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PHARMACOLOGICAL AND PHYTOCHEMICAL PROFILE OF HOLOPTELEA

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ABSTRACT

H. integrifolia, a plant used in traditional medicine and boasts and impressive array of pharmacology activities including anticancer, anti-inflammatory, anti-ulcer, anti-microbial, anthelmintic properties, anti-diabetic. The plant contains bioactive compound including flavonoid, alkaloid and glycosides are believed to contribute to its therapeutic properties. Mechanism of action is thought to involve the modulation of various signing pathways. These review aims to provide comprehensive overview of H. integrifolia pharmacological activity, highlighting its protentional as a natural remedy for various diseases. Further research direction and protentional application of plant botanical description are also discussed.

KEYWORDS: H. integrifolia, phytoconstituent, botanical description, ethnomedical uses, pharmacological activities.

INTRODUCTION

Plants have important role serve as medicine to human beings from very old time. Most of the medicinally useful compounds are obtained from plants. Medicinal plants, also called as medicinal herbs. Since, globally plants are much role in various medicinal agents. There are approximately 3, 82,000 accepted plant species on earth. According to WHO (world health organization) some source also estimated that up to 50,000 plant species may have potential medicinal properties, but further research is needed. Some source estimated that up to 6000-7000 plants species in India have medicinal properties, but only around 1500 to 2000 have been thoroughly studied and documented.

There are many traditional systems namely Ayurveda, Unani, Siddha, Homeopathy, Chinese and so forth. In traditional system, plants are good source as well as cost effective and fewer side effects. As per WHO, nearly 80% of population living in developing countries trust on traditional medicines for their primary healthcare need. Traditional medical practices concerned as an essential part of culture in many emerging countries.

Holoptelea Integrifolia Planch (family: *Ulmaceae*) is one of the most popular medicinal plants which primarily used to treat intestinal cancer, malaria, chronic wounds, rheumatism.

Botanical Description

Holoptelea Integrifolia originated from pacific island. This tree found in tropical regions of Asia, such as Nepal, India, Sri Lanka, China, Myanmar, Cambodia. In India, Indian Elm Tree observed in various region. Approximately up to altitude of 660m, lower ranges of Himalaya from Jammu to Awadh, forest of Dehradun, Orissa, Nagpur, West Bengal hills, Eastern slops of north circus also found or obtained in tropical region of Africa.

FIGURE NO.1.

- **Taxonomical Status**

1. Family: *Ulmaceae*
2. Genus: Holoptelea
3. Species: Integrifolia
4. Kingdom: Plantae
5. Class: Dicotyledons

6. Subclass: Polypetalae
7. Order: Rosales

- **Plant Description**

H. Integrifolia it is a large, smooth, deciduous, propagating tree. Which tree contain more medicinal active agent like, Holoptelin-A, Holoptelin-B, Alkaloids etc.

Bark is a whitish-grey in color with 6-8mm thick. Fruit is circular Elm with two membranous wings, and 2.5 to 3.5 cm long and 2.5cm wide. Leaves elliptic-ovate, base rounded, narrowly triangular. Flowers are lightly green or purple in color. Flowering occurs in February – March and fruit march onwords. Wood is yellow, interlocked-grained, medium and even textured, mildly heavier and strong. When crushing the leaf or cutting the bark produced an unpleasant odour.

- **Vernaecular Names**

H. Integrifolia it is a scientific name. It has many common names depending on the people spoken in particular region. The name used in different languages is presented on following table.

Table 1: Vernacular names of Holoptelea Integrifolia.

Language	Vernacular Names
PUNJABI	Rajain, Khulen, Aval
MARATHI	Vavala, Vavli, Bawal, Papra
HINDI	Papri, Kanju, Bawal, Dhamna, Chirabil
ENGLISH	Indian Elm, Jungle cork tree, Indian beech tree
SANSKRIT	Chirivilva, Pootikaranja, Markati, Karabhanji.
MALYALAM	Aavli, Aval
TELUGU	Pedanevilli, Nali

Phytochemistry of Holoptelea

Phytochemicals are chemical compound produced by plants, widely reduce or resist fungi, bacteria, and virus infections. Different parts of this plant such as fruit, leaves, flower, stem, heartwood, bark, pollen, and root are the source of various phytochemicals. Holoptelea integrifolia is characterized by a diverse range of phytochemical constituent.

Various compounds are detected such as terpenoids, alkaloids, glycosides, carbohydrates, steroid, saponins, tannins and protein. Different Phytoconstituent produced by different part of H. Integrifolia plant mentioned on following table.

Table 2: phytochemicals of H. integrifolia.

Part of plant	Phytoconstituents
BARK	Holoptelin-A, Holoptelin-B, Epifriedlin, Friedlin, 2-amino naphthoquinone, β -D-glucose, Stigmasterol, Hederagenin, Butulinic acid, botulin
LEAF	Hexacosanol, Octacosonol, β -sitosterol, α-amyrin, 1,4-naphthalenedione
HEARTWOOD	2,3-dihydroxyolean-12-en-28oic acid, Hederagenin
SEED	Palmitic acid, Myristic, Stearic, Linoleic, Linolenic acid
ROOT	24-ethyl-cholest-22-en-3α-ol

Integrifolia, a glycoside has potentially antioxidant & antidiabetic properties. Recently, isolated to medicinal pentacyclic triterpenoids Betulinic acid and betulin from methanolic extract has been shown to exhibited anti-inflammatory, anti-microbial, and anti-cancer activity. The phytochemical present in H. Integrifolia contribute to its pharmacological activities. These activities and uses of plant enhance the traditional medicinal uses and valuable potential therapeutic application.

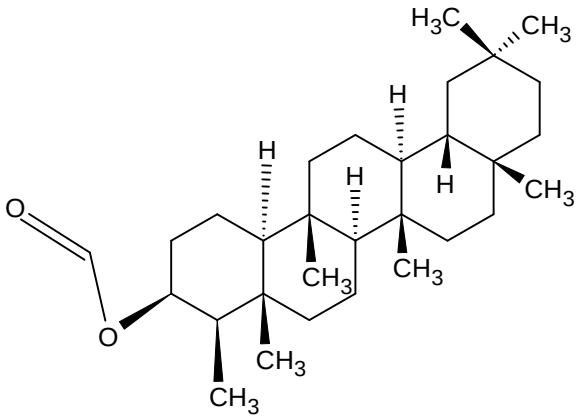

Figure 2: HOLOPTELIN- A.

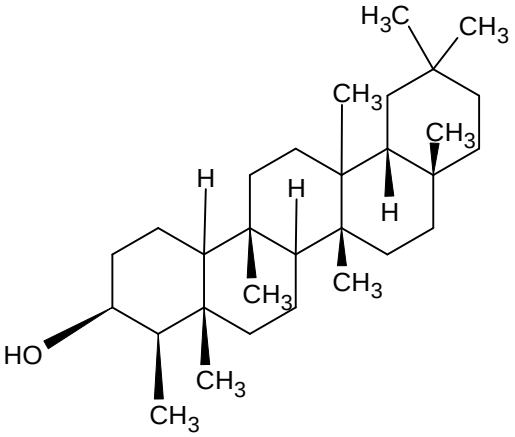

Figure 3: HOLOPTELIN-B.

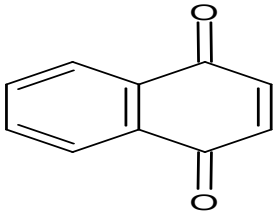

Figure 4: 1, 4- Naphthalene Dione.

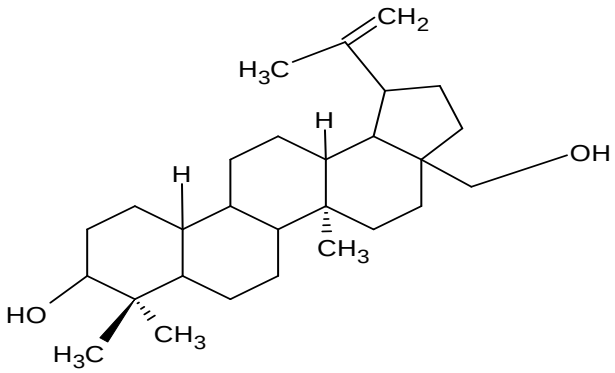

Figure 5: Betuline.

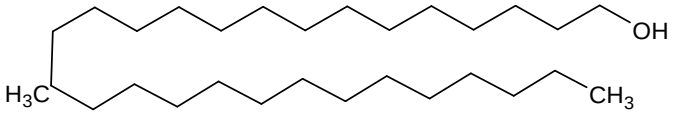

Figure 6: Octacosanol.

Ethnomedical Uses

1. Indian Elm Tree is a one of the most commonly used herbs for the treatment of localized swelling, skin disease, nausea, diabetes, indigestion, piles and act as blood purifier.
2. H. integrifolia has been used in traditional medicine for centuries.
3. In ayurveda, each vernacular name is chirabilava its mean that the plant alleviates the doshas very quickly and in other word means it grows quickly near water resources it has great result in different allergic condition.
4. From another perspective h. integrifolia is for timber which makes cheap furniture and also used as firwood in rural part.
5. It also used for ecological forestry for its heat.
6. As the experts studied, it is proven the plants therapeutic activities like anthelmintic, carminative, urinary astringent, laxative, anti-inflammatory action etc.
7. It is use for ornamental purpose in Pakistan
8. Methanolic and aqueous extract of chirabilva is found to be anti-viral in action.

Ethnomedical uses

Table 3: Ethanomedical uses of HOLOPTELEA.

PART OF PLANT	MODE OF APPLICATION	DISEASE	ACTIVITY	EXTRACT
BARK	Pest, externally powder, juice of a boiled bark, pounded and tied over the knee joint, cut and tied on arm.	For control bleeding by fresh wound, weakness, and inflammation of scabies, joint pain, control diabetes, skin disease, and herpes simplex infection.	Anti-viral, anti-bacterial, anti-fungal, anti-oxidant, wound healing, hypolipidemic, Anthelmintic, Anti-cancer.	Chloroform and methanolic, aqueous ethanolic, butanol
Leaf	Pest and paste, decoction of leave, juice, and young leaf cut and tied on back bone.	Malaria, scorpion sting, ring worm, leukoderma, facial paralysis, termination of pregnancy, tumor, rheumatism.	Anti-diabetic, anti-diarrhea, analgesic, anti-ulcer, wound healing, CNS depressant, anti-emetic.	Ethanolic, ethyl acetate, acetone, n-butanol, methanolic, hexane, diethyl ether.
Fruit	Dried fruit, seed are externally applied in the form of poultice on injured part; seeds are crushed in water and given thrice a day.	Urinary problems, brain tonic and general debility, inflammation, eczema, cutaneous disease, poly urea, uncontrolled, bleeding, diarrhea.	Anti-inflammatory, anti-bacteria, poly urea and urinary disorder.	N-hexane, ethanol extract.

Pharmacological Activity

Pharmacology activity refers to beneficial and adverse effect of a drug. Since H. integrifolia has a great demand and ancient use. However, some of them have been prove scientifically by various investigations. Further research in process. Here some of the report pharmacology activities are discussed below.

1. Antibacterial activity

The plant extracts have been shown to inhibit the growth of various bacterial species. Since there are the presence of bioactive compound like, flavonoids and alkaloids etc. These compounds have been found to disruption of bacteria membrane integrity, inhibition of bacterial cell wall synthesis and DNA replication. The chloroform extract of H. integrifolia showed highly effective as antibacterial against staphylococcus aureus, bacillus subtilis, Escherichia coli. The diethyl ether exacts of leaves found to be significant microbiocidal activity against β-lactam resistance. The ethanolic extract of H. integrifolia leaves exhibited antibacterial activity against salmonella typhi, shigella flexneri and vibrio cholerae its shows activity against gram positive ad gram negative bacteria strain.

2. Antidiabetic activity

Pharmacology studies have revealed that H. integrifolia exhibits significant antidiabetic activity. As per expert studies that extract of plant leaves, root including methanolic, aqueous ethanolic extract, have antidiabetic effect. It has shown mechanism by inhibition of α-glucosidase activity, reduction of glucose absorption from the gut, stimulation of insulin secretion from pancreatic β cell. The methanolic extract of H. integrifolia of leaves found an antidiabetic activity in streptozotocin induced diabetic rats. The ethanolic extract of H. integrifolia the activating of α-glycosidase.

3. Anti-inflammatory

Anti-inflammatory agents which reduces the swelling and inflammation. The methanolic extract of H. integrifolia found to be anti-inflammatory in carrageenan induced pain edema in rats. Its aqueous extract of root reduces in lipopolysaccharide stimulated macrophages there are some significant mechanisms such as inhibition of pro-inflammatory cytokines and mediator, modulation of the immune response all thought further research is needed fulfill understand its effect.

4. Anthelmintic activity

Anthelmintic refer to the ability of a drug or plant extract to expel or kill parasitic worms. The methanolic extract and aqueous extract of stem, bark of H. integrifolia has been used to treat parasitic worm infection. It has been found to exhibited significant anthelmintic activity against various types of worms such as pheretima Posthuma (earth worm), ascarides galli (chicken roundworm), and hymenolepis diminuta (tapeworm). Invitro and in vivo studies it has been shown promising result, with significant worm expulsion and reduced worm burden observed. The ethanoic extract of stem and also found to exhibited anthelmintic activity.

5. Wound healing

It is complex phenomenon including process repairing damaged tissue, faster wound closure, synthesis of ECM (extracellular matrix) protein. According the research to different extract of H. integrifolia methanolic leaf and methanolic stem bark extract as found to posses wound healing potential on albino rat. It increases tissue strength. Furthermore, enhanced wound contraction, improve collagen synthesis, antimicrobial activity.

6. Anti-Ulcer

The drug or substance reduce gastric acid secretion & protect the gastric mucosa. The methanolic leaf extract of H. integrifolia exhibit antiulcer effect in the rats at 500 mg/ kg per oral dose. H. integrifolia shows the anti-inflammatory properties which helps to decrease the gastric inflammation to reduce the risks of ulcers. The plant also shows antioxidant properties to protect the gastric mucosa from oxidative damage caused by free radicals promoting ulcer healing.

7. Anti-Cancer

Cancer is an abnormal cell growth this can happen various part of body such as skin, lung, brain, breast etc. Anticancer agent refers to its potential ability to prevent or slowdown growth of cancer cell. The ethanolic extract of H. integrifolia bark show anticancer efficacy against breast carcinomas in rat. According to research revealed that hexane and ethyl acetate extract H. integrifolia bark exhibited important cytotoxic effect on certain type of cancer cell. Especially this extract shown significant cytotoxicity against breast and prostate cancer cell.

8. Analgesic activity

A substance that provides relief or reduced pain. The ethanolic extract of plant H. integrifolia leaves give analgesic effect which reduces the pain sensation. The most effective analgesic activity was observed by ethanolic extract and followed in distending order by ethyl acetate, n-butanol and aqueous extract. Analgesic activity of H. integrifolia has been shown in different models tail flex test, hot plate test, acetic acid- induced writhing test. Reduce inflammation which can contribute the pain.

CONCLUSION

Holoptelela Intrgrifolia is a medicinal plant with rich source of phytochemicals having several health benefits. It possesses various ethanomedial uses with the advancement in technology it helps to understand H. Integrifolia active compound and their effect on body. It has been found to widely a range a pharmacological activity. Till now limited research has been done on H. integrifolia, and more studies are needed to explore its medicinal properties.

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