PHARMACOGNOSY

Examination Year – May 2013

YEAR -1ST

SOLVED BY –

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PRINCIPAL

SCMT , RAIKOT

S.B. Roll No. _____

PHARMACOGNOSY

1st Exam/Pharm/1983/Dec-13

Duration: 3 Hrs. Max. Marks: 80

Note: Attempt any five questions. Q. No. 1 and 2 are compulsory. All questions carry equal marks:

Q1 Fill in the blanks: 16

i. The chief active constituent of Ipecac is _____.
ii. The botanical name of Ispaghula is _____.
iii. Garlic is used as _____ and _____.
iv. Gokhni is used as _____.
v. The important chemical constituent of lemon grass oil is _____.
vi. The use of absorbent cotton is _____.
vii. Tulsi is also known as _____.
viii. Honey is obtained from honeycomb is _____.
ix. Ephedra belongs to the family _____.
x. Opium is obtained from _____.
xi. Fennel is commonly adulterated with _____.
xii. The main alkaloid present in Belladonna is _____.
xiii. Castor oil is obtained from _____.
xiv. Turmeric is used as _____.
xv. Beeswax is a _____ wax.
xvi. Drapendoff's reapent is used for identifying _____.

Q2 Give one specific use of the following: 8x2

i. Rouwolfie
ii. Arjuna
iii. Ashwagandha
iv. Dill
v. Cinnamon
vi. Orange oil
vii. Colchicum
viii. Black pepper

Q3 Give the biological source, collection, characters, chemical constituents and use of digitalis.

Q4 What are glycosident and what are their types? Give the identification tests and major therapeutic uses of glycosides.

Q5 Give the organloleptic and gross anatomical characteristics of clove.

Q6 Give the biological source, chemical constituents of the following drugs:

i. Ergot
ii. Cinchom
iii. Guggal
iv. Amla

Q7 Outline the system of classification of drugs of natural origin.

Q8 Write short note on:

i. Animal fibres
ii. Method to check adulteration of drugs

Note: Attempt any five questions. Q. No. 1 and 2 are compulsory. All questions carry equal marks:

Q1 Fill in the blanks: 16

i. The chief active constituent of Ipecac is **emetine**

ii. The botanical name of Ispaghula is **Plantago ovata**

iii. Garlic is used in **coronary heart disease**, and **hypertension**.

iv. Gokhnu is used as **diuretic**

v. The important chemical constituent of lemon grass oil is **Citral**

vi. The use of absorbent cotton is **surgical dressings**.

vii. Tulsi is also known as **holy basil**

viii. Honey is obtained from honeycomb is A. **mellifera**

ix. Ephedra belongs to the family **Ephedraceae**

x. Opium is obtained from **Papaver somniferum**

xi. Fennel is commonly adulterated with **exhausted Fenne.**

xii. The main alkaloid present in Belladonna is **Atropine**

xiii. Castor oil is obtained from **seeds of the Ricinus communis plant** .

xiv. Turmeric is used as **Antiinflammatry**

xv. Beeswax is a **natura**l wax.

xvi. Drapendoff's reapent is used for identifying **alkaloids**

Q2 Give one specific use of the following: 8x2
i. Rouwolfie
ii. Arjuna
iii. Ashwagandha
iv. Dill
v. Cinnamon
vi. Orange oil
vii. Colchicum
viii. Black pepper

I. Rouwolfie - Rauwolfia alkaloids belong to the general class of medicines called antihypertensives. They are used to treat **high blood pressure** (hypertension). **High blood pressure** adds to the workload of the heart and arteries.

II. Arjuna- erminalia **arjuna** has been used to balance the three “humors”: kapha, pitta, and vata. It has also been used for asthma, bile duct disorders, scorpion stings, and poisonings.

III. Ashwagandha- **Ashwagandha** has been used as an adaptogen, diuretic, and sedative and is available in the United States as a dietary supplement

IV. **Dill** seed is sometimes applied to the mouth and throat for pain and swelling (inflammation)

V. **Cinnamon** Is High in a Substance With Powerful Medicinal Properties. Is Loaded With Antioxidants. ...Anti-Inflammatory Properties. Cut the Risk of Heart Disease

VI. **Orange** Essential **Oil** is beneficial for maintaining the health, appearance, and texture of skin by promoting clarity, radiance, and smoothness, thereby reducing the signs of acne

VII. Colchicine is approved in many countries for the treatment of gout and familial Mediterranean **fever**

VIII. **black pepper** used mouth for arthritis, asthma, upset stomach, bronchitis, a bacterial infection that causes diarrhea

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By – Divesh verma

Q3 Give the biological source, collection, characters, chemical constituents and use of digitalis

Answer –

Digitalis

Synonym- foxglove, fairy glove, folium digitalis .

Biological source – it is dried leaves obtained from Digitalis purpurea Linn family Scrophulariaceae.

Geographical distribution – Europe , commonly in England , Germany , France. In India it is cultivated in Kashmir & Darjeeling at the higher altitude.

Morphological characters –
Shape- ovate lanceolate to broadly ovate.
Length – 10-20 cm
Colour- upper surface – deep green and grayish
Lower surface - - palegreen and more grey.
Margin – serrate
Texture – papery
Odour- Tea like
Taste – bitter

Chemical constituents – it contains mainly two cardiac glycosides purpurea glycoside A & purpurea glycoside B on Hydrolysis Purpurea glycoside A gives digitoxin and glucose . on hydrolysis of purpurea B gives gitoxin and glucose. Digitoxin is also a glycoside which gives yields of digitoxigein and 3 molecules digitoxose on hydrolysis. In addition of cardio glycoside yellow flavones luteolin , two saponin , traces of tannin are also present.

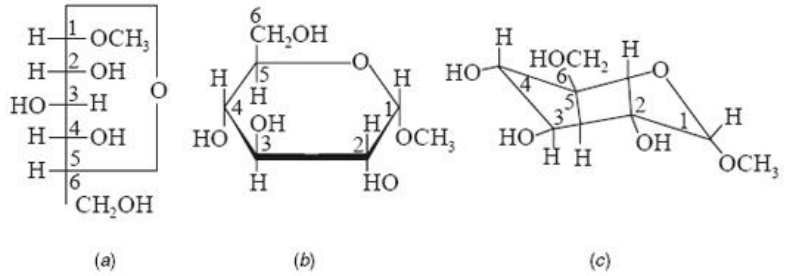
Uses – it is used as cardio tonic , it is used in congestive heart failure . it is also used as diuretic (which increase the flow of urine)

By – Divesh verma

Q4 What are glycosident and what are their types? Give the identification tests and major therapeutic uses of glycosides.

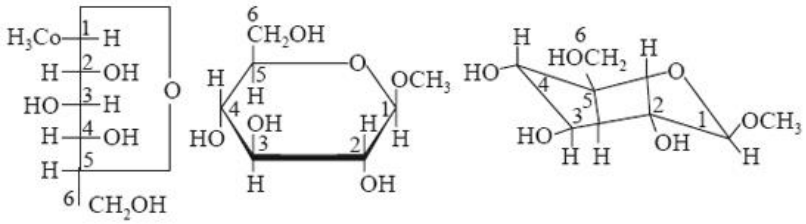
Glycoside

Glyocides are organic compounds of plants and animal origin which yield on either acidic or enzymatic hydrolysis, one or more sugar and a non sugar residue. The non sugar moiety is called as genin as aglycone , while the sugar components are glycones .



(a) (b) (c)

Fig. 4.1 Methyl-α-D-Glucoside



(a) (b) (c)

Fig. 4.2 Methyl-β-D-Glucoside

Occurrence and distribution - Glycosides are obtained from vegetable sources only. They occur in various parts of plants like fruits, seeds . leaves and barks , they are colour less , non reduction , optically active compounds . they are water soluble as well as alcohol soluble .They re hydrolyzed with dilute acid .

Classification –

They are classified on the basis of chemical nature of their aglycone moieties as following

1. Cyanophoric or cynogenetic glycoside- they yield one molecules of hydrocvanic acid as the product of their hydrolysis.
2. Cardiac glycosides – the term itself is self –explanatory , indicating that the glycosides act on cardiac muscle . these glycosides strengthen heart muscle by increasing force of contraction an thereby its efficiency.
3. Saponin glycoside-these plant glycosides on hydrolysis yield aglycone known as saponin , they form soapy solution in water , so they are called saponin .They taken orally they are less harm ful, they are power full emulsifiers and good detergents.
4. Isothiocynate glycoside- These are sulphur containing glycosides

5. Phenolic glucoside- this is the group covering largest number of glycoside available from plant sources. Depending upon the chemical structure , this group is subdivided as follows.
    a. Simple phenolic glycoside
    b. Anthracene glycoside
    c. Coumarin glycoside
    d. Flavones and flavonoid glycoside
    e. Anthocyanidins and their glycoside.

CHEMICAL TESTS OF GLYCOSIDES

Glycosides are the compounds with organic molecules having attached glucose or any mono-oligo sacchrid unit. Usually, these are crystalline or amorphous solids; optically active, soluble in water and alcohol but insoluble in organic solvents like ether, chloroform and benzene etc. Generally, aqueous or alcoholic extracts of crude drugs are tested with specific reagents for presence of various types of glycosides.

Chemical Tests for Anthraquinone Glycosides

Borntrager's test

To 1 gm of drug add 5–10 ml of dilute HCl boil on water bath for 10 min and filter. Filtrate was extracted with CCl4/ benzene and add equal amount of ammonia solution to filtrate filtrate and shake. Formation of pink or red colour in ammonical layer due to presence of anthraquinone moiety.

Chemical Tests for Saponin Glycosides

Haemolysis test

A drop blood on slide was mixed with few drops of aq. Saponin solution, RBC's becomes ruptured in presence of saponins.

Foam test

To 1 gm of drug add 10–20 ml of water, shake for few minutes, formation frothing which persists for 60–120 s in presence of saponins.

Chemical Tests for Steroid and Triterpenoid Glycosides

Libermann burchard test

Alcoholic extract of drug was evaporated to dryness and extracted with CHCl3, add few drops of acetic anhydride followed by conc. H2 SO4 from side wall of test tube to the CHCl3 extract. Formation of violet to blue coloured ring at the junction of two liquid, indicate the presence of steroid moiety.

Salkowaski test

Alcoholic extract of drug was evaporated to dryness and extracted with CHCl3, add conc. H2 SO4 from sidewall of test tube to the CHCl3 extract. Formation of yellow coloured ring at the junction of two liquid, which turns red after 2 min, indicate the presence of steroid moiety.

Antimony trichloride test

Alcoholic extract of drug was evaporated to dryness and extracted with $CHCl_3$, add saturated solution of $SbCl_3$ in $CHCl_3$ containing 20% acetic anhydride. Formation of pink colour on heating indicates presence of steroids and triterpenoids.

Trichloro acetic acid test

Triterpenes on addition of saturated solution of trichloro acetic acid forms coloured precipitate.

Tetranitro methane test

It forms yellow colour with unsaturated steroids and triterpenes.

Chemical Tests for Cardiac Glycosides

Keller-kiliani test

To the alcoholic extract of drug equal volume of water and 0.5 ml of strong lead acetate solution was added, shaked and filtered. Filtrate was extracted with equal volume of chloroform. Chloroform extract was evaporated to dryness and residue was dissolved in 3 ml of glacial acetic acid followed by addition of few drops of $FeCl_3$ solution. The resultant solution was transferred to a test tube containing 2 ml of conc. H_2SO_4. Reddish brown layer is formed, which turns bluish green after standing due to presence of digitoxose.

Legal test

To the alcoholic extract of drug equal volume of water and 0.5 ml of strong lead acetate solution was added, shaked and filtered. Filtrate was extracted with equal volume of chloroform and the chloroform extract was evaporated to dryness. The residue was dissolved in 2 ml of pyridine and sodium nitropruside 2 ml was added followed by addition of NaOH solution to make alkaline. Formation of pink colour in presence of glycosides or aglycon moiety.

Chemical Tests for Coumarin Glycosides

$FeCl_3$ test

To the concentrated alcoholic extract of drug few drops of alcoholic $FeCl_3$ solution was added. Formation of deep green colour, which turned yellow on addition of conc. HNO_3, indicates presence of coumarins.

Fluorescence test

The alcoholic extract of drug was mixed with 1N NaOH solution (one ml each). Development of blue-green fluorescence indicates presence of coumarins.

Chemical Tests for Cynophoric Glycoside

Sodium picrate test

Powdered drug was moistened with water in a conical flask and few drops of conc. Sulphuric acid was added. Filter paper impregnated with sodium picrate solution followed by sodium carbonate solution was trapped on the neck of flask using cork. Formation of brick red colour due to volatile HCN in presence of cynophoric glycosides takes place.

Q5 Give the organloleptic and gross anatomical characteristics of clove

Clove

Synonyms
Clove buds, Clove flowers.

Biological Source
Clove consists of the dried flower buds of *Eugenia caryophyllus* Thumb., belonging to family Myrtaceae.

Geographical Source
Clove tree is a native of Indonesia. It is cultivated mainly in Islands of Zanzibar, Pemba, Brazil, Amboiana, and Sumatra. It is also found in Madagascar, Penang, Mauritius, West Indies, India, and Ceylon.

Characterisitics Clove is reddish-brown in colour, with an upper crown and a hypanthium. The hypanthium is sub-cylindrical and tapering at the end. The hypanthium is 10 to 13 mm long, 4 mm wide, and 2 mm thick and has schizolysigenous oil glands and an ovary which is bilocular. The Crown region consists of the calyx, corolla, style and stamens. Calyx has four thick sepals. Corolla is also known as head, crown or cap; it is doineshaped and has four pale yellow coloured petals which are imbricate, immature, and membranous. The ovary consists of abundant ovules. Clove has strong spicy, aromatic odour, and pungent and aromatic taste.

Chemical Constituents
Clove contains 14–21% of volatile oil. The other constituents present are the eugenol, acetyl eugenol, gallotannic acid, and two crystalline principles; α- and β- caryophyllenes, methyl furfural, gum, resin, and fibre. Caryophyllin is odourless component and appears to be a phytosterol, whereas eugenol is a colourless liquid. Clove oil has 60–90% eugenol, which is the cause of its anesthetic and antiseptic properties.

Uses
Clove is used as an antiseptic, stimulant, carminative, aromatic, and as a flavouring agent. It is also used as anodyne, antiemetic. Dentists use clove oil as an oral anesthetic and to disinfect the root canals. Clove kills intestinal parasites and exhibits broad antimicrobial properties against fungi and bacteria and so it is used in the treatment of diarrhea, intestinal worms, and other digestive ailments. Clove oil can stop toothache. A few drops of the oil in water will stop vomiting, eating cloves is said to be aphrodisiac. Eugenol is also used as local anaesthetic in small doses. The oil stimulates peristalsis; it is a strong germicide, also a stimulating expectorant in bronchial problems. The infusion and Clove water are good vehicles for alkalies and aromatics.

By – Divesh verma

Q6 Give the biological source, chemical constituents of the following drugs:
i. Ergot
ii. Cinchmon
iii. Guggal
iv. Amla

i. **Ergot - Synonyms**

Ergot; Rye Ergot; Secale cornutum; Spurred rye; Ergot of rye; Ergota.

Biological Source

Ergot is the dried sclerotium of a fungus, *Claviceps purpurea* Tulasne, belonging to family Clavicipitaceae, developing in the ovary of rye plant, *Secale cereale* (Family Poaceae).
Ergot should yield about 0.15% of the total alkaloids calculated as ergotoxine and water-soluble alkaloids equivalent to about 0.01% of ergonovine.

Chemical Constituents

A large number of alkaloids have been isolated from the Ergot. The most important alkaloids are ergonovine and ergotamine. On the basis of solubility in water the alkaloids are divided into two groups: water-soluble ergometrine
(or ergonovine) group or water-insoluble (ergotamine and ergotoxine) groups as given hereunder

Ii. **Cinnamon-**
CINNAMON

Synonyms

Cortex cinnamoni, Ceylon cinnamon, Saigon cinnamon, Chinese cassia, *Cinnamomum aromaticum, Cinnamomum laurus.*

Biological Source Cinnamon is the dried inner bark of the coppiced shoots of *Cinnamomum zeylanicum* Nees., belonging to family Lauraceae.

Chemical Constituents

Cinnamon contains about 10% of volatile oil, tannin, mucilage, calcium oxalate and sugar. Volatile oil contains 50 to 65% cinnamic aldehyde, along with 5 to 10% eugenol, terpene hydrocarbons and small quantities of ketones and alcohols.

iii. Guggal

Guggal

Synonyms

Gumgugul, Salai-gogil.

Biological Source

Guggal is a gumresin obtained by incision of the bark of *Commiphora mukul* (H. and S.) Engl., belonging to family Burseraceae.

Chemical Constituents
Guggal contains gum (32%), essential oil (1.45%), sterols (guggulsterols I to VI, β-sitosterol, cholesterol, Z- and E-guggulsterone), sugars (sucrose, fructose), amino acids, α-camphorene, cembrene, allylcembrol, flavonoids (quercetin and its glycosides), ellagic acid, myricyl alcohol, aliphatic tetrols, etc.

iv. Amla

Amla

Synonyms
Indian gooseberry, Emblic myrobalan.
Biological Source
Amla consists of the fresh or dried fruit of *Emblica officinalis* Gaertn. (syn. *Phyllanthus emblica* Linn).**Family** Euphorbiaceae.

Chemical Constituents
It is highly nutritious and is an important dietary source of Vitamin C, minerals, and amino acids. The edible fruit tissue contains protein concentration 3-fold and ascorbic acid concentration 160-fold compared to that of the apple. The fruit also contains considerably higher concentration of most minerals and amino acids than apples. The pulpy portion of fruit, dried and freed from the nuts contains: gallic acid 1.32%, tannin, sugar 36.10%; gum 13.75%; albumin 13.08%; crude cellulose 17.08%; mineral matter 4.12%, and moisture 3.83%. Tannins are the mixture of gallic acid, ellagic acid, and phyllembin. The alkaloidal constituents such as phyllantidine and phyllantine have also been reported in the fruits. An immature fruit contains indolacetic acid and four other auxins: a1, a3, a4 and a5, and two growth inhibitors R1 and R2

Q8 Write short note on:
i. Animal fibres
ii. Method to check adulteration of drugs

Animal fibres By Divesh verma Principal Sadbhavna college of Management & Technology
SILK
Biological Source
Fibres obtained from the cocoons spun by the larvae *Bombyx mori* Linn., belonging to family Bombycidae/Moraceae.
Geographical Source
China, France, Iran, Italy, Japan, and India.
Preparation
One gram of silk-worm egg consists of around 15,000 eggs which are kept at 0°C to overcome the immature development. The silkworms eat mulberry leaves day and night and they grow very fast. When the colour of their heads changes darker, it indicates that the time for them to moult has come. It require almost a month time for its development into full size. During this period it takes four moulds and their body turns slightly yellow reaching a size of 4 cm long. The silk-worm finally eats a meal which is about twenty to twenty five times its weight of leaves and attains a size of 9 cm length and 10 mm thick. The skin becomes tight and all these symptoms indicate that it is going to cover itself with a silky cocoon. The process of spinning cocoon continues

for almost three days. After 7–8 days, the larvae changes into chrysalides, and the cocoons are collected by throwing them into boiling water, this kills the silkworms and also makes the cocoons easier to unravel. If the caterpillar is left to eat its way out of the cocoon naturally, the threads will be cut short and the silk will be useless. The cocoons are kept in hike warm water to remove the gum. Since all the eggs hatch almost the same time, the cocoons also be collected together and treated at the same period. Some amount of cocoons are retained and allowed to come out for fertilization. The females lay nearly 500 eggs and these eggs are stored till further requirement is wanted.

Description

Colour - Yellow
Size - 5 to 25 microns in diameter and 1,200 metre in length
Appearance - Fine, solid, smooth to touch
Solubility - Soluble in cuoxam, in cold dilute sulphuric acid.
Extra features- Hygroscopic in nature and has good elasticity and tensile strength.

Chemical Constituents

Silk mainly consists of protein known as fibrion. Fibrion is soluble in warm water and on hydrolysis yields two main amino acids, glycine and alanine.

Uses

Silk is used pharmaceutically in the preparation of sutures, sieves, and ligatures. The 'stiff silkworm' (dried body in the four to fifth stage of larva, which dies due to infection of the fungus *Beauveria bassiana*) is used in the traditional Chinese medicine. By Divesh verma Principal Sadbhavna college of Management & Technology

WOOL

Biological Source

Wool consist of hairs from the fleece of sheep *Ovis aries* Linn., belonging to family Bovidae.

Geographical Source

The worlds leading producers of wool are Australia (25%), China, and New Zealand (11%), while Turkey, Iran, India, and the United States (Texas, New Mexico) contribute to 2%.

Preparation

Wool is the fibre derived from the hair of animals of the Caprinae family, mainly sheep and goats. It is produced as the outer coat of sheep. The fibre obtained from domestic sheep has two qualities which differentiate it from hair or fur. The fibres have scales which overlap like shingles on a roof and it is crimped. The amount of crimp is directly proportional with the fineness of the wool fibres and the fine wool (like merino) have up to a 100 crimps per inch, whereas coarser wools (like karakul) have one or two crimps per inch. The hairs from sheep are removed during the shearing time. After shearing, the wool is separated into five main categories: namely fleece, pieces, bellies, crutchings, and locks. It is then cleaned from dirt and high level of grease (thus 'greasy wool') which contains valuable lanolin is present on the hair. The grease is generally removed for processing by scouring with detergent and alkali. The wool is then treated with hydrogen peroxide for bleaching, it is then washed properly and spreaded on wire nettings and dried under hot air.

Description

Wool is generally a creamy white colour but some of the breeds of sheep naturally produce black, brown (also called moorit) and grey coloured wool. The wool is smooth, elastic, slippery to touch and slightly curly. Diameter of wool varies from 15 μm (superfine merino) to 30 or 40 μm. The finer the diameters the greater its value is. Wool is soluble in warm alkaline solutions, but not in dilute or strong acids.

Chemical Constituents

Wool mainly consists of a sulphur containing protein called keratin. Keratin is composed of amino acid like cystine.

Chemical Tests

1. Solubility test: It is easily soluble in warm alkali.
2. Wool when treated with Con. Hydrochloric acid, it does not produce any effect but dissolves silk.
3. When treated with cuoxam solution, it does not dissolve but swells the wool and produces blue colour.
4. Solution of wool treated with lead acetate produces black precipitate due to high sulphur content.

Uses

i. It is used as a filtering aid and straining medium and in the manufacture of clothing, carpeting, felt and it is also used to absorb odours and noise in heavy machinery and stereo speakers.

Ii Adulteration.

Adultration – it may be defined as the mixing other matter of an inferior and sometimes harmful quality with food or drink intended to be sold. As a result of *adulteration,* food or drink becomes impure and unfit for human consumption.

Method of adulterating the drug

By – Divesh verma

1. Replacement by exhausted drug – costly drugs such as clove , saffron , tea etc. are exhausted for their active constituents and reused with genuine drugs after proper treatment.
2. Substituted with superficially similar but inferior drugs
3. Substituted with artificially manufactured substitutes
4. Substituted by sub –standard commercial verities.
5. Presence of organic matter from the same plant.