Pharma Unit

Pharmacognosy Top 10 Most Repeated Questions with Answers

According to New Syllabus ER 2020-21

1st Year D. Pharmacy

1) Define Pharmacognosy? Explain scope of Pharmacognosy?

Ans.

Definition

Pharmacognosy is the study of medicines or crude drugs produced from natural sources such as plants microbes and animals it includes analysis of their biological chemical physical and biochemical properties

History of pharmacognosy

The Egyptians were aware of medicinal use of several plants and animals and about human anatomy. The Greek physician Hippocrates known as father of medicine Greek pharmacist Galen described various methods of preparation containing active constituents of crude drugs. The history of pharmacognosy is very old. Different countries like India, China, Nepal develop medicine from plants to cure certain diseases. Indian history of medicinal plants is dated back to 3500 BC the curative properties of plants have been mentioned in the suktas of Rigveda and Atharvaveda. Ayurveda has also described a good number of plants with their therapeutic properties. The ancient well-known treaties in ayurveda are the charaka Samhita and sushruta Samhita and written by charaka and sushruta respectively

Scope of Pharmacognosy

a) Synthesis drugs and antibiotics: The demand of pharmaceutical production of plant origin has increased due to the world-wide use of synthesis drugs and antibiotics
b) Plant Drugs and remedies: Complex diseases like cancer AIDS are treated by plant drugs and remedies, which are safer than the Synthetic medicines
c) Herbal medicines and preparations: Herbal medicines have become more popular in recent years because it is believed that this do not have any toxin or side effects as compared to modern medicine
d) Natural flavouring agents and natural perfumes: Large number of aromatic plants which are extensively used as natural flavouring agents, natural perfume spices and medicine.
e) It provides a thorough understanding of how plants and animals are used to obtain drugs under botany and zoology.
f) Plant chemistry (phytochemistry) has seen significant progress, focusing on the synthesis and accumulation of various substances.
g) Provides insights into chemotaxonomy and biogenic pathways for creating active ingredients.

2) Define adulteration and give methods of adulteration with suitable examples?

Ans.

Definition

The term Adulteration is defined as substituting original crude drugs partially or wholly with other similar-looking substance

Methods used for drug adulteration.

1. Substitution with manufactured materials
2. Substitution with Inferior material
3. Substitution with Exhausted material
4. Excessive adventitious matter
5. Adulteration with non-plant material
6. Substitution with cheap natural substance

A. **Substitution with manufactured materials:** This is done with artificially manufactured material which resembles various drugs in form and appearance. Example: - Paraffin wax has been coloured yellow to substitute beeswax.
B. **Substitution with Inferior material:** Drugs are sometimes adulterated and substituted with standard commercial material. The common example of substitution is adulteration of cloves by mother cloves. Saffron is adulterated with dried flowers of Carthamus tinctorius (Safflower).
C. **Substitution with Exhausted material:** Exhausted material the vegetable residues which remain after the original material has been used for drug preparation. Example substitution of Alexandrian Senna with Arabian Senna, Used of exhausted Clove and ginger for adulteration.
D. **Substitution with cheap natural substances:** Sometimes drugs are adulterated with cheaper natural substances which have no relation to the genuine article. Example: - Japan wax for beeswax and sterculia gum for Tragacanth.
E. **Adulteration with non- plant material:** Plant materials are sometime adulteration with worthless non-plant materials

3) Write a note on alkaloids?

Ans.

Definition

Alkaloids are derived from the word alkali like. Alkaloids are nitrogenous compounds which are basic in nature due to the presence of one or more nitrogen atoms. They are defined as basic nitrogenous compounds of plant origin which are physiologically active.

Classification of alkaloids

a. True alkaloids: True alkaloids contain heterocyclic nitrogen atoms in the heterocyclic ring. The alkaloids are derived from amino acids. They are basic in nature. For example, quinine, atropine and morphine
b. Proto alkaloids: These are also called amino alkaloids. This contains nitrogen but not in the heterocyclic ring. It is also considered as a biological amine. It is also basic in nature. For example, ephedrine
c. Pseudo alkaloids: It contains heterocyclic nitrogen atom it is weak base for example caffeine

Occurrence and distribution of alkaloids

Alkaloids are found in plants and are especially common in certain families of flowering plants. They also occur in seed bearing plants mainly in berries, bark, fruits, roots and leaves. Alkaloids are more present in dicots than monocots. Families rich in alkaloids are Apocynaceae, Rubiaceae, Solanaceae, and papaveraceae.

Isolation method

i. Stas otto process: Extraction is basically carried out by Stas-Otto process in which the moistened drug is treated with alkali to set free the base existing in salt form and then the free base is separated with an organic solvent
ii. Kippenberger process: In this Process the powdered and sieved plant substance is first digested with solution of tannin in glycerol at a constant temperature 40 degree Celsius for 48hrs. The resultant mixture is further heated to 50°C to complete coagulation of pretentious substance and finally filtered

Identification test

a. Dragendorff's Test: This test uses Dragendorff's reagent, which is a solution of potassium bismuth iodide. When mixed with alkaloids, it produces an orange or reddish-brown precipitate, indicating the presence of alkaloids.
b. Mayer's Test: In this test, Mayer's reagent (a solution of potassium mercuric iodide) is added to the sample. If alkaloids are present, a cream-colored precipitate forms.
c. Hager's Test:
d. This test involves Hager's reagent, which is a saturated solution of picric acid. When it reacts with alkaloids, it produces a yellow precipitate as a positive result.
e. Wagner's Test: Wagner's reagent is a solution of iodine in potassium iodide. When added to a solution containing alkaloids, it forms a reddish-brown precipitate, confirming their presence.

Therapeutic uses

- It is used as antidepressant
- It is used as local anaesthetic agent
- It is used as antiseptic
- It is used as antibacterial agents

4) Write a note on volatile oil?

Ans.

Definition

Volatile oils are odorous volatile principles of plant and animal source, evaporate when exposed to air at ordinary temperature, they are also known as essential oils.

Classification of volatile oil

a) Hydrocarbon volatile oil: turpentine
b) Aldehyde volatile oil: lemongrass and cinnamon
c) Alcohol volatile oil: peppermint
d) Ketone volatile oil: camphor and cumin
e) Phenol volatile oil: clove
f) Oxide volatile oil: cardamom

Occurrence and distribution

Majority of volatile oil are present in plants they are especially present in secretory tissues for example oil ducts of umbelliferous fruits, oil cells or oil glands are present in sab epidermal tissue of lemon, and trichomes of several plants. In some cases, they do not pre-exist in the plant, but it is formed by decomposition of glycosides for example, mustard oil

Isolation method

a. Distillation method: the crude drug is distilled with water using Clevenger apparatus. For example, sandalwood, clove and cinnamon
b. Expression method: the volatile oil is obtained by expressing the fruit. For example, citrus fruits
c. Extraction method: the volatile oil is obtained by extracting the drug with volatile solvent such as ether and petroleum ether
d. Maceration method: drug containing volatile oil is first heated with melted fat or fixed oil stirring continuously in a water bath and left overnight the oil is separated from the fat with the help of alcohol. For example, oil obtained from flowers

Identification test

1. **Sudan III Test**: Take a thin section of the drug and add an alcoholic solution of **Sudan III**. The presence of **red-coloured globules** indicates volatile oils. **Explanation**: Sudan III is a fat-soluble dye that stains the oil globules, confirming the presence of volatile oil.
2. **Tincture Iodine Test**: Take a thin section of the drug and add a drop of **tincture iodine** (not tincture alkenes). **Observation**: A **red colour** appears, indicating the presence of volatile oil. **Explanation**: The iodine reacts with unsaturated compounds in the volatile oil, producing the red colour.

Therapeutic uses

- It is used as antiseptic agent
- It is used as antispasmodic agent
- It is used as carminative
- It is also used as flavouring agent
- It is also used in perfume industries
- It is also used in spices

5) Write a note on tannins?

Ans.

Definition

Tannins are polyphenolic Tannins are present in the aerial parts, e.g., leaves, fruits, barks, or stem, generally occurs in immature fruits, but disappears during the ripening process

Classification of Tannins

A. Tannins are classified into two types

Hydrolysable: these tannins are hydrolysed by acids or enzymes quickly and the product of hydrolysis is gallic acid and ellagic acid. On dry distillation gallic acid and other compound get converted to pyrogallol they react with ferric chloride solution producing bluish black colour

E.g.- Gallo tannins

B. Condensed: these are true tannins which on acidic or enzyme treatment get decomposed into a red insoluble compound known as phlobaphene's. On dry distillation they yield catechol tannins with ferric chloride solution they produce brownish green colour

E.g.- kino tannic acid,

Occurrence and distribution

Tannins are found commonly in the bark of trees, wood, leaves, buds, stems, fruits, seeds, roots, and plant galls. Tannins are distributed in species throughout the plant kingdom. They are commonly found in both gymnosperms and angiosperms. Mole studied the distribution of tannin in 180 families of dicotyledons and 44 families of monocotyledons.

Isolation Method

Both hydrolysable and condensed tannins are highly soluble in water and alcohol but insoluble in organic solvents such as solvent ether, chloroform, and benzene. Tannin compounds can be easily extracted by water or alcohol. The general method for the extraction of tannic acid from various galls is either with water-saturated ether, or with mixture of water, alcohol, and ether. In such cases, free acids such as Gallic and ellagic acid go along with ether, whereas true tannin gets extracted in water. If the drug consists of chlorophyll or pigment, it may be removed by ether. After extraction, the aqueous and ethereal layers are separately concentrated, dried, and subjected to further isolation and purification using various separation techniques of chromatography.

Identification test for tannins

1. Phenazone Test: To 5 ml of aqueous solution of tannin-containing drug, add 0.5 g of sodium acid phosphate. Warm the solution, cool, and filter. Add 2% phenazone solution to the filtrate. All tannins are precipitated as bulky, coloured precipitate.
2. Gelatine Test: To a 1% gelatine solution, add a little 10% sodium chloride. If a 1% solution of tannin is added to the gelatine solution, tannins cause precipitation of gelatine from solution.
3. Test for Catechin: Catechin test is the modification of the well-known phloroglucinol test for lignin. Matchsticks contain lignin. Dip a matchstick in the dilute extract of the drug, dry, moisten it with concentrated hydrochloric acid, and warm it near a flame. Catechin in the presence of acid produces phloroglucinol which stains the lignified wood pink or red.
4. Test for chlorogenic acid: A dilute solution of chlorogenic acid containing extract, if treated with aqueous ammonia and exposed to air, slowly turns green indicating the presence of chlorogenic acid.
5. Vanillin-hydrochloric acid test: Drug shows pink or red colour with a mixture of vanillin, alcohol, dilute Hcl in the ratio 1:10:10. The reaction produces phloroglucinol which along with vanillin gives pink or red colour.

Therapeutic uses

- It is used as antidote
- It is used as antitumor agent
- It is used as antidiarrheal agent
- They also have antibacterial properties

6) Write a note on glycosides?

Ans.

Definition

Glycosides can be defined as the compounds in which one or more sugars are combined with non-sugar molecules through glycosidic linkage

Classification of glycosides

1. Anthracene Glycoside – Senna, Rhubarb
2. Sterol Or Cardiac Glycoside – Digitalis, Squill
3. Cyanogenic Glycoside - Bitter Almond
4. Saponin Glycoside - Dioscorea
5. Isothiocyanate Glycoside - Black Mustard
6. Flavanol Glycoside - Silymarin
7. Coumarin Glycoside - Cantharides
8. Aldehyde Glycoside - Vanilla
9. Phenol Glycoside - Bearberry

Occurrence and distribution

Glycosides widely occur in root, bark, fruits, and to a small extent in leaves. Many glycosides occur in plants, often as flower and fruit pigments, for example, anthocyanins.\

Isolation method

The drug containing glycosides is finely powdered extracted by a continuous hot percolation method. Using Soxhlet apparatus with an alcohol as a solvent. During this process the various enzymes present in the drug get deactivated due to heating. The extract is than treated with lead acetate to precipitate tannins and to remain non-glycosidal impurities The excess of lead acetate is precipitate as lead sulphide by passing the H2S (hydrogen sulphide gas) through the solution The extracts filtered, and glycoside is obtained.

Identification of Glycosides

a) Borntrager's test: The drug is finely powdered and added to dilute H2SO4 Due to which the drug is hydrolysed and then it is filtered. The filtration is cooled and shaken with organic solvent such as benzene or chloroform by which aglycone part enter into the organic solvent. The organic solvent separated, and ammonia is added Ammoniacal layer turn pink to red colour

b) Killer Kiliani test: The powdered drug is boiled with 70% of alcohol for 2-3 mins and Filter. The filtrate is added to water and strong lead acetate solution. The chloroform is added and shaken. The aglycon now entered into the chloroform. The chloroform layer is separated and evaporated. The remaining part residue is then dissolved in glacial acetic acid containing 5%ferric chloride solution. Add Hcl or H2SO4, a reddish-brown layer is formed

Therapeutic uses

- Used in treating heart failure
- Used in treating irregular heartbeats

7) What are pharmaceutical aids give pharmacognosy of kaolin?

Ans.

Definition

Pharmaceutical aids are the substance which have no or little pharmacological effect, but they are essentially used in the preparation of pharmaceutical dosage form like tablets, capsule, injections, suspension and emulsion
Examples are kaolin, lanolin, beeswax, Acacia tragacanth, Agar

Pharmacognosy of kaolin

Synonyms: China clay, porcelain

Source: Kaolin is a naturally occurring mineral that is formed by the weathering of rocks containing aluminium silicates. Kaolin deposits are often found in areas with high levels of rainfall and a warm, tropical climate. Over time, the weathering of the rocks in these areas breaks down the aluminium silicates and leaves behind kaolin. The kaolin deposits are then mined from the earth and processed to remove impurities before being used in various industrial applications.

Chemical Constituents: kaolinite and halloysite. Kaolinite is a hydrated aluminium silicate with the chemical formula $Al_2Si_2O_5(OH)_4$, while halloysite is also a hydrated aluminium silicate with the chemical formula $Al_2Si_2O_5(OH)_4 \cdot 2H_2O$. Kaolin may also contain small amounts of other minerals, such as quartz, feldspar, and mica

Uses

- Kaolin is used in some pharmaceutical products as an excipient
- Kaolin is used in a range of personal care products, such as soaps, creams, and powders, as a thickening agent, absorbent, and skin protectant
- Kaolin is also used in the production of ceramics

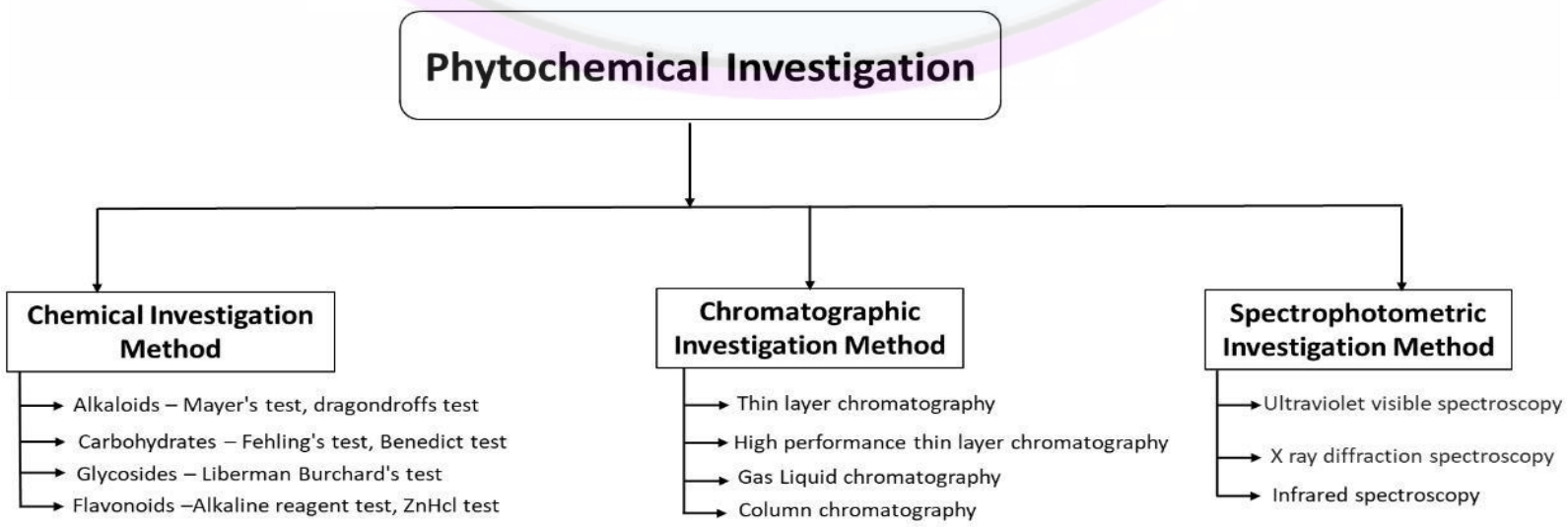
8) Explain phytochemical investigation of drugs?

Ans.

Definition

Phytochemical investigation of drugs is the scientific process of identifying and studying the active chemical components found in plants that have medicinal properties. These chemicals are often referred to as phytochemicals, and they can be extracted from various parts of the plant such as the leaves, stem, or roots.

Classification



9) Explain Morphological and Pharmacological classification of drugs?

Ans.

Morphological Classification of Drugs

Definition

The crude drugs are grouped according to the part of plant or animal represented into organised and unorganised drugs. The organised drugs are divided into parts of plants like leaves, flowers, fruits seeds, wood barks and subterranean parts like root and rhizomes. The unorganised drugs are dried latex gums etc. This system of classification is more convenient for practical study especially when the chemical nature of a drug is not clearly understood.

Classification of drug as per morphology

1. Seeds: nux-vomica, castor and isabgol
2. Leaves: senna, digitalis, vasaka
3. Barks: Cinchona, kurchi, cinnamon
4. Woods: Sandalwood, quassia, red sanders
5. Roots: Rauwolfia, aconite, ipecacuanha
6. Rhizomes: Turmeric, Ginger, podophyllum
7. Flowers: clove, saffron
8. Fruits: coriander, fennel
9. Entire drugs: Ergot, ephedra, belladonna
10. Dried latices: Opium, papain
11. Resins: balsam of tolu, asafoetida, benzoin
12. Dried juices: Aloes, Red gum
13. Gums: Acacia, Tragacanth, guar gum
14. Dried extracts: gelatine, catechu, agar

Pharmacological Classification of drugs

Definition

Pharmacological classification of through drugs involved the group of crude drugs according to their pharmacological action of their active constituent or their therapeutic uses the drugs which include in pharmacological classification have similar pharmacological action.

Classification of crude drug as per pharmacology

1. Drug acting on gastrointestinal tract: Carminatives such as Dill & Mentha, emetics such as ipecacuanha, purgatives such as senna & castor oil
2. Drug acting on respiratory system: Expectorants such as vasaka & liquorice, antitussive such as codeine, bronchodilators such as ephedra
3. Drugs acting on cardiovascular system: cardiotonic such as digitalis and squill, anti-hypertensives such as rauwolfia
4. Drugs acting on autonomic nervous system: Adrenergic such as ephedra, cholinergic such as physostigmine
5. Drugs acting on central nervous system: CNS stimulants such as coffee Central analgesics such as opium
6. Anti-cancer drugs: vinca, podophyllum
7. Anti-rheumatics drugs: Aconite, guggul
8. Anti-malarial drugs: Cinchona, artemisia
9. Astringents: Myrobalan, Black catechu
10. Antispasmodics: Papaverine, datura

10) Explain Pharmacognosy of senna and opium?

Ans.

Pharmacognosy of senna

A) **Synonyms:** Alexandrian senna, Tinnevelly senna, Folia senna

B) **Family:** Fabaceae (Leguminosae)

C) **Biological Source:** The biological source of senna is the dried leaflets and pods of Cassia angustifolia and Cassia acutifolia.

D) **Geographical Source:** Senna Alexandrina is naturally cultivated in the region from Mali in the east to Somalia and Kenya. It is indigenous to Asia, from the Arabian Peninsula to India and Sri Lanka. In India, it is mainly found in Tinnevelly, Madurai, and Ramnath Puram districts of Tamil Nadu.

E) **Organoleptic Properties**

- Colour: Flowers are Yellow in colour and Leaves are yellowish green
- Odour: Slight and unpleasant
- Taste: Mucilaginous, bitter, and characteristic
- Size: Leaves are 7-8 mm in width and 25 to 60 mm in length
- Shape: Leaves are lanceolate in shape with an acute apex, sometimes ending in a spine
- They have an asymmetrical base, with the transverse line being more prominent on the lower surface.
- Surface: Trichomes are present on the entire surface of the leaves.

F) **Chemical Constituents**

- Anthraquinone Glycosides: Present in less than 2.5%, also referred to as crystalline compounds. Contains Rhein and aloe-emodin. Includes sennosides A and B, which are stereoisomers: Sennoside A: Dextro-rotatory form (aglycone), Sennoside B: Meso-rotatory form (aglycone)
- Naphthalene Glycosides: Present in the leaves.
- Other Components: Calcium oxalate, Volatile substances Yellow flavanol colouring matters, such as kaempferol and its glycosides, and isorhamnetin, Sterols and their glucosides, Monoterpenes, phenylpropanes, fatty acids, and esters, Mucilage, Resin, Water-soluble polysaccharides

G) **Pharmaceutical Uses**

- Purgative Properties: Reduces water absorption by influencing peristaltic movement.
- Cathartic Action: Effective in chronic constipation.
- Laxative Properties: FDA-approved for over the counter (OTC) laxative use.
- Specific Conditions: Used in irritable bowel syndrome (IBS), Applied in post-rectal surgery care, Effective in haemorrhoids treatment
- Weight Management: Sometimes used for weight loss (though not recommended for prolonged use).
- Pregnancy and Lactation: Generally considered ineffective and should be avoided during pregnancy and lactation.

Pharmacognosy of Opium

A. **Synonym:** Crude opium, Raw Opium, Gum Opium, Afim.

B. **Family:** Papaveraceae

C. **Biological source:** Opium from the unripe capsules of Papaver somniferous belonging to family Papaveraceae

D. **Geographical source:** In India, opium is primarily cultivated in Madhya Pradesh, Rajasthan and Uttar Pradesh, These regions have suitable climate and soil conditions for Papaver somniferous cultivation

E. **Chemical Constituents:**

Codeine 0.8 to 2.5%, Nicotine, thebaine 0.5 to 2%, noscapine 4 to 8% and papaverine 0.5% to 2.5% and also contain morphine

A. Therapeutics uses:

- It is used as narcotic analgesic
- It also produces sedative action
- It also used to relieve pain.
- It is also used to treat cough

Extra Questions:

a) Explain difference between Prebiotics and probiotics?
b) Define carminatives? Explain biological sources of Tulsi, ephedra, myrobalan?
c) Explain Antitumor drugs? Write pharmacognosy of Vinca and camptotheca?
d) Explain biological sources of ergot, artemisia, ginger, opium, digitalis, rauwolfia?
e) Describe in detail about Alphabetical and taxonomical classification of crude drugs?

All The Best For Your Exam

Very Imp Note:

- Please Read All the chapters very carefully before Pharmacognosy Exam.
- These questions are only for the reference purpose.