ANTHELMINTIC STUDIES AND MEDICINAL HERBS – AN OVERVIEW

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ABSTRACT
Antihelminthics are drugs that expel parasitic worms from the body by killing them. Parasitic worms such as pinworms, roundworms, hookworms, threadworms, tape worms and filarial worms. The number of people suffering from worm infestation in developing countries runs in to millions. The medicinal herbs are used for helminthiasis are Artemisia absinthium, Adiantumcapillus, Cedrus deodara, Nerium indicum, Cassia angustifolia and etc., Some of the allopathic drugs also screened to treat the helminthiasis these are Albendazole, Mebendazole, Piperazine, Levamisole, Diethyl carbamazine.

Keywords: Helminthiasis, Artemisia absinthium, Adiantumcapillus, Cedrus deodara Albendazole, Mebendazole.

INTRODUCTION
The word “antihelmintic” is derived from the Greek “anti” means “against” and “helminis” meaning “worm”- which in effect means “to kill or destroy worms or parasites.” Antihelminthics or anthelmintics are drugs that expel parasitic worms (helminthes) from the body by either stunning or killing them. They may also be called vermifuges (stunning) or vermicides (killing). Vermicides means Kill a number of parasites including worms and protozoa found in the gut or elsewhere, including some found in the liver, spinal and cranial fluids. Vermifuges called as Expel the dead parasites and any associated debris, including fungal infections which may be caused by the die-off of the parasites from the body. Helminthiases is a macro parasitic disease of humans and animals in which a part of the body is infested with parasitic worms such as pinworms, roundworms, hookworms, threadworms, tape worms and filarial worms. Typically the worms reside in the gastrointestinal tract but may also burrow in to the liver or other organs. Worm infestation is one of the major global public health problems, more so in tropical countries. Besides the environmental conditions peculiar to tropics poverty, illiteracy, lack of adequate sanitary facilities and of pure water supply make total eradication of this problem is very difficult. In the case of schistosomiasis, enhancing the agricultural productivity by developing and expanding water conservation schemes, as created ideal breeding places for snails, the intermediate host, thus increase in the prevalence of schistosomiasis in the population. The number of people suffering from worm infestation in developing countries runs in to millions. The helminthes are multicellular organisms possessing three germ layers and exhibiting a bilateral symmetry. They are classified into two major phyla. Phylum Nemathelminthes (Roundworms: Nematodes), Phylum Platynecithelminthes (Flatworms: Cestodes and Trematodes).

Signs and Symptoms of Helminthiasis:¹
Abdominal pain, Diarrhoea, Fever, Fatigue, Enlarged Liver, Enlarged Spleen, Cough, Eosinophilia, Gastro intestinal inflammation, Malabsorption, Bowel obstruction, Anemia, dehydration, Skin symptoms, Chest Pain, Vomiting, Constipation, Itchy skin, Eye symptoms, malaise, Headache, Neurological problems, Irritability.

Causes:
The primary cause of helminthiasis is the result of transmission of an infectious disease. Some subtypes of this disease contagious spread easily between people. While other subtypes are infectious transmitted by a pathogenic organism.

Causes of broader categories of Helminthiasis:
Parasitic diseases: There are many different sizes of parasites including single cell protozoa and multicelled parasites like worms, flukes and even insects. Some other small parasitic creatures are called Filaria, richattias and spirochets. Fungi and yeasts are parasitic plants. Conditions Involving a Pathogen: Medical condition involving some type of pathogens such as viruses or bacteria.

Treatment:
Antihelminthics are drugs used in treatment of helminthiasis.
- The efficacy of the new drug can be gauged by counting the ova or eggs present in the stools.
- The efficacy of a drug against can only be judged by the appearance of the scolex in the stools.
- Patients suffering from multiple parasitic infestations are ideal for investigating a new anthelmintic drug claimed to have a broad spectrum of action.
In endemic areas, the main aim of antihelminthic treatment should be to reduce the load of infection below the level of clinical significance.

Complete parasitological cure is unnecessary and often not possible in achieving this safety and economic considerations must determine the choice of the drug is Mass Therapy.

### Table 1: Common Forms of Helminthiasis and Drugs Used In Their Treatment

<table>
<thead>
<tr>
<th>Helminth</th>
<th>Common Name</th>
<th>Drug of Choice</th>
<th>Alternative Drugs</th>
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<tbody>
<tr>
<td><strong>NEMATODES (Intestinal)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascaris lumbricoides</td>
<td>Roundworms</td>
<td>Albendazole, Mebendazole</td>
<td>Pyrantel, Piperazine</td>
</tr>
<tr>
<td>Ancylostoma duodenale</td>
<td>Hookworms</td>
<td>Albendazole, Mebendazole</td>
<td>Pyrantel, Thiabendazole</td>
</tr>
<tr>
<td>Enterobius vermicularis</td>
<td>Pinworm</td>
<td>Albendazole, Mebendazole</td>
<td>Pyrantel, Piperazine</td>
</tr>
<tr>
<td>Trichinella spiralis</td>
<td>Porkroundworm</td>
<td>Albendazole</td>
<td>Thiabendazole, Mebendazole</td>
</tr>
<tr>
<td><strong>NEMATODES (Somatic)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wucheraria bancrofti</td>
<td>Lymphatic filarial worm</td>
<td>Diethylcarbamazine</td>
<td>Ivermectin</td>
</tr>
<tr>
<td>Oncocerca volvulus</td>
<td>Oculodermal filarial worm</td>
<td>Ivermectin</td>
<td>Diethylcarbamazine</td>
</tr>
<tr>
<td>Oncocerca loaoa</td>
<td>Oculodermal filarial worm</td>
<td>Ivermectin</td>
<td>Diethylcarbamazine</td>
</tr>
<tr>
<td>Dracuncula medinensis</td>
<td>Guinea worm</td>
<td>Metronidazole</td>
<td>Mebendazole</td>
</tr>
<tr>
<td><strong>TREMATODES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schistosoma hematobium</td>
<td>Bloodflukes</td>
<td>Praziquantel</td>
<td>Metrifonate</td>
</tr>
<tr>
<td>Schistosoma mansoni</td>
<td>Bloodflukes</td>
<td>Praziquantel</td>
<td>Oxamniquin</td>
</tr>
<tr>
<td>Schistosoma japonicum</td>
<td>Bloodflukes</td>
<td>Praziquantel</td>
<td></td>
</tr>
<tr>
<td><strong>CESTODES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenia saginata</td>
<td>Beef tape worm</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>Tenia solium</td>
<td>Porktape worm</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>cysticerca cellulosae</td>
<td>Larva of tenia solium</td>
<td>Albendazole</td>
<td>Praziquantal</td>
</tr>
<tr>
<td>Diphyllobothrium latum</td>
<td>Fish tapeworm</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>Hymenolepis hana</td>
<td>Dwarf tape worm</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>Echinococcus granulosus</td>
<td>Hydatid larva</td>
<td>Albendazole</td>
<td>Mebendazole</td>
</tr>
<tr>
<td><strong>FLUKES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fasciola hepatica</td>
<td>Liver fluke</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>Clonorchis sinensis</td>
<td>Chinese liverfluke</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>Fasciola busci</td>
<td>Giant intestinal fluke</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
<tr>
<td>Paragonimus Westermani</td>
<td>Lung fluke</td>
<td>Praziquantel</td>
<td>Niclosamide</td>
</tr>
</tbody>
</table>

### Table 2: Mechanism of action of common antihelminthic drugs

<table>
<thead>
<tr>
<th>DRUGS</th>
<th>SITE</th>
<th>MECHANISM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neuromuscular transmission</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levimisole, pyrantel palmoate</td>
<td>A) Ganglionic nicotonic Ach receptors at neuromuscular junction</td>
<td>Stimulation produces persistant depolarisation resulting in muscular contracture/paralysis</td>
</tr>
<tr>
<td>Piperazine</td>
<td>B) GABA receptors at neuromuscular junction</td>
<td>GABA against causing hyperpolarisation and flaccid paralysis</td>
</tr>
<tr>
<td>Ivermectin</td>
<td>C) Glutamate-gated chloride channel at neuromuscular junction in invertebrates</td>
<td>causes tonic paralysis of microfilariae which are then immobilized and phagocytosed by RECELLS</td>
</tr>
<tr>
<td>Metrifonate</td>
<td>Acetyl cholinesterase</td>
<td>inhibition,causing muscular contracture</td>
</tr>
<tr>
<td>praziquantel</td>
<td>Cell membrane</td>
<td>increase the calcium influx leading to muscular contracture</td>
</tr>
<tr>
<td>benzimidazole, mebendazole, albendazole, thiabendazole</td>
<td>microtubules in cytoskeleton</td>
<td>Block the transport secretory granules and movements of other sub-cellular organelles.</td>
</tr>
<tr>
<td>Niclosamide</td>
<td>mitochondria</td>
<td>inhibition of anaerobic phosphorylation of ADP leading to death</td>
</tr>
</tbody>
</table>

Drug therapy of worms (Allopathic)
Piperazine:
This drug is used in therapy of ascariasis and enterobiasis. Adverse reactions: Piperazine has wide margin of safety. Adverse effects are rare and they include nausea, vomiting, diarrhea, urticaria. Neurotoxic effects have been observed rarely they include vertigo, muscular in coordination, hypotonic, ataxia. Convulsions are very rare. This drug appears to be safe during pregnancy.

Mebendazole:
It is a benzimidazole derivative and a broad spectrum antihelminthic. It is effective in ascariasis, enterobiasis, trichuriasis and hook worm infestation. It is effective in vivo against the larvae of trichinella spiralis and exerts lethal effects on the germinal membrane of the larva of echinococcus granulosus (hydatid worm). It also has some action against s.stercoralis

Adverse Reactions: It causes abdominal pain, nausea and diarrhea. Very large doses may cause vertigo, dizziness, and headache. It should be avoided in pregnancy.

Albendazole:
It is a broad spectrum benzimidazole derivative. It is effective in hydatid diseases, ascariasis, trichuriasis and ankylostomias. Its major advantage is effective against many common intestinal worm.

Adverse Reactions: Reactions are mild mainly GI disturbances. When used in hydatid disease for long time therapy. It may cause alopecia, liver damage and bone marrow depression.

Pyrantel Pamoate:
It is highly effective against Round worms and E.vermicularis and less effective against hook worms.

Adverse Reactions: They include Anorexia, nausea, Vomiting, Diarrhoea, Headache, Abdominal pain.

Levamisole:
It has immunostimulant properties. It is effective in ascariasis, hookworms. It is also effective against TrichoStrongyliasis.

Adverse Reactions: They are usually mild and includes nausea, vomiting, abdominal pain, drowsiness.

Drug Therapy of Hook Worms:
A duodenal infestation is extremely common in tropical countries and represents in important cause of iron deficiency anemia. The infestation often exists along with ascariasis. In such situations, it is preferable to treat ascariasis first, as drug used solely against ancylostomiasis may irritate the round worms causing their migration or their aggregation into ball like masses. The former may lead to invasion of the bile duct and the liver. Hence the drug effective against both the roundworms and hook worms are to be preferred.

Bephenium Hydroxy Naphthoate:
It is effective in removing round worms and hook worms of the species Ancylostomaduodenale. It is less effective against Necator Americans. The drug has moderate effect against whipworms and trichostrongylus orientalis.

Adverse Reactions: It includes Nausea, vomiting and Diarrhoea.

Drug therapy of Strongyloidiasis:

Thiabendazole:
The drug is benzimidazole derivative and it has broad spectrum of activity. It is effective against round worms and Hook worms, pin worms and strongyloid worms.

Adverse Reactions: They include skin reactions, anorexia, nausea, vomiting, fever and epigastric distress. Other effects are hypoglycemia, liver damage and crystalluria.

Drug Therapy of Trichuriasis (Whip Worm):
Trichuriasis caused by Trichuristrichura is frequently encountered along with round worms and hook worms. Trichuriasis is acquired after consumption of food contaminated with parasite eggs. Children are usually susceptible and develop anemia. Rarely, the worms may lodge in the appendix or may penetrate the bowel wall and cause peritonitis. The drugs preferred to treat Trichuriasis are Albendazole and Mebendazole.

Drug Therapy of Filariasis:

DiethylCarbamazine:
The drug is Piperazine derivative, inactive invitro, leads to a rapid disappearance of microfilariae of wucherariabancrofti, b.malayi and loalaoa from the human peripheral blood. The microfilariae of wucherariabancrofti in a hydrocoele, however are not affected. The drug kills the adult worms of b.malayi and loalaoa and possibly those of Wucherariabancrofti. The drug has no action against the adult worms of o.volvulus and it has some action in ascariasis.

Adverse Reactions: They include nausea, anorexia, vomiting, headache and drowsiness, allergic reactions, fever, muscular pains, skin rashes and tachycardia.

Ivermectin:
It was originally obtained from streptomycesavermitilis found in the soil sample of a Japanese, golf course. This macrocyclic lactone has been found to be highly effective against a broad range of parasites and arthropods and is extensively used in veterinary medicine. It is the drug of choice in onchocerciasis. The drug has no lethal effect against adult worms.

Adverse Reactions: It causes less severe and fewer systemic and ocular adverse reactions. These are mostly due to the death of microfilariae which causes ocular inflammation that may lead to blindness. Commonly it may cause itching, skin edema, arthralgia, headache and fever.

Drug Therapy of Guinea worm:

Available online at www.globalresearchonline.net
Dracunculus medinensis infestation is transmitted by drinking of water containing infected Cyclops (water flea). The adult female usually remains in the subcutaneous tissue and may come out through a small ulcer, usually on the foot. Metronidazole has been shown to be effective in this condition. The important treatment of arecontiasis, as in any other worm infestation, is preventive. This is very simple as the intermediate host, Cyclops can easily be filtered out from the drinking water by using a piece of cloth.

**Drug Therapy of Tape Worms:**

This infestation is transmitted by ingestion of infected beef or fork and can be prevented by avoiding the ingestion of suspected meat or by it’s through cooking.

**Niclosamide:**

This drug is effective in Tenia saginata, Tenia solium, D. latum, and H. nana infestations. Niclosamide is a vermicidal drug. The segments of the worm which are voided after its administration are partially digested by the action of the intestinal proteolytic enzymes; this makes the identification of the scolex impossible. Identification of the scolex is important when treating tenia solium infestation, as cysticercosis, that is harboring of the larval forms (cysticerci) in the tissues of the host may develop if the infestation is completely eradicated. Niclosamide is not effective against cysticercosis. Hence in the treatment of infestation with tenia solium praziquantel is preferred.

**Praziquantel:**

It is the drug of choice in teniasis and it is highly effective against intestinal teniasis, tenia saginata, tenia solium, D.latum infestations in humans, as well as in cysticercosis of the brain.

**Drug therapy of Schistosomiasis:**

Schistosomiasis is caused by blood flukes that parasitize the venous channels of the definitive host. The three common species are S. hematobium, S.mansoni, S. japonicum. Man and domestic animals acts as a host for schistosomes.

**Praziquantel:**

It is effective against all species of Schistosomes found in man at all ages and in all areas. It is effective against liver, lung and intestinal flukes as well as against cestodes causing teniasis and cysticercosis.

Adverse reactions: It includes dizziness, somnolence, and abdominal pain. Rarely does it cause hallucinations and seizures.

**Metrifonate:**

It is effective only in S.hematobium infestations.

Adverse Reactions: They are usually mild and transient. They consist of Gl disturbances, weakness, dizziness, and vertigo.

**Drug therapy of Flukes:**

**Praziquantel:**

This drug has revolutionized the treatment of infestation with these parasites. It is highly effective against liver, lung and intestinal flukes.

**Thiabendazole:**

It is also useful for liver and lung flukes.

**Drug Theraphy of Pin worms:**

E.vermicularis is a common parasite found in the ceacum and the verminform appendix. The infestation is more common in children. The gravid female worm deposits eggs on the perianal skin leading to intense itching. Scratching of this region may lead to auto infection by ingestion of ova carried under the nails. To prevent this, patients should be advised to trim the nails and wash the hands thoroughly before the meals. Symptomatically, an antihistamanic cream applied around the anus relieves itching. Infection can also occurred through under clothing, bed linen, lavaratory contamination and water contamination. Besides the drug theraphy, additional measures are desirable in resistant cases. At nights the patients should wear pants under the pyjamas, and gloves which can be boiled. Mebendazole, albendazole, piperazine are the drugs used for the treatment of pinworms.

**DESCRIPTION OF ANTIHELMINTHICS MEDICINAL HERBS:**

**Adiantum capillus:**

Synonym: maidenhair fern, lady fern.
Botanical name: *Adiantum capillus*
Scientific Classification:
Kingdom- Planate
Division- Pteridophyta
Class- Pteridales
Family- Adiantaceae
Genus- Adiantum
Species- A. capillus-veneris

Plant description: Maidenhair is small creeper, slender, branched and having entirely marginal with single broad tooth near base. The leaves are green fronds segmented into pinnae 5-10mm long and wide. This shorter creeper grows to 20-70cms tall in height.

Chemical constituents: Adiantone, Adiantoxide, Carotenes, Coumaric acid, Quercetins, Quinic acid, Rutin, Caffeic acids.

Parts used: Leaves and Rhizomes

**Artemisia absinthium:**

Synonym: Wormwood, Wermut.
Botanical Name: *Artemisia absinthium*
Scientific Classification:
Kingdom- Planate
Order- Asterales
Family- Asteraceae
Genus- Artemisia
Species- A.absinthium

Plant description: Wormwood is herbaceous perennial plant having hard rhizome the stem of wormwood plant is erect growing to 1.5m tall. The leaves are arranged spirally with upper part green and lower part white in colour. The leaves are covered with silver white trichomes, growing up to 25cm long and have bipinnate or tripininate petioles. The flowers are pale yellow bearing in cluster in spherical bent down heads.

Chemical constituents: Volatile oil which contains Thujone, Alcohol, Pinene, Phellandrene.

Parts used: Dried leaves.

**Cinnamomum camphor:**

Synonym: Camphor tree, Gum camphor, camphor laurel.
Botanical name: *Cinnamomum camphor*
Scientific Classification:
Kingdom- Planate
Subkingdom- Tracheobionta
Superdivision- Spermatophyta
Division- Magnoliophyta
Class- Magnoliopsida
Subclass -Magnoliidae
Order- Laurales
Family- Lauraceae
Genus- Cinnamomum
Species- Cinnamomum verum

Plant description: Cinnamon is from a tropical ever green tree of the laurel family growing up to 7m(56feet) in its wild state. It has thick scabrous bark, strong branches, young shoots, speckled greeny orange. The bark is smooth and yellowish. The leaves are ovate, petiolate, deeply veined leaves that are dark green on top, light green underneath. They become leathery when mature upper side shiny green, under side lighter. When bruished they smell spicy and have a hot taste. The flowers are yellowish white with disagreeable odour that bears dark berries. The fruit is an oval berry like an acron in its receptical is bluish when ripe with white spots on it, bigger than a blackberry.

Chemical constituents: Cinnamaldehyde, mannitol, coumarins, gum, tannins, essential oils (aldehyde, eugenol, pinene).

Parts used: Roots, wood.

**Cedrus deodara:**

Synonym: Deodar, Devdar, Himalayan deodar.
Botanical Name: *Cedrus deodara*
Scientific Classification:
Kingdom- Planate
Division- Pinophyta
Class- Pinopsida
Order- Pinales
Family- Pinaceae
Genus- Cedrus deodara

Plant description: It belongs to pine family and are conical in shape growing to height of 30-40 feet having scanty wood, thick ridged bark and broad branches. The leaves of cedar are evergreen appearing needle like 80-50mm long, arranged on shoots in bright green to dark green colour. The seeds and cones are barrel shaped in green-grayish colour, 6-12cm long and 3-9cm broad. The seeds of cedar are 10-14mm long having numerous resin blisters and contain resin like substances.

Chemical constituents: Alkaloids, Oils, resins, tannins, phosphorus, calcium.

Parts used: Woods and Leaves.

*Gmelina arborea:*

Synonym: Gmelina.
Botanical Name: *Gmelina arborea*
Scientific classification:
Kingdom- Planate
Order- Asterales
Family- Lamiales
Genus- Gmelina
Species- G. arborea

Plant description: Gmelina is deciduous tree growing to 3cm tall in height having chlorophyll layer on the outer bark. The leaves of this tree are found to be 4-9 inches long and 2-5 inch broad with opposite petioles and broadly ovate blade at the base. The flowers are in racemes, tubular, two lipped and yellow to brownish with four stamens. The fruit is yellow fleshy ovate berry of 3cm long and 25cm wider.

Chemical constituents: Oils, resins, alkaloids, benzoic acid, tartaric acid, butyric acid.

Parts used: Roots, fruits, leaves and flowers.

*Malottus philipensis:*

Synonym: kamala, kamala tree.
Botanical Name: *Malottus philipensis*
Scientific classification:
Kingdom- Planate
Division- Magnoliophyta
Class- Magnoliopsida
Order- Malpighiales
Family- Euphorbiaceae
Subfamily: Acalyphoideae
Tribe- Acalypeae
Genus- Mallotus
Species- M. philipensis

Plant description: The height reaches up to 10m and the leaves are 1-2inches long, alternate, ovate. The branches are straight slender with pale bark and flowers are dicous arranged in male and female together in the axils of small bracts. The plants also consists of trilobed small capsule of peasize having minute glands and bearing small hairs. The capsules are odour less, tasteless but used in various purposes.

Chemical constituents: Rottlerin, gum, volatile oil, tannic acid, wax, yellow and red resins.

Parts used: leaves, seeds and bark.

*Nerium indicum:*

Synonym: Indian oleander, excile tree.
Botanical Name: *Nerium indicum*
Scientific classification:
Kingdom- Planate
Division- Magnoliophyta
Class- Magnoliopsida
Order- Malpighiales
Family- Euphorbiaceae
Subfamily: Acalyphoideae
Tribe- Acalypeae
Genus- Nerium
Species- N. indicum
Botanical Name: *Nerium indicum*
Scientific Classification:
Kingdom- Planate
Division- Tracheophyta
Class- Magnoliopsida
Order- Gentianales
Family- Apocynaceae
Genus- Nerium
Species- *N. indicum*

Plant description: Nerium is evergreen shrub that grows up to the height of 4m and bearing leaves all the year around. The leaves are long, linear, lanceolate, 10-15cm in length with horizontal nerves. Flowers are hermaphrodite, white, pink or red in colour, sweet smelled and 4-5cm in diameter. Fruits of nerium are long about 15-20cm, cylindrical and paired growing with the stem. Seeds contained in fruits are numerous, compressed and white in colour having smooth hair.

Chemical constituents: Glycosides, Tannin, Oleandrin, Neriin, Volatile oil, phytosterin, Neriodorin, Neriodorein.

Parts used: Roots, leaves.

*Oxalis corniculata:*

Synonym: yellow wood sorrel, Indian sorrel.
Botanical Name: *Oxalis corniculata*
Scientific Classification:
Kingdom- Planate
Subkingdom- Tracheobionta
Division- Magnoliophyta
Class- Magnoliopsida
Order- Fabales
Family- Oxalidaceae
Genus- Oxalis
Species- *O. corniculata*

Plant description: The branches of wood sorrel are erect, creeping about 30cm long borne with small hairs while the roots are fibrous and branch. The leaves are small, slightly ovate and about 4-12cm long and 10-20mm broad.

The flowers are inflorescence yellow growing in clusters of 1-6 petals are 6-7m long.

Chemical constituents: Water, fat, protein, iron, niacin, carbohydrates, betacarotene, Vitamin C, phosphorous.

Parts used: Flowers, leaves.

*Pongamia pinnata:*

Synonym: Indian beech, pongam oil tree.
Botanical Name: *Pongamia pinnata*
Scientific Classification:
Kingdom- Planate
Division- Magnoliophyta
Class- Magnoliopsida
Order- Fabales
Family- Fabaceae
Genus- Pongamia
Species- *P. pinnata*

Plant description: *Pongamia pinnata* is deciduous legume tree growing to 15 to 18 feet in height with widely diffused canopy. The leaves of Indian beach tree are soft and lustrous. While the colour changes to green when it matures. The flowers are white, pink or purple born in clusters throughout the year on the branches. This is a potent nitrogen fixation plant having dense roots and thick tap root which promotes nitrogen fixation.

Chemical constituents: Glabrin, Pongamol, alkaloids, kanjone, Saponin, Pinnatin, Neoglabrin parts used.

Parts used: Roots, leaves, Bark, flowers, Seed oil.

*Cassia angustifolia*
Synonym: Indian senna, senna.

Botanical Name: *Cassia angustifolia*

Scientific Classification:
- Kingdom: Plantae
- Division: Angiospermae
- Order: Fabales
- Family: Fabaceae
- Subfamily: Caesalpinioideae
- Tribe: Cassieae
- Subtribe: Cassinae
- Genus: *Cassia*
- Species: *C. angustifolia*

Plant description: It is small shrub while in some species, *senna* grows into small tree and the leaves are lanceolate, compound and leaflets are opposite. The flowers are yellow and white in colour having five petals similar to each other.

Chemical constituents: Sennacrol, senapicrin, rhein, alo-emodin, glucoside, chrysophoric acid.

Parts used: Dried leaves, pods.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Family</th>
<th>Chemical Constituents</th>
<th>Parts used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barbadosaloe, Commonaloe, yellowaloe</td>
<td>Aloe vera</td>
<td>Asphodeceae</td>
<td>Pectic Acid, Anthrones, Glucomononans, Anthroquinones</td>
<td>Leaves</td>
</tr>
<tr>
<td>2</td>
<td>Garlic</td>
<td>Allium sativum</td>
<td>Alliaceae</td>
<td>Pungent, essential volatile oils, allisin, diallylisulphide</td>
<td>Bulb</td>
</tr>
<tr>
<td>3</td>
<td>Abutilon, Indian mallow</td>
<td>Abutilon indicum</td>
<td>Malvaceae</td>
<td></td>
<td>Whole plant</td>
</tr>
<tr>
<td>4</td>
<td>Dill, Dillweed, garden dill</td>
<td>Anethum graveolens</td>
<td>Apiaceae</td>
<td></td>
<td>Fruits, leaves</td>
</tr>
<tr>
<td>5</td>
<td>Gaitswallow wort, Milkweed</td>
<td>Calotropis procera</td>
<td>Asclepiadaceae</td>
<td>Yellow bitter resin, black acid resin, calotropin</td>
<td>Barks, roots and whole plant</td>
</tr>
<tr>
<td>6</td>
<td>Coffeesenna, Coffeeweed, Poetid cissia</td>
<td>Cassia occidentalis</td>
<td>Fabaceae</td>
<td>Aloe-emodin, anthrones, Apigenin, linolenic acid, manitol</td>
<td>Roots, seeds, leaves</td>
</tr>
<tr>
<td>7</td>
<td>Abuta, velvet leaf</td>
<td>Cissampelospareira</td>
<td>Menispermaceae</td>
<td>Arachidic acid, Bebeerine, cissamine, bulbocapnine</td>
<td>Roots, barks, leaves</td>
</tr>
<tr>
<td>8</td>
<td>Cucumber</td>
<td>Cucumis sativus</td>
<td>Cucurbitaceae</td>
<td>Water, linoleic acid, palmitic acid, Oleic acid</td>
<td>Fruits, seeds, leaves</td>
</tr>
<tr>
<td>9</td>
<td>Velvety beauty berry, Bastra</td>
<td>Calicarpama crophylla</td>
<td>Verbenaceae</td>
<td></td>
<td>Fruits, seeds, leaves, Wood</td>
</tr>
<tr>
<td>10</td>
<td>Embelia, Falseblackpepper</td>
<td>Embeliarbes</td>
<td>Myrsinaceae</td>
<td></td>
<td>Barks, Berries, Leaves, Roots</td>
</tr>
<tr>
<td>11</td>
<td>Gentian, bitter root, Butterwort</td>
<td>Gentianavema gerntianacea</td>
<td>Gentianaceae</td>
<td>Glycosides, gentiopicrin, Amarogentin</td>
<td>Roots, leaves</td>
</tr>
<tr>
<td>12</td>
<td>Clove-tongue, Christmas plant</td>
<td>Helleborus niger</td>
<td>Ranunculaceae</td>
<td>Helleborin, Helleborcin, resin, Fat and starch</td>
<td>Dried, Rhizomes</td>
</tr>
<tr>
<td>13</td>
<td>East Indian Scadtree, Nutleaved scad tree</td>
<td>Helicteresiosa</td>
<td>Sterculiaceae</td>
<td></td>
<td>Roots, barks, fruits</td>
</tr>
<tr>
<td>14</td>
<td>Black walnut</td>
<td>Juglans nigra</td>
<td>Juglandaceae</td>
<td>Tannins, volatile oil, vitamin c, Betacarotene, omega-3 fatty acids</td>
<td>Wood, barks, fruits</td>
</tr>
<tr>
<td>15</td>
<td>Moringa, horseradish tree, drumstick tree</td>
<td>Moringa oleifera</td>
<td>Moringaceae</td>
<td>Palmitic acid, Stearic acid, Moringine, Moringinine</td>
<td>Fruits, Seeds, leaves</td>
</tr>
<tr>
<td>16</td>
<td>Bulletwood tree, indianmedaller</td>
<td>Mimusopshengi</td>
<td>Sapotaceae</td>
<td></td>
<td>Barks, flowers, seeds, fruits</td>
</tr>
<tr>
<td>17</td>
<td>Chirpina, three leaved pine</td>
<td>Pinus roxburghii</td>
<td>Pinaceae</td>
<td>Oleoresin, oil</td>
<td>Wood</td>
</tr>
<tr>
<td>18</td>
<td>Indian podophyllum, Himalayan may apple</td>
<td>Podophyllum emodi</td>
<td>Berberidaceae</td>
<td></td>
<td>Rhizomes, roots, fruits</td>
</tr>
<tr>
<td>19</td>
<td>Cloves</td>
<td>Syzygium aromaticum</td>
<td>Myrtaceae</td>
<td>Eugenol, triterpene, oleanolic acid</td>
<td>Whole clove</td>
</tr>
<tr>
<td>20</td>
<td>Groundsel, simson, Ragwort</td>
<td>Senecio vulgaris</td>
<td>Asteraceae</td>
<td>Senecin and senicin</td>
<td>Dried herbs</td>
</tr>
<tr>
<td>21</td>
<td>Tansy, mugwort</td>
<td>Tanacetum vulgare</td>
<td>Asteraceae</td>
<td>Thujone, Bitter glycosides, Terpenoids, Sesquiterpene</td>
<td>Aerial parts</td>
</tr>
<tr>
<td>22</td>
<td>Thyme</td>
<td>Thymus vulgaris</td>
<td>Labiatae</td>
<td>Phenols, thymol, Cineol, cymene, Borneol, esters, carvacol</td>
<td>Dried leaves and stem</td>
</tr>
<tr>
<td>23</td>
<td>Fennel, fenkel, sweet fennel</td>
<td>Foeniculium vulgare</td>
<td>Apiaceae</td>
<td>Limonene, fenchone, seeds also contain fibre and complex carbohydrates</td>
<td>Seeds, Leaves, Roots, oil</td>
</tr>
</tbody>
</table>

Table 3: List of Medicinal Herbs Used For Antihelminthics

6 Available online at www.globalresearchonline.net
CONCLUSION

Antihelminthics or anthelmintics are drugs that expel parasitic worms (helminthes) from the body by either stunning or killing them. They may also be called vermifuges (stunning) or vermicides (killing). The worms causing helminthiasis are Round worms, Hook worms, Tape worms, Pin worms, Whip worms e.t.c. The medicinal herbs used for helminthiasis are Artemisia absinthium, Adiantumcapillus, Cedrus deodara, Nerium indicum, Cassia angustifolia e.t.c. Some of the allopathic drugs used to treat helminthiasis are Albendazole, Mebendazole, Piperazine, Levamisole, Diethyl carbamazone.

REFERENCES