Kratom), 4) *Leonotis leonorus* (Lion's tail).

**METHODS:** A ball mill was used to obtain powdered samples from the dried material to be extracted. Several solvents (methanol, ethanol, water, phosphate buffer) and different extraction procedures were tested. Extracts were analysed using gas chromatography (GC) with mass spectrometric detection (MS). Both electron impact (EI) and chemical ionisation (CI) were studied. The CI spectra using methane allowed the detection of molecular ions of the compounds identified.

**CONCLUSIONS:** Several compounds were identified in the extracts. Lysergic acid amide (LSA) and lysergol were detected in *Argyreia nervosa* seeds. The LSA content of *Argyreia nervosa* is about 0.10% by dry weight of seeds and its hallucinogenic activity occurs with 2–5 mg of the active compound. Mesembrine, mesembrone, mesembranol and sceletium were identified in *Sceletium tortuosum*. Corynoxine, mitraciliatine, rhychophylline, rotundifoline, speciofoline, and stipulatine were found in *Mitragyna speciosa*. Identification of marrubiin and leonurine was possible after analysing *Leonotis leonorus*. The choice of the extraction procedures was critical for identification of the analytes by mass spectrometry. The GC-MS analysis of the compounds listed above was possible both by chemical ionisation and electron impact. A quantitative method for mesembrine was developed and validated too.

**KEYWORDS:** Herbal medicines, Extraction, Gas chromatography, Mass spectrometry, Chemical ionisation

**Corresponding author:** [FrancescoSaverio.Romolo@uniroma1.it](mailto:FrancescoSaverio.Romolo@uniroma1.it)