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REVIEW ARTICLE ON THE HERBAL DRUGS USED IN TREATMENT OF CANCER

Vaishnavi Suryawanshi*, Neha Raut, Shivani Tomar and Patel A. C.

Student, Mp Nagarsoga, Ausa, Maharashtra, India.

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***Corresponding Author**
Vaishnavi Suryawanshi
Student, Mp Nagarsoga,
Ausa, Maharashtra, India.

ABSTRACT

The cancer is most widely increasing disease in this entire world. chemotherapy, surgery, radiation therapy & hormone therapy can be used in the treatment of cancer but they have a lot of side effects like pain, fatigue, mouth problems, skin problems etc. Many of the classes of phytochemicals in herbal medicine are finding therapeutic use. The phytoconstituents are essential for a variety of therapeutic applications, and some exhibit anticancer activity. Scientists claim that phytochemicals modulate autophagy and apoptosis, which are involved in the pathobiology underlying cancer development and regulation. Many herbal medicine has antipyretic, analgesic, anti-inflammatory, and anticancer effects. In addition to its many therapeutic effects, herbal medicine is also used as a nutritional supplement to fight cancer and have anti-inflammatory effects. Numerous in vitro and in vivo herbal medicine studies on various cell lines have been reported. However, its mechanism of action remains unclear. in this review it was attempted to glance at the herbal drugs which can be used in treatment of cancer. This review focus on the herbal drugs, their active pharmaceutical ingredients & their structure.

KEYWORDS: The phytoconstituents are essential for a variety of therapeutic applications, and some exhibit anticancer activity.

INTRODUCTION

Cancer is a disease caused when cells divide uncontrollably and spread into surrounding tissues. The estimated number of cancer cases in India in 2022 was 14,61,427 (crude incidence rate: 100.4 per 100,000 people). In India, one in nine people will develop cancer in

their lifetime. Lung cancer and breast cancer were the most common cancer sites in men and women, respectively.

According to the National Cancer Registry Programme of the Indian Council of Medical Research (ICMR), an estimated incidence of cancer cases in India by different states and Union territories in 2020 was 13,92,179 and it increased to 14,26,447 in 2021 and 14,61,427 in 2022. Estimated mortality due to cancer in India was 7,70,230 in 2020 and it increased to 7,89,202 in 2021 and 8,08,558 in 2022. Several studies have shown that extracts from many herbal plants have anticancer effects both in vitro and in vivo.

It is strongly believed that because herbal medicines are natural, they have no serious side effects and are less likely to cause addiction. Numerous Chinese herbal medicines are being used in combination with chemotherapy or radiotherapy to improve the efficacy of cancer therapy and reduce side effects and complications. Biologically active compounds from medicinal plants often target tumor cells through a variety of mechanisms, resulting in carcinogenesis, angiogenesis, oxidative stress, induction of cell cycle arrest, as well as extrinsic and intrinsic factors. sexual apoptosis is inhibited. Allopathic medicines are synthesized in labs and have side effects ranging from mild to severe. This is not the case in Ayurvedic medicine because all the remedies are naturally made with natural ingredients that don't cause devastating effects on our health.

Research on herbs suggests they may help to.
Boost the immune system
Ease cancer symptoms
Reduce treatment side effects
Slow cancer spreading (metastasis)
Attack cancer cells

#Following drugs can be used in the treatment of cancer

1)vinca
2) turmuric
3) amla
4) ginkgo
5) arjuna bark
6) kalmegh

7) ispaghula

8) neem

9) guggul

10) ashwagandha

1)Vinca

Synonyms: Catharanthus Vinca rosea. Periwinkle.

Biological Source: It is the dried whole plant of Catharanthus roseus.

Family: Apocynaceae

Geographical Distribution: It is probably indigenous to Madagascar. It is cultivated in South Africa, West Indies, India, USA, Europe and Australia as an ornamental plant, as well as for its medicinal properties.

Organoleptic Characters

The leaves are green, roots are pale grey, flowers are violet pink-white or carmine-red in colour. The odour is characteristic and taste is bitter. Vinca is an erect, pubescent herb with branched tap-root. Leaves are simple, petiolate. ovate or oblong unicostate reticulate, entire, brittle with acute apex and glossy appearance. Flowers are bractate. pedicellate complete, hermaphrodite, normally 2 to 3 in cymose axillary clusters. Fruits are follicles with several black Seeds.

Fig:-vinca.

Chemical Constituents

A large number of indole alkaloids are present in vinca vincristine and vinblastine are most significant. Vinblastine contains indole alkaloid part calles catharanthine and dihydroindole alkaloid part called vindoline. The other alkaloids present in vinca are ajmalicine, lochnerine, serpentine and tetrahydroalstonine. It requires about 500 kg crude drug to extract out 1 g of vincristine, Vinca contains wide varieties of chemicals including the glycosides and alkaloids. The indole-indoline alkaloids are very important constituents.

Both vinblastine and vincristine have the same structures with the difference that in vinblastine there is N-methyl group while, in vincristine it is N-formyl group and both possess different activities. The other alkaloids are vindoline, vindolinine and catharanthine.

Uses

It is used as anticancer agent.

Used in treatment of leukemia and Hodgkin's disease.

Vinca also exhibits hypotensive and antidibetic actions.

Extraction of Vinca alkaloids

The dried leaf material is taken and is extracted with a solution of hot ethanol-water-acetic acid in a ratio of 9:1:1.

The solvent is removed and to the residue hot hydrochloric acid solution of 2% is added.

The pH of the acidic extract is adjusted to 4, for the precipitation of the non- alkaloidal components, which can be separated by filtration.

The pH of the aqueous acidic solution is now adjusted to 7 and then extracted with benzene.

The benzene layer is evaporated to obtain vinblastine and other alkaloids.

Isolation of Vinblastine and Vincristine

The phenolic materials are removed by the washing the extract with dilute alkali.

The washed extract is subjected to chromatography on alumina and elution is carried out in 18 fractions starting with benzene methylene chloride (65:35) mixture to pure methylene chloride.

Vinblastine recovered in the ninth fraction.

Further elution of the column results in separating the fractions of vincristine.

2) Turmuric

Synonym: Indian saffron, Haldi.

Biological source

Turmeric consists of dried, as well as fresh rhizomes of plant known as

Curcuma longa linn.

Family: Zingiberaceae.

Geographical source

West Pakistan, India, Malaysia and China

In India Maharashtra, Tamil Nadu, West Bengal, UP & Punjab

Chemical constituents

Curcumin

Curcuminiods

Cymene

Tumeron

Diarylheptanoids

EXTRACTION OF CURCUMIN

Curcumin is extracted from the dried roots of the Rhizome Curcuma Longs Curcumin can be extracted from the following Methods.

Conventional extraction using Soxhlet Soxhlet extractors piece of laboratory apparatus invented in 1879 by Franz von Soxhlet. It was riginally designed for the extraction of a liquid from a solid materal Typically Soxhlet extraction is used when a desired compound as a limited solubility in a solvent and the impurity is insoluble in that solvent it allows for unmonitored unmanaged operation while efficienty recycling a small amount of solvent to dissolve a larger amount of material.

ISOLATION

Powdered drug/juice + moisten drug with aqueous solution of K.CO,

Extract with CHCI,

Evaporate solvent

Extract with Dil. H_2SO_4

Acidic extract made alkaline by K_2CO_3

Atropine precipitate out

Crystallize by use of alcohol

Fig:-turmuric.

Uses

It is used as anticancer agent

It is used in the disorders of skin, joints, digestive system etc

It purifies the blood

Used as antiseptic

3) Amla

Synonym: Emblica, Indian goose berry, Embelic, Myrobalan.

Biological source: Dried as well as fresh fruits of the plant Emblica officinalis.

Family: Euphorbiaceae.

Chemical Constituents

Vitamin C

0.5% fat

Phyllemblin

5% Tannins

Phosphorus

Calcium

Iron

Pectin

Uses

1. Slows sown aging

2 Purifies the blood

4 Cures sore throat

5) Strengthans bones

6) used as anticancer agent

Fig:-amla.

Extraction of amla

The powder of amla was refluxed with 300ml of ethanol of ethanol for 48 hours filter with whatman N541 filter paper. The solvent was evaporated with rotary evaporator.

It is passed through sodium sulphate bed to remove moisture. "The final product is obstained

4) Ginkgo

Synonyms: Maiden hair tree, kew tree

Biological source: Dried leaves of Ginkgo biloba L.

Family: Ginkgoaceae.

Geographical source: China, USA, Japan, Europe, Australia.

Macroscopic characters

Colour: bright yellow flowers.

Leaves: bilobate

Chemical constituents

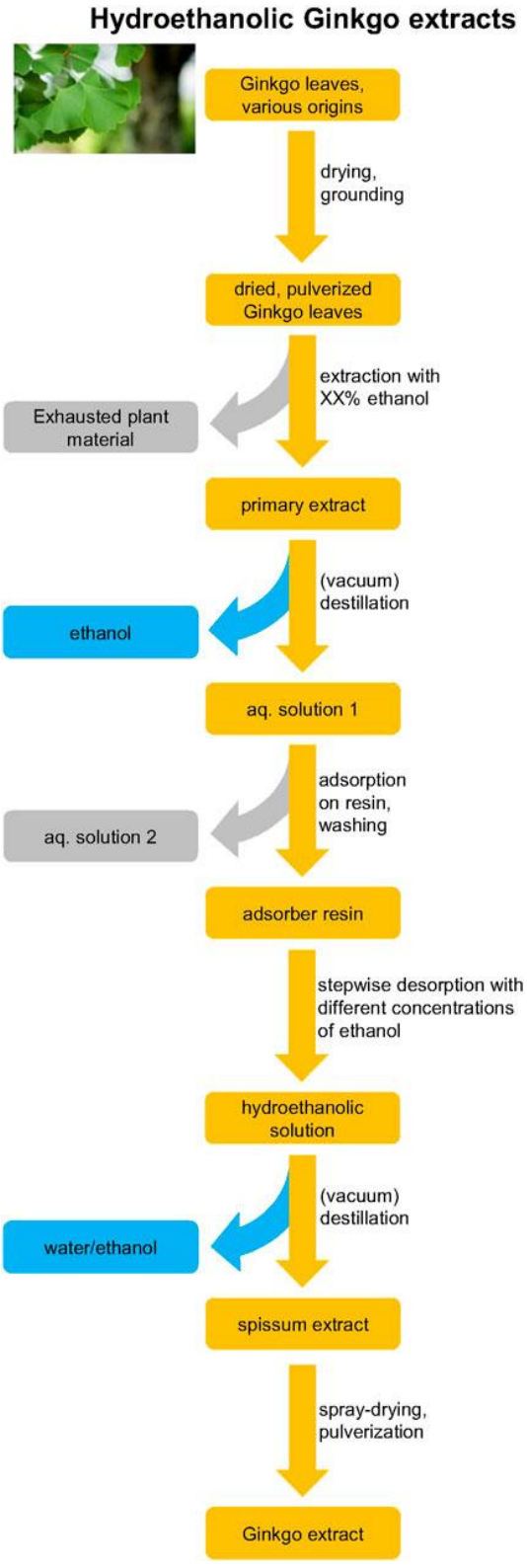
Ginkgolide, ginkgolide B, ginkgolide C, glycoside, shikimic acid, glucose, Caretenoids, alcohol, sterols.

Fig:-ginkgo.

Uses

1) Used as anticancer agent
2) May help improve memory
3) May prevent cognitive decline
4) May help prevent eye degeneration
5) May help reduce depression and anxiety
6) Can help lower blood pressure

Extraction of ginkgo



5)arjuna bark

Common name: Arjun

Botanical name: Terminalia arjuna

Family: Combretaceae

Parts used: Dried bark

Chemical constituents: Tannins; arjunglucosides; phytosterols; organic acids; sugars etc.

Uses: it is used as anticancer agent, Mild diuretic; astringent, tonic and febrifuge; beneficial effects in ischaemic heart disease.

Fig:-arjuna bark.

Extraction of arjuna bark

Terminalia arjuna bark is taken. Alcoholic extract is made. partition with dichloromethane is done. Residue is obtained(Flashevaporation). partition with ethyl acetate is done Residue is obtained (flash evaporation). By adding butanol the extract is obtained.

6) kalmegh

Synonyms: Andrographis, King of bitters, Chiretta; Bengal Chirata; Green Chirata; Kiryet

Biological Source: Kalmegh consists of leaves or entire aerial part of Androgra-phis paniculata Nees., belonging to family Acanthaceae.

Geographical source: It grows abundantly in southeastern Asia: India (and Sri Lanka), Pakistan and Indonesia but it is cultivated extensively in China and Thailand, the East and West Indies, and Mauritius.

Chemical Constituents

The plant possesses kalmeghin, a bitter crystalline diterpene lactone, such as, andrographolide flavonoids and phenols. The lactones isolated from Kalmegh are andrographolide, 14-deoxy-ll-oxo-andrographolide,

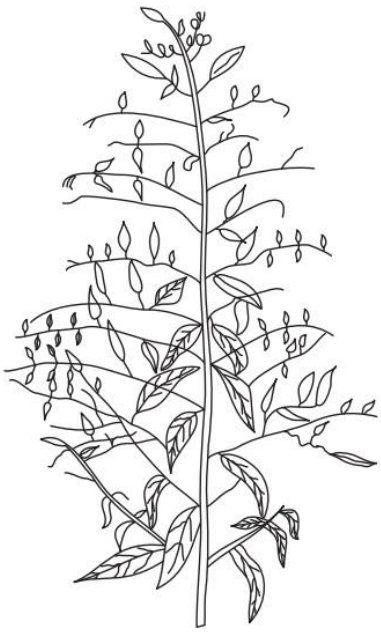
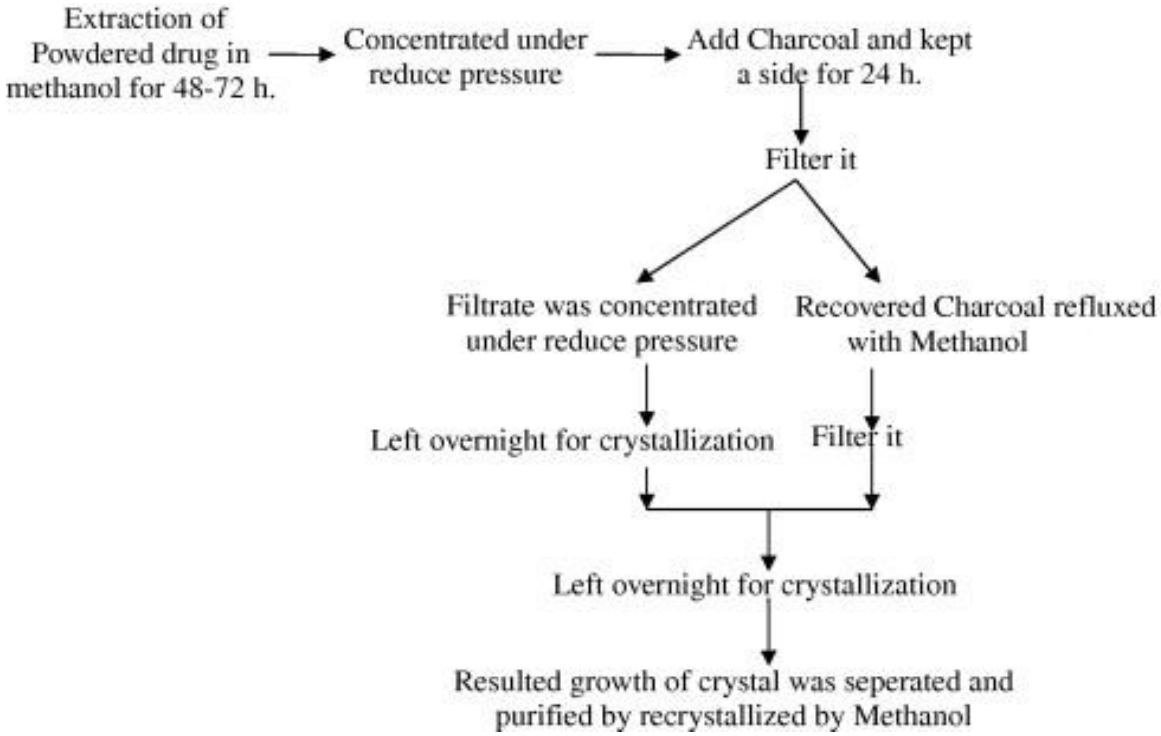


Fig: Andrographis Paniculata.

Uses:- Kalmegh has febrifuge, tonic, alterative, anthelmintic, astringent, anodyne, alexipharmic and cholagogue properties. It is useful in debility, cholera, diabetes, swelling, itches, consumption, influenza, piles, gonorrhoea, bronchitis, dysentery, dyspepsia, fever and in weakness. A decoction of the plant is used as a blood purifier and as a cure for torphid and jaundice. The pills prepared from macerated leaves and certain spices (e.g. Cardamom, Clove and Cinnamon) are given for stomach ailments of infants.

Extraction of andrographis paniculata



7) ispaghula

Synonyms: Ispaghula, Ispagol, Ishabgula, Spongel seeds.

Botanical Source

Ispaghula consists of dried seeds of Plantago ovata Forskal belonging to family Plantaginacce.

Geographical Source

Ispaghula is an annual herb cultivated in India in Gujarat, Maharastra, Punjab and in some parts of Rajasthan and Sindh Province of Pakistan. It is cultivated extensively around Sidhpur in north Gujarat.

Chemical constituents

Ispaghula seeds contain about 10% mucilage which is present in the epidermis of testa.

• Mucilage consists of two complex polysaccharides, of which one is soluble in cold water and the other soluble in hot water.

Chemically it is pentosan and aldobionic acid. Pentosan on hydrolysis yields xylose and arabinose and aldobionic acid yields galactouronic acid and rhamnose.

• Protein and fixed oil are present in endosperm and embryo.

Fig: Ispaghula.

Uses

It is used as anticancer agent

Ispaghula seeds are used as an excellent demulcent and bulk laxative in chronic constipation.

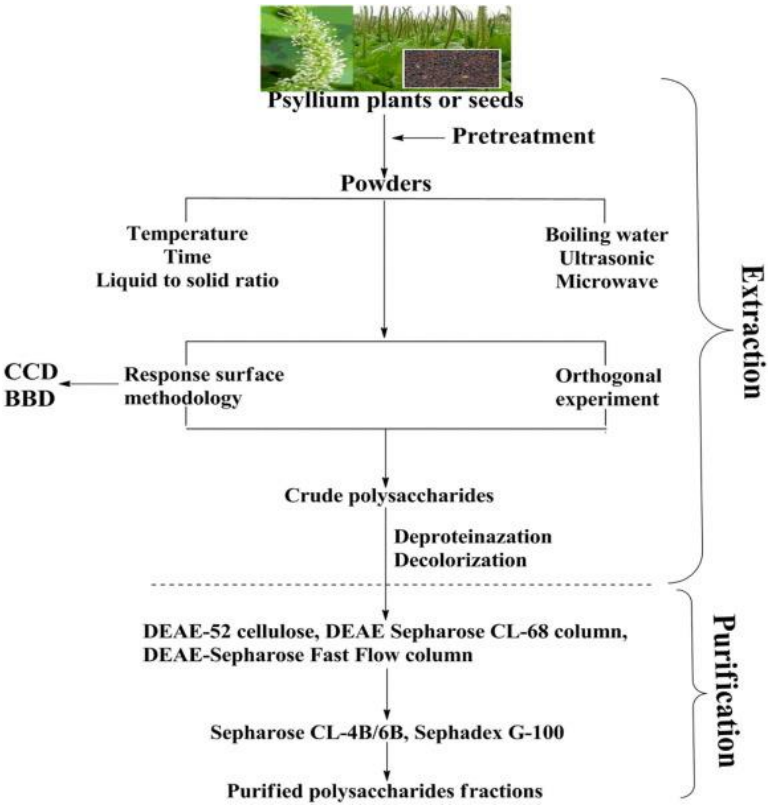
The laxative activity of ispaghula mucilage is purely mechanical.

It is also useful in dysentery, chronic diarrhoea, in cases of duodenal ulcers and piles.

It works effectively as a soothing agent.

Ispaghula husk is also used for similar purpose.

Extraction and isolation of ispaghula



8)Neem

Synonym: Melia azadirachta

Biological sources: It consists of leaves and other aerial parts of Azadirachta indica.

Geographical source: It is indigenous and widely grown in India

It grows in various tropical and subtropical regions

Chemical constituents

The active ingredients are Azadirachtin, Salannin and Meliantriol

Neem leaves contain Nimbosterol and Quercetin

Seeds contain Azadirachtin, Salanin, Meliantrol and Meliacin.

The trunk bark contains Nimbin, Nimbinin, Nimbidin, Nimbosterol and a bitter principle called Margosine.

Neem oil contains chiefly glycerides of Oleic (50%) and Stearic (20%) acids.

Fig:- Neem.

Uses

Used as anticancer agent

Beneficial for Skin

Beneficial for Hair

Beneficial for Dental Health

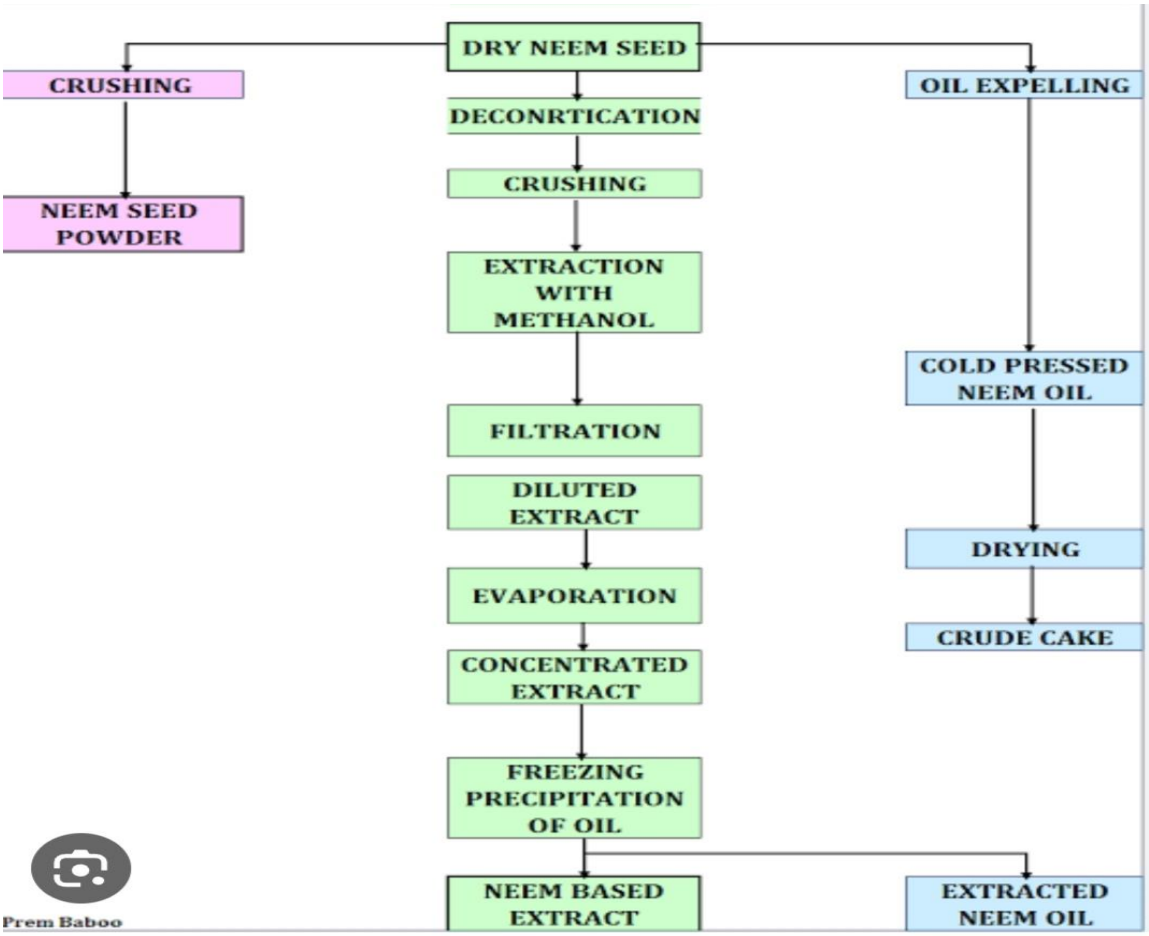
Boosts Immune System

Regulates Blood Sugar

Purifies Blood

Relieves Pain And Inflammation

Extraction of neem



9) guggul

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.

Geographical Source :The tree is a small, thorny plant distributed throughout India.

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.

Uses

Guggal significantly lowers serum triglycerides and cholesterol as well as LDL and VLDL cholesterols (the bad cholesterols). At the same time, it raises levels of HDL cholesterol (the good cholesterol), inhibits platelet aggregation, and may increase thermogenesis through stimulation of the thyroid, potentially resulting in weight loss. Also gum is astringent, aritirheumatic, antiseptic, expectorant, aphrodisiac, demulcent, and emmenagogue.

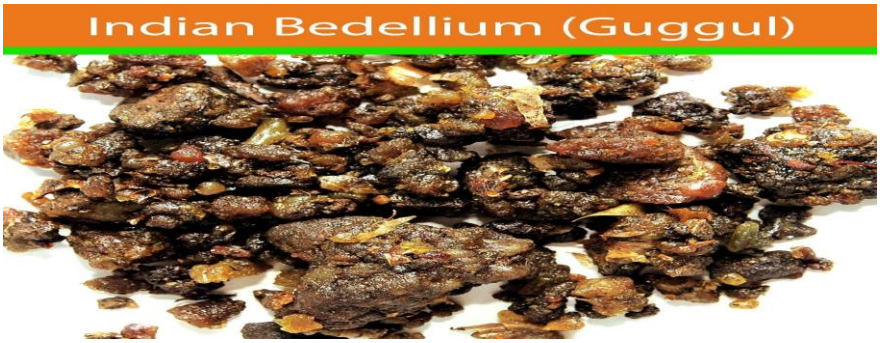


Fig:- Guggul.

Extraction of guggul

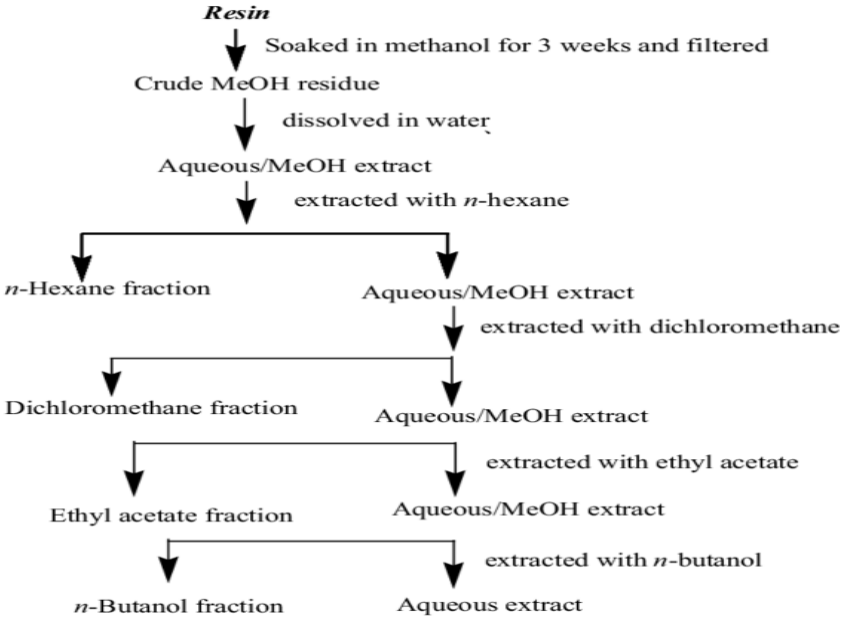


Fig:- guggul.

10) ashwagandha

BIOLOGICAL SOURCE

it consists of dried roots and stem bases of withana somnifera, belonging to family solanaceae.

geographical sourcemadhya pradesh, uttar pradesh punjab plains & n-w india like gujarat, rajasthan.

macroscopic characters:

colour: roots are buff to grey yellow odour: fresh roots smell similar to urine of horses(hence "ashwagandha")

taste: bitter

Chemical Constituents

Steroidal alkaloids:

Anaferin

Withanine

Tropine

Anahygrine

Cuscohygrine

Choline

Uses

Sedative and Hypnotic

Hypotensive, Respiratory stimulant action along with Bradycardia

Anticancer agent

Immuno-modulatory agent and having

anti-stress activity

Fig:-ashwagandha.

Extraction of ashwagandha

A process for extraction of Withanoside IV and Withanoside V from Ashwagandha (Withania sotnnifera) roots comprises following steps:- a) Sorting and sieving of roots to remove dust and contaminants;

b) pulverizing of roots to obtain pulverized powder;

c) cold extraction of pulverized powder of step (b) with polar solvent followed by centrifuging to obtain the residue,

d) subjecting to hot extraction of residue obtained in step (c) by adding it to polar solvent followed by refluxing and centrifuging;

e) collecting the filtrates of step (c) and step (d) after centrifugation, followed by distillation to obtain an extract;

f) adding and mixing methyl paraben IP, Propyl paraben IP, dicalcium phosphate anhydrous IP and Colloidal silicone Dioxide IP to the extract of step (e) to obtain pasty mass;

g) transferring the pasty mass of step (f) to evaporator, followed by stirring and heating to obtain granular powder of 30 to 60 mesh

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