

Ethnopharmacology-based chemical extraction approaches: toward further optimizing green chemistry

Opinion

Ethnopharmacology shows that the extraction of active ingredients from medicinal and aromatic plants began with protocols that used simple natural solvents such as water, vegetable oils and animal fats.¹ Ancient healers made herbal preparations, especially teas and aromatic plants extracts, to obtain therapeutic drugs and preparations used in different aspects of the daily life. Importantly, they knew the importance of hot water in optimizing the active substances extractions.² Therefore, the study of traditional medicines^{3,4} and Pharmacognosy⁵ remains and important filed for medical students and health care professionals⁶ especially within the context of modern pharmacological and toxicological sciences⁷⁻¹⁰ that provide increasing evidences about the biological effects extracts and natural compounds have on cell cultures¹¹ and animals¹² and thus, provide starting points to develop new therapies for a variety of pathologies.

It has been reported that the use of organic solvents in the extraction of active ingredients from natural compounds started with Nicolas Lémery (1645-1715), a French apothecary who both used alcohol as a solvent and prolonged the extraction time.¹³ Nowadays, phytochemical processes involve a variety of solvents among which many are hazardous to human health, environment and have impacts on biological entities at the cellular and the molecular levels.¹⁴ Green chemistry came to solve these problems by reducing organic solvents use via its fifth principle concerning “safer, nontoxic and environmentally friendly solvents”.¹⁵ Using water in green extraction techniques (which are environmentally friendly) is close to traditional extractions approaches; but under different conditions of heating with an increase in yield and the biological activities of the extracts with a decrease in the extraction time.¹⁶ Indeed, various natural products have been extracted using green techniques including polyphenols¹⁷ and essential oils.¹⁸ It is important to mention that many activities of green extracts have been reported and evaluated especially the antibacterial and antioxidant activities.¹⁹

Green chemistry appears to take their origin from ethnopharmacology which represents historically and scientifically the limitless source of knowledge for all human civilizations. Green chemistry reflects natural ways of extracting medicines in its fifth principle.

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Conflict of interest

The author declares no conflict of interest.

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