

Expert Article

Expert opinion on plant-based medicines

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Ever since the dawn of human civilization, plants occupy a pivotal position in human life. Various parts of plants like roots, shoot, bark, leaves or fruits not only serve as food and spices, but they are also known to provide various medicines for over 5000 years. Plants serve as a major part of folk medicine, Indian Ayurveda, Siddha medicine, traditional Chinese medicine, Unani, tribal medicine as well as all forms of modern medicine. They play an important role in providing antibiotics, chemotherapy, pain management and halucinogenics. Till date, over 70,000 plant species have been screened for their possible medicinal value. Plants, especially those with ethnopharmacological uses, have been searched for being the primary source of medicine during early drug discovery. Medicinal plants may be herbs, shrubs or trees, and they also provide various ingredients or phytochemicals, which can form part of various therapies, used in both traditional and modern systems of medicine. Plants actually evolved to synthesise hundreds of chemical compounds for multifarious functions including their own defence against insects, fungi, diseases, and herbivorous mammals, which have largely been exploited for medicinal use. Among these, many phytochemicals with potential or established medicinal activities against various diseases have been identified, including many with anti-cancer potential.¹ Drug research makes use of ethnobotany to search for pharmacologically active substances in nature, and has in this way discovered hundreds of useful compounds and biologically active molecules. These include some common drugs like aspirin (found in a handful of plants including *Salix alba*, *Spirea* spp. and *Betula* spp.), digoxin (from *Digitalis lanata*), quinine (from *Cinchona calisaya* tree from

South America), myriocin (from fungus *Mycelia sterilia*), penicillin (from mould *Penicillium chrysogenum*), paclitaxel (from Pacific Yew *Taxus brevifolia*), vincristine and vinblastine (from Madagascar periwinkle plant *Catharanthus roseus*), curcumin (from *Curcuma longa*), azadirachtin (from *Azadirachta indica*) and opium (from Opium poppy, *Papaveraceae somniferum*). The compounds found in plants are of many kinds, but most belong to four major biochemical categories, namely, alkaloids, glycosides, polyphenols, and terpenes. In a recent survey, Ahn² reported that about 70–95% of the population in developing countries continues to use plants as traditional medicines even today and the potential global market for botanical extracts and medicines was estimated at several hundred billion dollars. However, there is also some risk associated with use of some poisonous botanical extracts in improper or over-doses. As there is little regulation for use of traditional medicine in some countries, the World Health Organization has now formed a regulatory body to coordinate a network to encourage safe and rational usage of certain traditional medicines.

Medicinal plants may provide three main kinds of benefit to mankind: i) health benefits to the people who take them as medicines; ii) financial benefits to people who are engaged in harvest, process, and industrialization and distribution of medicine; and iii) to society at large, by creating job opportunities, and labour resource.³ However, more pragmatic research is needed to validate use, proper dose and concentration, and modernize the concept and process of drug discovery and drug development.

In recent years, some new approaches are being made, such as combinatorial chemistry, computer-based molecular modeling design, and by synthetic chemistry etc. However, the role of natural plant products in human life can never be undermined. The need for better quality control, enactment of proper regulatory mechanisms, and proper vigilance to keep a healthy balance between rejuvenation/replenishment of plant resources and utilization for demand are concerns that need proper attention to keep an ecological balance.

Molecular biology studies are now suggested to reveal the mode of action and to determine relevant and accurate molecular targets. In this regard, there has been a paradigm shift in recent years in the area of drug-carriage and drug bioavailability. Many plant-based drugs, including insoluble ones, are being transported effectively via various biodegradable, non-toxic nano-carriers making the drugs more selective, targetted and faster-acting.⁴

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