

PHARMACOGNOSY : ITS SIGNIFICANCE AND PERSPECTIVES IN HOMOEOPATHIC DRUG RESEARCH IN INDIA

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Pharmacognosy as a branch of Science has grown enormously as a specialised discipline in pharmaceutical study. A multitude of drugs used since time immemorial are still in vogue and are used in the same manner by the present practitioners. Although tremendous strides have been made in the techniques of extraction, separation, isolation and identification of the compounds present in the plants and animals, the basic purpose for which the drug is used remains the same as was intended by our predecessors in the study of medicine.

Pharmacognosy is closely related to both botany and plant chemistry. It mainly began in the present century on botanical side concerning with the description and identification of drugs both in whole form as well as in powder state. But with the recent phenomenal development in the utilisation of physical instrumentation in the study of plant product chemistry, things have become easier in structural elucidation of naturally occurring molecules and their biological importance.

Among the earliest human activities have been the study of plants and animals, primarily in search for the sources of food. Man had to distinguish between the poisonous and non-poisonous plants which subsequently led to the development of knowledge of naturally occurring drugs. This accumulated information, once orally transmitted, transformed into the written edicts, as on papyri, baked clay, tablets, parchments, manuscript herbals,

pharmacopoeias and most recently computerised data banks.

The term '*pharmacognosy*' first coined by C.A. Seydler in 1815, is formed of two Greek words '*pharmakon*' meaning drug and '*gnosis*' meaning knowledge. Pharmacognosy is defined as a branch of science which deals with the history, distribution, cultivation, collection, selection, preparation, commerce, evaluation, identification, preservation and use of drugs, and economic substances that affect the health of man and other animals.

Our vast plant kingdom has several species of plants having substances of medicinal value which are already described and also those which are yet to be probed. There is a lot of scope for research still on the plants used for medicinal, narcotic and other purposes by the primitive tribes. The studies in this direction termed '*Ethnobotany*' has attracted the attention of the customary floristic studies. Lot of impetus is given presently in this area as Government agencies and Council's working under Govt. of India are keen on developing new drugs in indigenous systems. Discovery of new plant drug in the treatment of various ailments with which the humanity is suffering, forms one of the important achievements in medicinal practices. This study requires concerted efforts of scientists and social workers to trap the information from tribals well versed with folklore medicinal practices hitherto unknown to civilization. Once the information is retrieved it is for the scientists to make neces-

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sary studies, to find out the active principle involved and effect its use in an improved way.

Factors in Drug Production

The crude drug has to pass several stages finally to reach pharmaceutical manufacturing line. These can be dealt in various headings viz., climate, cultivated and wild plants, collection, drying and storage.

Climate

The plant growth and development, and often the nature and quantity of secondary metabolites, are affected by temperature, rainfall, length of day including the quality of light and altitude.

Temperature

Temperature is a major factor controlling the development and metabolism of plants. Although each species has become adapted to its own natural environment, plants frequently can exist in a considerable range of temperatures. Formation of volatile oils appears to be increased at higher temperature but very hot days may lead to excess physical loss of oil.

Rainfall

Variable results have been reported for the production of volatile oils under different rainfall conditions and in some instances coupled with the development of glandular hairs. Incessant rain can lead to the loss of water soluble substances from leaves and roots by leaching.

Day length and Radiation

Plants vary much both in the amount and intensity of the light which they require. In certain cases research has shown that light is a factor which helps determine the amount of glycosides or alkaloids produced. Long day

conditions have shown the production of menthone, menthol and traces of menthofuran, while in short day conditions showed menthofuran as major component of volatile oil. Many plants initiate flowers only in certain day-lengths and where flowering is essential, this factor must be carefully considered before planting in a new region.

Altitude

Altitude also is an important factor in drug production. For example coconut palm needs a maritime climate while the sugarcane is a lowland plant. Medicinal plants like rhubarb, tragacanth and cinchona require elevation. The bitter constituents of *Gentiana lutea* increase with altitude whereas the alkaloids of *Aconitum napellus* and oil contents of thyme and peppermint decrease.

Cultivated and Wild plants

Plant drugs are obtained both from cultivation as well as from wild source. Certain drugs which are purely derived from cultivation are ginger, cardamoms, cinnamon, cinchona etc. Most of the other plant drugs are obtained in wild state. Essential drugs like opium and Indian hemp are under cultivation subject to Government control. In order to meet the demand and inadequacy of the material in the wild state certain plant drugs are cultivated. For success in cultivation it is necessary to study the conditions under which the plant flourishes in the wild state and reproduce these conditions or improve on them.

Soils

Plant species vary in their requirements in nutrients and soil which is very essential in the medicinal plant cultivation. The three factors - physical, chemical and microbiological are important in the maintenance of soil. For example, the nitrogen-containing nutrients in the soil has a marked effect on alkaloid production. Generally fertilisers increase the size of the plants and the alkaloid content.

Collection

Drugs may be collected from wild or cultivated plants. The season of collection is very important, since the yield and the nature of active constituent is not the same throughout the year. For example in the collection of podophyllum, ephedra, rhubarb, aconite etc. there is a sequence of changes in transformation of active compounds in its biological course at different times.

Apart from these care should also be taken in propagation methods. In the case of seeds they have to be collected when perfectly ripe and stored in ambient conditions.

Deterioration of Drugs

There are various factors both physical and biological which effect the quality of drugs on storage for example moisture content, temperature, light and the presence of living organisms like bacteria, moulds, mites and insects. The increase in moisture and temperature effects the loss of volatile constituents (essential oil) from dried drug materials. Direct sun-rays may cause photochemical action leading to decomposition of drugs. Attention should be taken and a 'wormy' drug should be sacrificed instead of risking contamination of other products.

Evaluation

The evaluation of crude drug which enters the market is of considerable importance. This involves identification of the material, determination of its quality, purity and if adulterated the nature of adulterant. Deliberate adulteration is prone to occur with expensive materials like saffron and also with those materials in short supply. The evaluation of a drug involves a number of methods that may be classified as follows:

Organoleptic : Study refers to evaluation by means of the organs of sense and includes the

macroscopic appearance of the drug, its odor and taste, occasionally the sound of its fracture and the 'feel' of the drug to the touch.

Microscopic : Study is essential to study the adulterants in powder plant, but is indispensable in the identification of the pure powdered drug. However, anatomical studies of the plant drug in various planes (T.S. & L.S.) provides equally an authentic evidence and forms the basis for identification of drug in powder form. Histochemical studies also provide important clues in the identification.

Biologic : Study involves pharmacological activity of drugs as applied to their evaluation and standardisation. Assays on living animals as well as on intact or excised organs often indicate the strength of the drug or its preparation.

Chemical : The active constituents of many natural drugs have been determined. Chemical methods of evaluating crude drugs and their products are useful and consequently are widely employed.

Physical : Physical constants are extensively applied to the active principles of the drugs, such as alkaloids, volatile oils, fixed oils and others.

Standards

The authenticity of a crude drug is established by reference to the descriptions of it given in various Pharmacopoeias or other official publications viz., E.P., B.P., I.P., U.S.P., H.P.I., etc. of the country concerned.

Pharmacognostically the drug description is provided in a systematic order starting with Botanical name, Habitat, Geographical distribution, Local and Vernacular names, History & Authority, Parts utilised; Morphology, Anatomy, Histochemistry, Powder in Microscopy, Physico-chemical analysis of powder,

Fluorescence studies, Uses of the drug, Action of the drug, Chemical study, Research references etc.

For convenience of study, drugs may be arranged not only according to families and chemical constituents but into such morphological groups as barks, roots, leaves, seeds etc. Some drugs constitute more than one morphological part, e.g. whole herbs and commercial 'roots' which may consist of both rhizomes and roots. Sometimes for convenience drugs are prefixed with Latin terminology in identifying the source without further preparation. For example coriander or clove is described as fructus coriandri or flores coriandri which directly gives the morphological nature or source. Same way aconite as Tubera aconiti (Tuber), Radix Ipecac for Ipecacuanha (Root), Herba kalmegh for Kalmegh (Whole herb).

In the recent years Homoeopathic System of Medicine has attained tremendous popularity and has come to prevail over allopathic and other systems due to comparatively less harmful and less cumulative or side effects providing either long standing or total cure for various diseases. The mass of drugs used for homoeopathic practice is derived from plants, animals, minerals, synthetic chemical products, nosodes, sarcodes as well as physical energies. In this system mainly about 1200 plant drugs are utilised as a source of medicine. Out of these only 40% of the plants are reported growing in India while about 60% are found in other countries.

In India studies on Homoeopathic drugs is being carried out by various Governmental Institutions (State & Central), Homoeopathic Pharmacopoeia Laboratory at Ghaziabad under the Department of Indian Systems of Medicine and Homoeopathy, Ministry of Health and Family Welfare is a premier organisation for pharmacopoeial standards and drug testing while Central Council for Research in Homoeopathy under the Ministry is

another Institution devoted to the research in various aspects of Homoeopathic system in India. The Pharmacopoeia laboratory has also taken up the project to grow exotic plants of Indian origin used in Homoeopathy. The Laboratory has liaison with scientists, pharmacognosists, herbalists and botanical gardens over the world and possesses complete data of germplasm. It has a close interaction between pharmacognosists, phytochemists and pharmacologists.

The Central Council for Research in Homoeopathy under the aegis of Ministry of Health & Family Welfare, established in the year 1979 is engaged in research pertaining to development of various aspects of Homoeopathy in the country. It has a network of several units spread all over the country working on various aspects of Homoeopathy. Of these, Homoeopathic Drug Research Institute (HDRI) at Lucknow and Drug Standardisation Units (H) working at Ghaziabad and Hyderabad are the three institutions working on the Drug Standardisation mainly pertaining to Pharmacognosy.

The Drug Standardisation Unit at Hyderabad was established in the year 1979, in the Osmania University Campus. The unit since then is engaged in pharmacognostic studies of the vegetable drugs assigned to them from time to time by C.C.R.H., New Delhi. The aims and objectives of this unit is to lay down specific standards for testing purity of Homoeopathic drugs (both authentic and commercial) at various stages of preparation viz. macroscopic, microscopic, powder and mother tincture levels.

Since its inception, about 96 plant drugs have been pharmacognostically worked out. The details of the work have been incorporated in the unit's annual progress reports. The Drug Standardisation Unit is now a fullfledged centre for pharmacognostic studies with institutions like Osmania University, Hyderabad; Regional Research Laboratory, Hyderabad;

Centre for Cellular and Molecular Biology,
Hyderabad and National Institute of Nutrition,
Hyderabad within the vicinity and access.

Acknowledgements

Thanks are due to Dr. D.P. Rastogi, Director,
Central Council for Research in Homoeopathy, New Delhi
for the support and encouragement.

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"Science in particular, can move ahead **only if**
scientists are free to think as unconventionally
as they please and to pursue those unexpected
leads that are constantly developing as part of
the scientific process".

Allan T. Waterman
