Introduction to Pharmacognosy

2nd semester/2nd stage

Lect.1

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The word "pharmacognosy" is derived from two Greek words **pharmakon** (drug), and **gnosis** (knowledge).

It is defined as: the study of medicinal drugs derived from plants or other natural sources.

It includes the study of the physical, chemical, biochemical and biological properties of drugs, as well as the search for new drugs from natural sources.

It is also defined as the study of **crude drugs.**

Although pharmacognosy is principally concerned with plant materials , there are some animal products which are traditionally included within the subject such as (beeswax , gelatin , wool fat ,Vitamins …..etc).

So the Source of natural drugs includes, Plant kingdom Animal kingdom Microbial world and venomes.

- Pharmacognosy has developed from ancient civilizations & used parts from local plants and animals for their survival .
- By trial & error, the primitive man had acquired biologic knowledge that was useful in determining which plants and animals possessed food value & which of them to be avoided because they were unpalatable, poisonous or dangerous.

The use of modern isolation techniques and pharmacological testing procedures means **that** the new plant drugs may find their way into medicine as purified substances, but the use of single pure compound is not without limitations.

Pharmacognosy Science Concerned With Studying the Following Subjects:

1- Taxonomy of plants & the natural sources of drugs.
2- Distribution of natural products in the world.
3- Description of plants such as : Tree or Shrub.

4- The active constituents from natural sources (Active groups) like:
(Glycosides, Alkaloids, Volatile Oils, Tannins, etc).

5- The biosynthetic pathway of the active constituents.

6- Storage places of the active constituents in organisms : **Leaf** (Digitalis):digitalis leaf contains natural derivative called cardioactive glycoside (digitoxin) , **Roots** (Liquorice) , **Seeds** (Coffee bean), and **Bark**(Cinnamon).

7- Collection & Storage of the part used.

8- Physical , Chemical & Biological properties of the active constituents.

9- The Correct prescription of natural drug in the treatment of the disease.

Definitions & Basic Principles

Taxonomy: is the science that deals with the description, identification, nomenclature, and classification of organisms.

The names of plants are given in binomial form: the first part of the name is the **genus**; the second part of the name is the **species**. Followed by the family

e.g. ***Papaver somniferum F: Papaveraceae***

Natural products: is a chemical compound or substance produced by a living organism found in nature that usually has a pharmacological or biological activity to be used in pharmaceutical drug discovery & drug design .

they can be

1- Entire organism (plant, animal)

2- Part of an organism (a leaf or flower of a plant, an isolated gland or other organ of an animal)

3- An extract or an exudate of an organism

4- Isolated pure compounds

phytotherapy

The study of medicinal use of plants or plant extracts for medicinal purposes. This means study herbal medicine with details: How the drugs work? In which time should take it after or before eating? Is safe gave it to infant or pregnant ?

Phytochemistry

It’s the study of chemicals derived from the plants (included the identification of new drugs derived from plants sources.

Drug: according to FDA **(food and drug administration) the drug is** any synthetic or natural substance or mixture at substances which may be used for the cure, prevention or mitigation of disease in human or other animals. The drug should be included in the official pharmacopoeia.

Pharmacopeia: is a book containing an official list of medicinal drugs together with articles on their preparation and use. E.g. British Pharmacopeia B.P., Euoropean Pharmacopeia U.P. and United state Pharmacopeia U.S.P., and national formulary N.F.

A crude drug: is any naturally occurring, unrefined substance derived from organic or inorganic sources such as plant, animal, bacteria intended for use in the diagnosis, cure, mitigation, or prevention of disease in humans or other animals.

These natural drugs (crude) undergo only the process of collection and drying.

Extractives (derivatives) : This term deals with the principle constituents (active constituents) that found in natural substances and can be isolated by many methods like (**Extraction , distillation, grinding, crushing, drying …….etc** .) they are responsible for the pharmaceutical activity of natural drug, they are found either as single or mixture of substances.

Natural drug: A general term for any substance which is used in healthcare obtained from natural source.

Synthetic drugs: are compounds that are obtained from chemical synthesis and whose source is the laboratory. Example aspirin, diazepam, indomethacin, propranolol.

Semi-synthetic drugs: are produced by the natural drug and treated it chemically to isolate the active ingredient and then modify it.

Official drugs: drugs that are listed or recognized in the current versions of official pharmacopeia or standard book of medicine and they are described to have specific therapeutic activity or pharmaceutic necessity.

Unofficial drugs: Drugs that have been included in previous pharmacopeia but the current issue have omitted them.

Non-official drugs: drugs that are never appear in the pharmacopeias, but they may be in the future time become official.

indigenous plants: are those plants which grow in their native countries. E.g. the plant Digitalis purpurea is indigenous to central and southern Europe.

Neutralized plants: are those plants which grow in foreign land other than their native homes. E.g. Datura stramonium which was introduced into United state from Europe.

Cultivated plants: are those plants which grow in their native countries or in foreign land under certain conditions to improve their quality and quantity of production. E.g. opium is cultivated in their native home either because of insufficient natural supply or to improve the quality of drug.

Medicinal plants: are plants that contain active constituents with pharmacological properties or physiological activities.

Classification of Natural Products :

Vegetable drugs can be arranged for study under the following titles:

1 . **Alphabetical**: drugs are arranged in alphabetical order using either Latin or English names. U.P. used Latin names, while B.P. and U.S.P. used English names.

2. Morphological: the drugs are grouped according to parts such as following:
leaves, flowers, fruits, seeds, herbs and entire organisms, woods, barks, rhizomes and roots (known as organized drugs).

e.g. **Rhubarb** الراوندgrouped under rhizomes and root.

Mustard الخردلgrouped under seeds.

Cinnamon الدارسينgrouped under bark.





While, drugs which are prepared from plants by some intermediate physical processes such as (incision , drying or extraction with a solvent are called as (unorganized drugs) such as (Aloe juice , opium latex , agar , gelatin , tragacanth , , honey , beeswax , lemon grass oil ..etc.).

3- Taxonomic: the drugs are arranged according to the plants from which they are obtained, in classes, orders, families, genera and species.

e.g. drugs Belladona ست الحسن , **stramonium** الداتورا , these drugs have certain characters as alternative leaves, cymose flower الزهرة على قمة المحور and fruit that capsule.

These drugs are considered with Solanaceae family العائلة الباذنجانية .

4- Pharmacological or Therapeutic: This classification involves the grouping of drugs according to the pharmacological action of their most important constituent or their therapeutic use.

E.g. cascara sagrada, senna, podophyllumand castor oil , all these drugs are grouped together according to their action on intestine and used as cathartics ملين.

5- Chemical or Biogenetic: in this class the drugs are divided into groups according to their most important chemical constituents. **E.g.** alkaloids, glycosides and volatile oils, also drugs are grouped according to biosynthetic pathway by which the constituents are formed or produced.

Another **e.g.** drugs as clove القرنفل, nutmeg جوزة الطيب and peppermint are grouped together according to their chemical constituents (volatile oil).

Compounds from natural sources play four significant roles in modern medicine:

1. They provide a number of extremely useful drugs that difficult if not impossible to produce commercially by synthetic means (eg. Vincristine).

2. Natural sources also supply basic compounds that may be modified render them effective or less toxic (eg. Hydromorphone).

3. A third role is their utility as a prototype for synthetic drugs possessing physiological activation similar to the original (eg. Procaine from cocaine).

4. Some natural products contain compounds that demonstrate little or no activity themselves but which can be modified by chemical or biological methods to produce potent drugs not easily obtained other methods (eg, taxol).

THANK YOU

