



9 Chapter

Pharmacognosy and its importance in medicinal plant uses

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Pharmacognosy and Pharmacology :

Pharmacognosy is the scientific study of medicinal drugs derived from plants or other natural sources. It is the study of the structural, physical, chemical and sensory characters of crude drugs of plants, animals and other natural origin. It is also related with the study of their history, cultivation, collection and other particulars relating their uses or treatment. Pharmacognosy may also be defined as an applied science which deals with the biological, biochemical and economic features of natural drugs and their constituents. It is a study of drugs together with their natural derivatives having their origin in the plant and animal kingdoms. In a broad sense, it embraces about the knowledge of the history, distribution, cultivation, selection, preparation, identification, evaluation, preservation and use of drugs affecting the health of man and other animals. Plant preparations are said to be medicinal or herbal when they are used to promote health beyond basic nutrition. The study of drugs from plants includes the subjects of botany, chemistry and pharmacology. Botany includes the identification (taxonomy), genetics, and cultivation of plants. Chemical characterization includes the isolation, identification and quantification of constituents in plant materials.

The 'American Society of Pharmacognosy' defines 'pharmacognosy' as "the study of the physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources." It is also defined as the study of crude drugs, or is the study of drugs of natural origin.

The term 'pharmacognosy' was first introduced by C. Anotheus Seydler (1815) in a work titled *Analecta Pharmacognostica*. The word pharmacognosy is derived from two Greek words, 'pharmakon' means drug or medicine and 'gnosis' means knowledge.

The knowledge of pharmacognosy developed from ancient civilization when man used parts of plants and animals to eliminate pain, control suffering and counteract ailments. By trial and error, aboriginal people acquired biological knowledge regarding which plants and animals possessed food values, which were handed over from one generation to another. Their observations separation, isolation and identification of the drug plants have occurred in recent





past, but the purpose for which these medicinal plants/substances are employed today were intended by our predecessors.

In this line of history, the names of Hippocrates, Aristotle, Theophrastus, Pliny, etc are well known. From this humble beginning, medicine and pharmacy gradually emerged along separate path. The physician diagnosing the ailment and prescribing the remedy and the pharmacist specializing the collection, preparation and compounding the substances.

Although most pharmacognostic studies focus on plants and medicines derived from plants, other types of organisms are also regarded as pharmacognostically interesting, in particular, various types of microbes (bacteria, fungi, etc.), and, recently, various marine organisms.

Pharmacology is an essential branch of medicine, which is related to the study of the action of drugs. Pharmacology can be defined as the study of the biological effects of the chemicals found in medicinal plants on cell cultures, animals and humans. The renaissance of herbal medicine creates a demand for studies in the field of pharmacognosy as well as pharmacology.

Drugs and its types :

The drugs can be defined those substances natural or synthetic having therapeutic or medicinal properties and usually used as medicines or as ingredients of medicines.

The term drugs means -

- (i) Articles recognized in the pharmacopeia or in the National Formulary or any supplement to any of them.
- (ii) Articles intended for the use in the diagnosis, cure, mitigation, treatment or prevention of diseases in man or other animals and
- (iii) Articles (other than food) which intended to affect the structure and functioning of the body.

Depending upon the natural origin, drugs may be vegetable drug (those obtain from plants) and animal drug (those obtain from animal).

Drugs may be 'crude' and 'commercial'. Crude means any product which has not been advanced in value or improved in condition by grinding, crushing, distilling, evaporation, extracting, by artificial mixing with other substances or by any other processes. Sometimes, the crude drugs are used as such as therapeutic agents, but more frequently their chief principles are separated by various means in a more specific manner. These principles are known as 'derivatives' or 'extractives'. Whether these 'derivatives' or 'extractives' are a single substance or a mixture or substances, they are said to be the 'chief constituents' of the drug.

The commercial origin of a drug refers to its production and its channels of trade. In this case, the drugs bear a geographical name indicating the country





or region from which they are collected, the country and city from which they are shipped or to indicate a certain variety.

Preparation of Plant Drugs for Commercial Market :

Preparation of plant drugs for Commercial Market involved the following steps -

- (i) Collection
- (ii) Harvesting
- (iii) Drying
- (iv) Garbling
- (v) Packaging
- (vi) Storage and preservation

(i) **Collection** : Collection of drug is an important step in pharmacognosy. The drug collected from cultivated plants always insures a true natural source and a reliable product, which, however, not maintained when collected from wild sources/plants. The drug plants are obtained from all over the world, collection areas are almost same and collectors may vary from an uneducated native to a highly skilled person.

Since the quality of the constituents vary greatly, the proper time of collection as well as harvesting is very important. The most convenient time of collection is during which period the drug is highest in its content of active principles.

- The roots and other underground parts should be collected when the vegetative growths have ceased.
- Barks should be collected in the spring.
- The leaves should be collected when photosynthesis is most active and before the maturing of the fruits/seeds.
- Flowers should be collected prior to or just at the time pollination.
- Fruits may be collected either before or after the ripening period.
- Seeds should be collected when fully matured and if possible before the fruits have opened.

(ii) **Harvesting** : On the basis of drug produced and pharmaceutical requirement, the mode of harvesting varies. Harvesting may be done by hand or by mechanical devices. Plant material which is used for distillation is cut with a mower and left to dry partially before distillation. For the leaves and herbs, the cut plants may be hauled directly to the dryers after which they are separated from the stem. Flowers are best collected by a hand cranberry scoop. The fruits and seeds are best cut with a combination a mower and binder. Barks are largely removed by hand stripping. Roots and rhizomes may be dug by hand, after which the soil adhering the roots must be removed in special root-washing machines.





(iii) **Drying** : Drying the drug is very important. It ensures good keeping qualities and prevents molding, chemical changes, etc. As a result of drying, the chemical constituents are usually fixed and it also helps grinding and milling. The control of temperature and the regulation of air flow are the two main principles of drying. The materials may be dried either by Sun or by the use of heat. Sun drying is usually done for those materials which are not affected by the direct action of sunlight. Shade drying is employed when it is desirable to retain the original colour of the drug. Air drying may be done in the sun or in the shade depending upon the materials/drugs. Drugs containing volatile constituents are usually air dried in the shade or in a mechanical dryer at a temperature low enough to prevent loss of the volatile compounds.

Artificial drying is usually done at 40°C to 60°C depending upon not to destroy the active principle. Artificial drying by using heat has the advantage over air drying as it can stop enzymatic action more rapidly than drying by air.

(iv) **Garbling** : It is the final step of removing extraneous matter like other parts of the plant, dirt, etc from the sample in the preparation of a drug. Garbling can be done initially at the time of collection and finally after the drug is dried and before it is packaged.

(v) **Packaging** : The packaging of drug is dependent upon their final disposition. It provides ample protection to the drug, as well as provides sufficient space.

(vi) **Storage and Preservation** : The storage and preservation of the drug material is important to maintain the quality of the drug. The drug materials are usually stored in the specially prepared fire-proof steel, concrete or brick built ware-house. The ware-house should be cool, dark, well ventilated with dry air and rodent-proof.

During preservation of the drugs care should be taken against attack by insects. The simplest method against this attack is to keep the drugs to a temperature of 65°C. Fumigation with methyl bromide is also an important method against insect attack.

Sometimes, the drug plants are preserved in air-tight, moisture-proof and light-proof containers. Drugs should not be preserved in wooden boxes or in drawers and in paper-bags. All these cases not only is deterioration hastens but odour may communicated from one another, insect attacks are facilitated and destruction by rodents may occur. Since high temperature accelerate all chemical reactions, drugs must be stored at as low temperature as possible. Certain drugs must be stored at a temperature range of 2°C - 10°C.

Evaluation of Drugs :

The main basis of evaluation of drugs is to 'identify' it and to 'determine its quality and purity'.

The identity of a drug is established by actual collection of the drug from

