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Editorial

Quality certification and prevention of adulteration in plant parts used as source of medicines

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Use of plant species in treatment of ailment and as food supplements is reported from the time of Vedic period (1750-500 BCE). Modern pharmaceutical sciences still relies on knowledge of traditional herbal practices for the discovery of new drugs and their preparation.[1,2] Many plant metabolites are under examination to test their potential against large numbers of diseases. Plants produce extensive varieties of chemical compounds which are used either for their growth and development or for the defense mechanism for survival against harsh conditions. The chemical compounds used for their growth and development are called primary metabolites. They include biomolecules such as amino acids, lipids, carbohydrates and nucleic acids. They play major role in regulation of cellular metabolism, photosyntheisis, respiration and nutrients assimilation. These primary metabolites are used as food additives as well as raw material for extraction of secondary metabolites. The chemical compounds used for defense mechanism are called secondary metabolites. They include alkaloids, phemols, anthocyanin, saponins, flavonoids, sterols, etc.[3] these compounds are of major interest in pharmaceuticals as potential source of new medicines as antimicrobials, metabolic modulators, and diet supplements.

There are vast numbers of examples where one particular plant part is used in treatment of variety of diseases. For example, Leaves and fruits of *Dillenia indica* are used in astringent, laxative, fever and diarrhea. Stem of *Polyalthia longifolia* is used in febrifuge, rheumatism, menorrhagia, scorpion sting and diabetes. Leaves of *Cadaba indica* are useful in treatment of eczema, swelling and constipation. Leaf powder of *Cocculus hirsutus* is useful in treatment of eczema, gonorrhoea, prurigo, impetigo cough, ophthalmia, cephalalgia and neuralgia. Leaves and roots of *Cyclea peltata* are used in anti-inflammatory, cough, bronchitis, helminthiasis, diarrhoea, dropsy, painful swellings, skin diseases, leprosy, fever strangury, ulcers, wounds, vomiting, hyperdipsia and cardiac disorders.[4]

The current scenario demands authentic plant source for consistent quality, efficacy and safety of medicine. It can be ensured by finding reliable

characteristics through botanical identification of plant material. This would ensure the reliability and repeated use of the specific plant material for herbal preparations and its manufacturing. Further pharmacological and clinical research requires consistent quality control and assurance of test product. However, botanical monographs are only available for limited herbal products compared to wide range of source and their adulterants. It is essential that any crude plant material used for curative needs to be subjected for inspection of quality and source identity.

Classical ways of herbal identification (morphological and microscopic observation) is further substituted by confirmation of presence of specific phytochemical using qualitative and quantitative methods. Morphological recognition of plant material provides base for identification of plant species utilized for herbal formulation. Anatomical identification complements morphological identification and provide essential base for plant part identification.[5] Characterization of secondary metabolites through chromatographic and spectrometric techniques serves as a possible tool for proper identification of phytochemicals used for production of pharmaceutical medicines.[6]

Subsequently, two modern approaches are in practice for validation of herbals. First approach is use of analytical techniques based on spectroscopy and chromatography. Here identification process is mainly two step where first stage is separation of active or signature molecules using separation techniques such as HPTLC, HPLC, GC etc. and second stage is confirmation of molecule and their active group by FTIR, MS, NMR etc.[6] Second approach is use of molecular biology techniques to identify source material based on DNA pattern. It includes molecular marker based DNA fingerprinting and DNA barcoding.[7, 8]

However, relevance and application of these methods change on case to case bases. Some specific products could be easily validated based on morphological characters whereas, some additionally requires approach based on anatomical identification. These traditional methods provides rapid and economic option for validation of bulk herbal products. Concurrently analytical and molecular methods identifies signature presence of specific metabolite or DNA sequence. They are relatively costly and cumbersome compared to traditional methods but provides very accurate herbal identification.

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