



PHARMACOGNOSY

1st
YEAR
STUDENTS



MASTER NOTES FOR D.PHARMA



**Subject Wise
Notes**



**According To
PCI Syllabus**



**Easy To
Understand**



**Prepared By
Experts**



**Learn With
Flow Charts**

Definition, History , Present Status & Scope Of Pharmacognosy

- Definition
- History of Pharmacognosy
- Present status of Pharmacognosy
- Scope of Pharmacognosy

Definition and Introduction of Pharmacognosy

- A branch of bioscience which treats in details medicinal and related products of crude or primary type obtained from plant, animal and mineral origins.
- “It is a branch of science and a tool for crude drug standardization which deals with the scientific and systematic
 - study of structural,
 - physical,
 - chemical and
 - biological characters
 - and evaluation of crude drugs along with geographical sources, history, method of cultivation, collection and preparation for the market, their proper storage and their application in the improvement of health.”
- **Drugs** - all medicines for external or internal use of human beings or animals and all substances or in the diagnosis, treatment, and mitigation to be used for prevention of any disease or disorder in human being or animals.
- **Crude Drugs** - Naturally occurring substances either obtained from plants/ animals/ minerals which is used in their natural state (without any processing except drying & side reduction).
- Examples –
 - ✓ Vinca, Punarnava (Whole plant)
 - ✓ Clove (flower bud)
 - ✓ Coriander, Cumin (fruit)
 - ✓ Tulsi, Neem (leaf)
- Pharmacognosy term – first used by *Johann Adam Schmidt* in his manuscript *Lehrbuch der Materia Medica* in 1811.
- First coined by *C.A. Seydler* (German scientist) by in 1815 in the title of his work “*Analecta Pharmacognostica*”.

Derived from Greek word

Pharmakon,
'a drug'



gignosco or gnosio,
'to acquire the knowledge of'



Seydler

History of Pharmacognosy

- China- many medicinal plants had been in use since 5000 B.C. The oldest known herbal is- pent'sao written by emperor *Shen Nung* (around 3000 B.C). It contains 365 drugs, one for each day of year.
- India- A large portion of Indian population even today depends on the Indian system of Medicine- Ayurveda, “An ancient science of life”. (Ayur- Life and Veda –study of).
- **Charaka Samhita**- made 50 groups of 10 herbs for illness, according to physician's need
- **Sushruta Samhita**- arranged 760 herbs in 7 distinct sets based on their common properties.

- Here, the crude drugs are grouped according to the part of the plant or animal represented into organized and unorganized drugs.
- Some of the examples of crude drugs under this type of classification are as:

Parts	Drugs	Parts	Drugs
Seeds	Isabgol, Castor	Fruits	Fennel, Coriander
Leaves	Senna, Eucalyptus	Entire drugs	Ephedra, Belladonna
Bark	Cinchona, Cinnamon	Dried latex	Opium, Papain
Woods	Sandalwood, Quassia	Dried extracts	Gelatin, Agar
Roots	Rauwolfia, Jalap	Dried juices	Aloe
Rhizomes	Turmeric, Ginger	Resins	Asafoetida
Flowers	Clove, Saffron	Gums	Acacia, Tragacanth

- **Advantage-**
 - This system of classification is more convenient for practical study especially when the chemical nature of the drug is not clearly understood.
- **Disadvantages-**
 - It does not give any idea about biological source, chemical constituents, and uses.
 - Difficult to classify, when different parts of plant contain different chemical constituents.

4. Chemical Classification

- Here, the crude drugs are divided into different groups according to the chemical nature of their most important constituent.
- Since the pharmacological activity and therapeutic significance of crude drugs are based on - the nature of their chemical constituents, it would appear that chemical classification on crude drugs is the preferred method of study.
- The crude drugs belonging to different morphological or taxonomical categories may be brought together, provided there is some similarities in the chemical nature of active principle.



Chemical Classification	Crude drugs
Glycosides	Digitalis, Senna, Liquorice
Alkaloids	Cinchona, Nux-vomica, Datura
Tannins	Ashoka, Amla
Volatile oils	Peppermint, Eucalyptus, Gaultheria
Lipids	Castor oil, Cod liver oil, Bees wax
Carbohydrates	Acacia, Agar, Pectin, Honey
Resins	Jalap, Balsam of Tolu

- **Advantage-**
 - Chemical Constituents are known.
 - Medicinal uses are known.
- **Disadvantages-**
 - Drugs of different origin are grouped under similar chemical titles.
 - This type of classification makes no proper placement of drugs containing two different types of chemicals.
 - E.g. Cinchona (Contains alkaloids and glycosides),
 - Nutmeg (Fixed oil and volatile oil), having equal importance together so difficult to categorize them properly.

5. Pharmacological (Therapeutic) Classification

4.	Wagner's Test	Drug solution + few drops of Wagner's reagent (dilute Iodine solution)	reddish-brown precipitate
5.	Tannic Acid Test	Drug solution + few drops of tannic acid solution	buff coloured precipitate
6.	Ammonia Reineckate Test	Drug solution + slightly acidified (HCl) saturated solution of ammonia reineckate	pink flocculent precipitate

Therapeutic effects and pharmaceutical applications of alkaloids

S. No.	Alkaloids	Pharmacological Action
1.	Morphine	Analgesic
2.	Cocaine	Analgesics
3.	Quinine	Antimalarial
4.	Quinidine	Antiarrhythmic
5.	Camptothecin	Anticancer
6.	Papavarine	Smooth muscle relaxant
7.	Emetine	Emetics
8.	Ergotamine	Treatment of Migraine
9.	Strychnine	Bitter, stomachic
10.	Reserpine	Antihypertensive
11.	Vincristine, Vinblastine	Anticancer
12.	Pilocarpine	Glaucoma
13.	Ephedrine	Treatment of asthma
14.	Caffeine	CNS stimulant

TERPENOIDS

Introduction

- The **terpenoids**, sometimes called **isoprenoids**, are a large and diverse class of naturally occurring organic chemicals similar to terpenes, derived from five-carbon isoprene units assembled and modified in thousands of ways.
- Most are multicyclic structures that differ from one another not only in functional groups but also in their basic carbon skeletons.
- These lipids can be found in all classes of living things and are the largest group of natural products. About 60% of known natural products are terpenoids.

Occurrence

1. Terpenoids also form a group of naturally occurring compounds majority of which occur in plants, a few of them have also been obtained from other sources.
2. Terpenoids are volatile substances which give plants and flowers their fragrance.
3. They occur widely in the leaves and fruits of higher plants, conifers, citrus and eucalyptus.
4. The term 'terpene' was given to the compounds isolated from turpentine, a volatile liquid isolated from pine trees.
5. The simpler mono and sequin terpenes are chief constituent of the essential oils obtained from sap and tissues of certain plant and trees.

Distribution of Terpenoids

Based on the extensive distribution of terpenoids in the vast plant kingdom they are classified broadly as follows, namely:

- The best-known families of which all species tested contain tannin are:
- Aceraceae, Actinidiaceae, Anacardiaceae, Bixaceae, Combretaceae, etc.

Distribution of Tannins

- **Bark:** e.g., Arjuna, Ashoka.
- **Fruits:** e.g., Amla, Behada.
- **Leaves:** e.g., Tea.
- **Seeds:** e.g., Coffee.
- **Extract:** e.g., Pale catechu and Black catechu.

Classification

S.NO	CLASSIFICATION	DESCRIPTION	PLANT
1	Hydrolysable tannins	On treatment with acid or enzyme it produce gallic acid ellagic acid. When these tannins are heated pyrogallol is produced	Bahera, Myrobalan, Arjuna, Amla
2	Condensed tannins	On treatment with acid it produce phlobaphenes These tannins are resistance to hydrolysis	Ashoka Bark, Black catechu, Pale catechu, Pterocarpus, cinchona bark, cinnamon bark
3	Pseudo tannins	Don't respond to Goldbeater's skin test	Tea, catechin – cocoa chlorogenic, coffea

Isolation of Tannins

- Tannins are non-crystallizable compounds soluble in water (more soluble in hot water).
- These cannot be separated easily, so sometimes these are also called as "tannin extract" rather tannin.

Identification Test of Tannins

Chemical test	Test	Observation	Interference
Goldbeater skin test	Goldbeater skin + HCl + Rinsed in water + placed in tannins + FeSO ₄ (1%)	Brown/ Black colour observed	Tannin present
Match stick test	Match Stick + dipped in Aqueous solution of plant extract and dried near burner + moistened with HCl	Wood tuns red due to formation of phloroglucinol	Tannin present
Phenazone test	Extract of tannin + (1 gm) Na ₃ PO ₄ + 2% Phenazone solution added	Tannin precipitate	Tannin present
Chlorogenic acid test	Chlorogenic containing drugs + aq. Ammonia	Green colour formed on expose to air	Tannin present
Ferric chloride test	Test extract + FeCl ₃	Blue colour/green colour	Presence of hydrolysable/ condensed tannin

Therapeutic activity and pharmaceutical application of Tannins

Plant Fibres used as Surgical Dressings

- Cotton
- Silk
- Wool and regenerated fibres
- Sutures – Surgical Catgut and Ligatures

PLANT FIBRES

COTTON

Synonyms: Raw cotton, Purified cotton, Absorbent cotton

Biological source: It consists of *epidermal trichomes* (hairs) of the seeds of various species of *Gossypium* (*Gossypium barbedens*, *Gossypium peruvianum*, *Gossypium herbaceum*)

Family: Malvaceae

Chemical constituents

- Raw cotton consists of
 1. Cellulose 91%
 2. Wax, oil and fat 0.4%
 3. Protoplasm and other cell constituents 0.6%
 4. Moisture 7.8 %
 5. Ash value 0.2%

Difference between absorbent and non-absorbent cotton

ABSORBENT COTTON	NON-ABSORBENT
These are epidermal trichomes of seeds of <i>Gossypium</i> species	These are also epidermal trichomes of seeds of <i>Gossypium</i> species
It is pure white in colour	Slightly brownish in colour
If a piece of cotton is placed on the surface water, it absorbs water and sinks	Float on water surface
It is used in surgical dressing and as filtering media	It is not suitable for surgical dressing because of its non-absorbency

Uses

- It is used in surgical dressing to absorb the body fluid, blood and pus etc.
- Protect from bacterial infection.

SILK

Biological source: These are the fibres made from the cocoons spun by the larvae of *Bombayx mori*.

Family: Bombycidae

Chemical constituents

- Raw silk consists of fibroin (65%), sericin (22%), moisture (11%), minerals and colouring substance (1%).
- Sericin can be removed by boiling in soap solution (degumming process)

Uses: It is used in making ligature (wound stitching thread).

WOOL

Synonym: Animal wool, Sheep wool, Lama

Biological source: Wool consists of the hairs separated from the fleece (The layer of skin in which the roots of hairs are embedded) of the sheep (*Quis aries*).

Family: Bovidae

Chemical constituents: keratin containing carbon, hydrogen, oxygen, nitrogen and sulphur.

Uses: Insulating material & in the manufacture of filters.

RAYON (Regenerated Fibre)

Brief introduction and therapeutic applications of:

- Nutraceuticals
- Antioxidants
- Pro-biotics
- Pre-biotics
- Dietary fibres
- Omega-3-fatty acids
- Spirulina
- Carotenoids
- Soya and
- Garlic

NUTRACEUTICALS

Introduction

- Those substances that may protect cells from the damage caused by unstable molecules (free radicals) are known as Antioxidants.
- In oxidation process free radicals are produced that will destroy the living cell but antioxidant prevent this to happen.
- Nutraceutical can thus be defined as food or part of diet that improve health or decrease the incidence of diseases.
- **Example:** Ascorbic acid, cellulose, pectin, β -carotene, Allicin Plants Animals Lecithin, Calcium, Bifidobacterium bifidum, etc.

Classification of nutraceuticals on the basis of food source

Food source	Example
Plants	Ascorbic acid, cellulose, leutein, pectin, B-carotene, Allicin
Animals	Lecithin, Creatinine, Calcium, Conjugated Linoleic acid, Royal jelly
Microbes	Sacchromyces boulardii, Bifidobacterium bifidum, B. infantum, etc.

Classification of nutraceutical on the basis of therapeutic action

Anticancer	Influence on blood lipid profile	Antioxidant activity	Anti inflammatory	Bone protective
Capsaicin	β -glucan	Ascorbic acid	lenolenic acid	Soy protein
Genestein	γ -Tocotrienol	β -carotene	Gama linolenic acid	Calcium
Ellagic acid	Pectin	Lutein	curcumin	Inulin

Percolation

The process of percolation includes 5 steps



1. **Comminution of drug:** It is the size reduction of drug usually from coarse powder to fine powder so that
 - To increase surface area
 - To ensure complete removal of drugs
 - To slow down the movement of menstruum
 - For uniform packing
2. **Imbibition of drug**
 - Swelling of drug by absorbing menstruum. It is allowed to stand for 4 hour in a closed container.
 - It is done to achieve following objectives:
 - ✓ To avoid choking
 - ✓ To remove air
 - ✓ To avoid washing out of fine particles
3. **Packing**
 - After imbibition drug is evenly back into the percolator.
 - The filter paper placed on the bottom to support the column of drug.
 - The moistured drug is placed on the filter paper.
 - Over the moisture drug another filter paper is placed having weight on it.
 - Then menstruum is added close the lid if menstruum is volatile.
4. **Maceration**
 - After packing sufficient menstruum is added and covered with lid.
 - When liquid begins to drop the lower orifice is closed.
 - The percolator is set aside 24 hours.
5. **Percolation**
 - After 24 hours lower orifice is opened and menstruum is collected with a control speed until 3/4th of menstruum is collected.
 - Then more menstruum is added and collected from the lower orifice so that mark does not become dry.
 - Then mark is pressed to get extract which is combined with previous liquid.
 - Then it is allowed to stand and then it is filtered.