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Short Communication

Basic Extraction and Fractionation Procedures for Experimental Purposes in the Preparation of Medicinal Plants

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ABSTRACT

Preparing medicinal plants for experimental purposes is the first and most important stage in generating a high-quality study result. It entails extracting bioactive elements and determining their quality and quantity before proceeding with the desired biological tests. The primary purpose of this study was to evaluate the various processes for medicinal plant preparation and screening that we use in our daily research. Extraction techniques include maceration, digesting, decoction, infusion, percolation, Soxhlet extraction, superficial extraction, ultrasound-assisted, and microwave-assisted extractions. Following that, the numerous methodologies outlined above might be grouped and addressed in terms of targeted biological testing to help young researchers focus and direct their research.

Keywords: Extraction; Fractionation; Maceration; Phytochemical screening procedures

ABOUT THE STUDY

Plant components or the entire plant may be medicinally active. Herbal medications are pharmaceutical formulations that contain active components derived from plants. The product can be made from any portion of the plant or the entire plant. The choice of a suitable solvent, extraction methods, phytochemical screening procedures, fractionation methods, and identification techniques are all critical phases in the production of a high-quality bioactive molecule. Herbal medicine also includes preparations made from by-products of herbal plants, such as oils, gums, and other secretions [1-3].

Menstruum is a liquid or a suitable solvent that is used in the extraction process. At the completion of the extraction procedure, an insoluble or inactive drug substance is left behind. Micelle is a combination of the extracted medicinal substance and the extraction solvent. The main nutritional components of plants, such as common sugars, amino acids, proteins, and chlorophyll, are known as primary plant constituents. These have very little, if any, therapeutic value. Alkaloids, terpenoids, saponins, phenolic compounds, flavonoids, and tannins are examples of secondary plant elements, often known as secondary metabolites. These are in charge of a wide range of biological and pharmacological functions [4-6].

Methods for extracting medicinal herbs that are commonly used

The separation of medicinally active sections of plant tissues from inactive or inert components using selective solvents in typical extraction processes is referred to as extraction in the pharmaceutical industry. Plants produce relatively impure liquids, semisolids, or powders that are only intended for oral or external consumption. The extract can be utilised as a medicinal agent in the form of tinctures and fluid extracts, or it can be separated to isolate individual chemical entities such ajmalicine, hyoscine, and vincristine, which are modern medications. As a result, extraction procedure standardisation has a significant impact on the final quality of the herbal medication.

Percolation: In the creation of tinctures and fluid extracts, this is the most common method for extracting active substances. In most cases, a percolator (a thin, cone-shaped jar with openings on both ends) is utilised. The solid materials are soaked with an adequate amount of the prescribed menstruum and let to stand for around 4 hours in a tightly sealed container, following which the mass is packed and the percolator's top is closed. A thin layer of menstruum is poured on top of the bulk, and the mixture is macerated for 24 hours in a closed percolator. The outlet of the percolator is then opened, allowing the liquid inside to slowly flow out. More menstruum is added as needed until the

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percolate reaches about three-quarters of the volume of the finished product. The liquid is put into the percolate after pressing the marc. The required amount of menstruum is added, and the resulting mixture is filtered using filtration or standing, followed by decanting.

Soxhlet extraction: The crude medicine is finely powdered and placed in a porous bag or "thimble" composed of strong filter paper, which is then placed in the Soxhlet apparatus' chamber. Heat is applied to the extracting solvent in the flask, and the vapours condense in the condenser. The condensed extractant drips into the thimble of crude medicine and extracts it by contact. The liquid contents of the chamber siphon into the flask when the level of liquid in the chamber reaches the top of the siphon tube.

Counter-current Extraction: In Counter Current Extraction (CCE), wet input material is crushed using toothed disc disintegrators to produce fine slurry. Within a cylindrical extractor, the material to be extracted is carried in one direction (typically as a fine slurry) until it comes into contact with the extraction solvent. As the starting material is moved further away, the extract becomes more concentrated. Complete extraction is possible when the quantities of solvent and material, as well as their flow rates, are optimised. The operation is quick and painless, taking only a few minutes and requiring no exposure to severe temperatures. Finally, one end of the extractor produces a sufficiently concentrated extract, while the other produces the marc (which is almost solvent-free).

Ultrasound-assisted extraction: Ultrasound waves with frequencies ranging from 20 kHz to 2000 kHz are used in the technique, which enhances the permeability of cell walls and causes cavitation. Although the method is effective in particular situations, such as rauwolfia root extraction, its use on a broad scale is limited due to the increased costs. One downside of the process is the known but rare adverse effect of ultrasonic energy (more than 20 kHz) on the active ingredients of medicinal plants, resulting in the creation of free radicals and, as a result, unwanted alterations in the drug molecules.

CONCLUSION

These procedures are repeated until a drop of solvent from the syphon tube evaporates without leaving any residue. When compared to other approaches, Soxhlet extraction method has the benefit of extracting significant amounts of medication with a much less amount of solvent. This has a huge impact on the economy in terms of time, energy, and, as a result, financial inputs. It is only used as a batch process on a small size, but when transformed to a continuous extraction operation on a medium or large scale, it becomes much more cost-effective and sustainable.

REFERENCES

1. Azwanida NN. A review on the extraction methods use in medicinal plants, principle, strength and limitation. Med Aromat Plants. 2015;4(196):2167-2412.
2. Pandey A, Tripathi S. Concept of standardization, extraction, and pre-phytochemical screening strategies for herbal drug. J Pharmacogn Phytochem. 2014;2(5):115-119.
3. Doughari JH. Phytochemicals: Extraction methods, basic structures, and mode of action as potential chemotherapeutic agents. Chem Report. 2012.
4. Sasidharan S, Chen Y, Saravanan D, Sundram KM, Latha YL. Extraction, isolation and characterization of bioactive compounds from plants' extracts. Afr J Tradit Complement Altern Med. 2011;8:1-10.
5. Rungsung W, Ratha KK, Dutta S, Dixit AK, Hazra J. Secondary metabolites of plants in drugs discovery. World J Pharm Res. 2015;4:604-613.
6. Sofowora A. The present status of knowledge of the plants used in traditional medicine in western Africa: A medical approach and a chemical evaluation. J Ethnopharmacol. 1980;2:109-118.