



Ethnomedicinal Uses, Phytochemistry and Pharmacological Activities of *Pittosporum floribundum* Wight. & Arn. – A Review

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Authors' contributions

This work was carried out in collaboration among all authors. Author KKG designed the study and wrote the first draft of the manuscript. Authors KKG and AJG managed the analyses of the study. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Objectives: *Pittosporum floribundum* Wight & Arn. (Pittosporaceae) has been associated with many therapeutic claims, especially for its ethnomedicinal and economical uses. In this review, an extensive literature survey was carried out to compile information available about its medicinal uses, phytochemistry and pharmacological properties.

Materials and Methods: Ethnobotanical uses of *P. floribundum* reported in available books on ethnobotany and ethnomedicinal research articles have been compiled. The obtained data are arranged in a tabular form, enlisting its local names, their area of presence and parts used. Therapeutic indications, external or internal dosage form and usage of the drug are also noted.

Results and Discussion: It was found that stem bark, leaves, and root of *P. floribundum* are used to combat itching, rheumatism, leprosy, sprain, eczema, arthritis, diabetes, chest pain and antidote

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for snake bite. Bark has maximum applications in leprosy, and sprain. The extracts of the different parts were subjected to phytochemical screening for the presence of phytoconstituents such as alkaloids, flavonoids, phenols, lignins, anthroquinones, steroids, tannins, saponins, fixed oils and glycosides. Studies have shown that the methanolic extract of bark having promising antifungal, antibacterial, anti-inflammatory, antioxidant, hepatoprotective, neuropharmacological and behaviour activities.

Conclusion: *P. floribundum* has multifaceted uses in varied aspects thus underlining its significance. Reported claimed anti-bacterial and anti-oxidant activities can be further strengthened through pharmacological and clinical studies to establish the ethnic claims like leprosy, sprain, bruises, sciatica, pulmonary affection and phthisis.

Keywords: *Devasundha*; *ethnomedicine*; *Pittosporum floribundum*; *pharmacological*; *phytochemical activities*; *traditional medicine*.

1. INTRODUCTION

Since ancient time medicinal plants are the primary life supporting system for rural and tribal communities. About 80% of the world population rely on the use of traditional medicine which is predominantly based on plant materials [1]. India has one of the richest plant based traditional system medicine in the world many of them are well documented in number of classical texts such as *Ayurveda*, *Unani* and *Sidhdha* system of medicine. There are many plants which are being used traditionally but not noted for their pharmacological activities in classical texts of *Ayurveda* or ayurvedic pharmacopoeia. In the past, many claims have been recorded during ethnobotanical surveys in the various tribal region of different states of India and other parts of the world. Recent reports say that there are around 20,000 medicinal plants which have been recorded in India; however, traditional practitioners use only 7000- 7500 plants for curing different diseases [2].

Pittosporum floribundum Wight & Arn. Synonym- *Pittosporum napaulense* (DC.) Rehder & E.H. Wilson (Family-*Pittosporaceae*), one among such plant is a small evergreen tree, found along the foot of outer Himalayas from Punjab eastwards to the hills of Assam and in the hills of peninsular India, ascending up to an altitude of 2400 m above mean sea level (msl) and also the Dun in shady places or ravines. It is called *Devasundha*, *Debosunda*, *Devson*, *Purshpashan*, *Chachin* (Odia), *Rakamuki* (Telugu), *Kattu sampangi*, *Najundai*, *Tammata* (Tamil), *Tumari*, *Vikharl*, and *Vekhali* (Marathi) [3-5].

Single hand information about the ethnomedicinal, economical uses of the species of *Pittosporum floribundum* is still lacking. Despite its range of traditional medicinal uses,

the phytochemistry and therapeutic potential of *P. floribundum* has not been extensively studied. Hence, in the present article, an attempt has been made to congregate data from reported research journals, and survey study reports.

2. MATERIALS AND METHODS

Information of all the reported ethnobotanical uses of *P. floribundum* from available books on ethnobotany and ethnomedicinal research articles have been compiled from library source as well as from Google Scholar, DHARA, PubMed, Ayusoft and other web-based search engines.

The obtained data are arranged in a tabular form, with regard to various local names, as known by different tribes across India, name of the tribe and their area of occurrence, part used, therapeutic indications. External (E), and internal (I) usage of the drug are also noted in a separate column with individual references. Recent research carried out on *P. floribundum* is also compiled and presented till December 2019.

3. RESULTS AND DISCUSSION

3.1 Botanical Description

Pittosporum floribundum is a shrub or medium sized tree. Trunk typically light grey with characteristic bands of darker lenticels. Young branchlets brown, lenticellate. Leaves clustered at branchlet apex, biennial; petiole stout, 1–2 cm shiny green, leaf blade dark brown adaxially after drying, oblong or oblong-lanceolate, 8–20 x 4–8 cm, thickly leathery, glabrous abaxially, lateral veins convex adaxially, base cuneate, margin flat, reflexed after drying, apex acute or acuminate. Inflorescences small greenish-white to cream, terminal, paniculate or compound

corymbose-paniculate, usually brown pubescent; pedicels 7–10 mm. Sepals slightly connate at base, ovate, 2–3 mm, glabrous or margin ciliate. Petals narrowly oblong, 5–6 mm. Stamens ca. 4 mm. Ovary ca. 2 mm, pubescent. Style ca. 1 mm, glabrous; stigmas capitate. Fruits Capsule globose, 6–7 mm in diam., dehiscent by 2 valves; pericarp orbicular, thin, horizontally striate adaxially; placentas at base of valves. Seeds 4–8, 2–3 mm in diam; funicle very short. The fruit capsules typically split open while still on the tree, revealing the bright orange, sticky covering of the seeds. Flowering. March–May, Fruiting. May–November [6].

3.2 Phytochemistry

Preliminary Phytochemical Screening:

Extracts of different parts were subjected to phytochemical screening for the presence of

phytoconstituents like alkaloids, flavonoids, phenols, lignins, anthraquinones, steroids, tannins, saponins, fixed oils and glycosides by using standard methods from the book Harborne [7] and Kokate [8]; Farnsworth and Gibbs methods.

The plant yields an essential oil (0.26%) with alpha-pinene, dipentene, linalool, cineol, methyl salicylate, decyl aldehyde, anisaldehyde, bergapten, eugenol, indole and salicylic and benzoic acids as major constituents. The hydrodistillation of stem bark of *P. napaulense* gave oil of 0.9% (w/v) yield, based on the dry weight of the plant. Twenty-three components were identified representing 97.62% of the total oil. The major constituents of the oil were n-tetradecanal (60.1%), n-dodecanoic acid (6.4%), butyl methyl ketone (4.3%) and β -acoradiene (0.3%) [9].

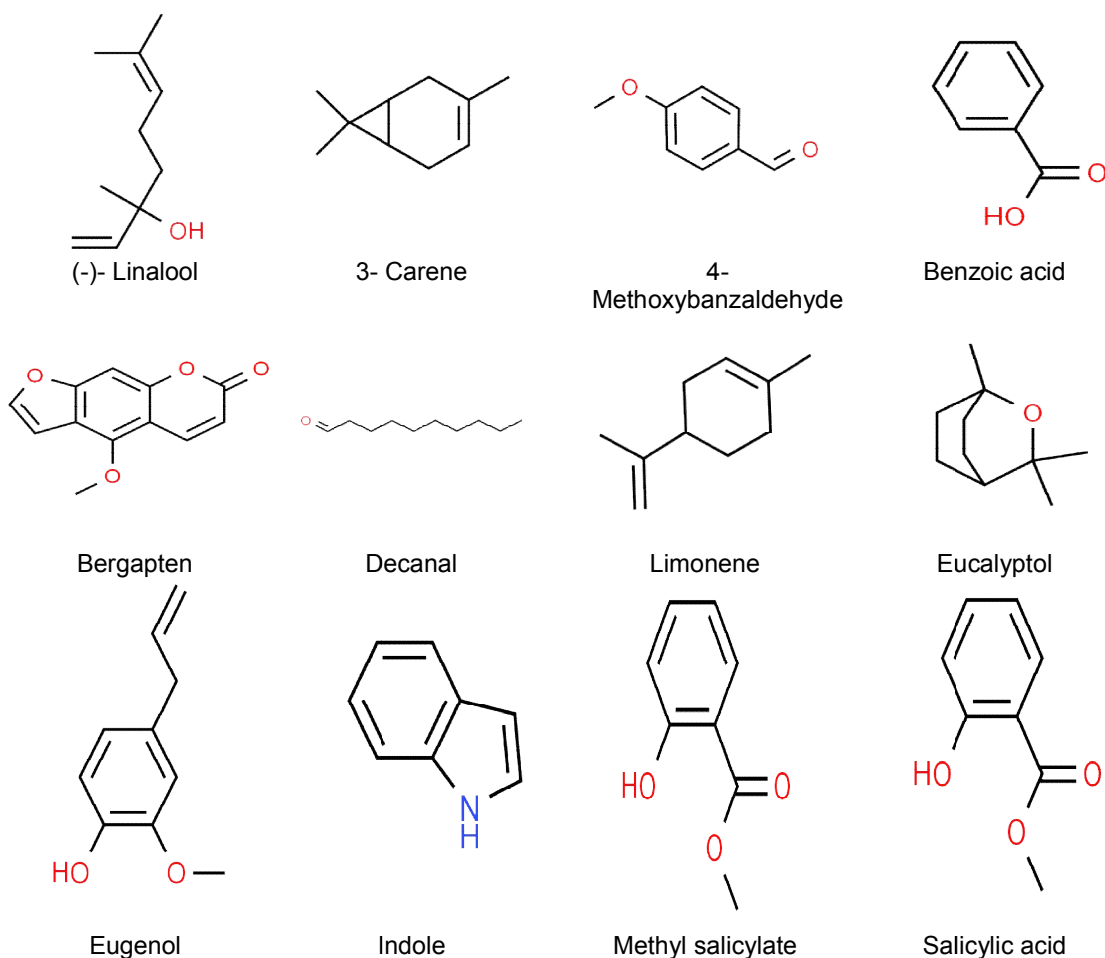


Fig. 1. Chemical constituents: The structural elucidation of identified compounds

Table 1. Ethno-medical claims of *P. floribundum* Wight & Arn. stem bark

Sr. no.	Part used	Dosage External (E) / Internal (I)	Therapeutic claim	Ref.
1	Bark	Powder (I)	In high dose acts as antidote to snake poison, general weakness and stimulant,	[13]
2	Bark	Powder (I)	Leprosy, leprous affections, various forms of cutaneous disease, secondary syphilis and chronic rheumatism, chronic bronchitis and asthma.	[14]
3	Bark	Powder (I)	Chronic bronchitis, leprous affections	[15]
4	Bark	Powder (I)	The roasted bark of young trees is used in the treatment of dysentery	[16]
5	Bark	Powder (I)	The bark is used as a medicine for anaemia and for preventing abortion in young women	[17]
6	Bark	Powder (I)	Urinary problems	[18]
7	Bark	Decoction (I)	Decoctions or infusions are widely used to treat stomach complaints, abdominal pain, skin disease, chest infection and fever	[19]
8	Bark	Powder (E)	Inflammatory, dropsical and rheumatic swellings	[20]
9	Bark	Powder (E)	It is said to ease pain and have a calming effect used in arthritis, inflammatory, spasmodic, sciatica, sprains	[21]
10	Bark	Powder (I)	Asthma, cough, fever, leprosy and snake poison	[22]
11	Bark	Paste (E)	Inflammatory, dropsical and rheumatic swelling, Skin diseases and itches	[23,24]
12	Bark	Paste (E)	Mix with root paste of <i>Salacia brunoniana</i> and applied externally on piles.	[25]
13	Bark	Oil (E)	Itching, rheumatism, leprosy, sprain, bruises, sciatica, pulmonary affections, phthisis and ophthalmia	[26]
14	Bark	Oil (E)	Rheumatism, skin diseases, secondary syphilis	[27]
15	Root and bark	Powder (I)	The dried, powdered root or bark is sometimes added to beer as an aphrodisiac	[28]

The secondary metabolites like alkaloids, flavonoids, phenols, lignins, steroids, tannins saponins, fixed oils and glycosides are present in all parts. In leaf alkaloids, flavonoids and phenols are present in water extracts; in bark alcohol and methanol extracts; in fruit alcohol extracts; Flavonoids and phenols in water, alcohol and methanol extracts. Tannins, saponins, and fixed oils in all parts in water, alcohol, methanol extracts, and glycosides are absent in water extracts, of leaf and bark; but present in fruit water extracts [10].

The narcotic action of the bark may be due to the presence of oleoresins, saponins and pittedosporins [11].

3.3 Chemical Constituents

Chemical constituents (Fig. 1) [12] showed the structural elucidation of identified compounds.

3.4 Ethnomedicinal Uses

It was found that stem bark, root, leaf and fruits are used to combat several diseases. About 7 external applications and 13 internal administrations are reported. Stem bark, as a part used, has maximum applications in 15 disease conditions. Fruit is being used in 2 disease conditions, while leaf and root are used in 1 disease condition each (Tables 1 and 2).

3.5 Pharmacological Aspects

Different parts of *P. floribundum* have been reported for their pharmacological activities through experimental studies (Table 3).

The plant has been studied for its propagation, cultivation and its fodder use. Branch biomass calorific value of this plant is 4700 Kcal/kg [37] (Table 4).

Table 2. Ethno-medical claims of other parts of *P. floribundum* Wight & Arn.

Sr. no.	Part used	Dosage form: External (E) / Internal (I)	Therapeutic claim	Ref.
1	Fruit	Ripe fruit (I)	Jaundice and piles	[29]
2	Fruit	Mature fruit (I)	Eaten as a refrigerant and also for gastric discomfort.	[30]
3	Root	Paste (E)	Applied to dropsical and rheumatic swellings.	[21]
4	Leaf	Fresh juice (I)	Liver problem	
5	Wood sticks	Wood sticks (I)	Chewing sticks for oral care.	[31]

Table 3. Research work carried out on *Pittosporum floribundum* Wight & Arn.

No.	Activity	Part used	Dosage form	Result	Ref.
1.	Antibacterial and antifungal studies	Bark, leaf, seed and fruit	Aqueous, methanol and alcohol extracts	The plant extracts has effective antibacterial activity against all tested bacteria to that of control group.	[32]
2.	Acute and sub-acute toxicity studies	Bark leaf and seed	Aqueous, methanol and alcohol extracts	The drug bark extracts maybe recommended at acute and sub-acute doses between 10 mg to 75 mg/kg body weight.	[33]
3.	Anti-inflammatory activity	Bark, leaf and seed	Aqueous, methanol and alcohol extracts	Bark extract of the plant was proved more effective as anti-inflammatory and analgesic drug.	[34]
4.	Analgesic activity	Bark	Aqueous, methanol and alcohol extracts	Bark of <i>P. floribundum</i> acts as analgesic.	[35]
5.	Anxiolytic effect	Bark	Aqueous, methanol and alcohol extracts	Bark of <i>P. floribundum</i> having anxiolytic effect due to the regulation of neurotransmitters.	[31]
6.	Sedative/narcotic effect	Bark	Aqueous, methanol and alcohol extracts	<i>P. floribundum</i> bark extracts sedative effect starts after 30 minutes of treatment and persists up to 45 minutes.	[31]
7.	Antibacterial activity	Leaf and fruit	Essential oil	Methanol extracts of bark showed more effective inhibition zones against all selected gram-positive and gram-negative bacterial strains and two fungal strains.	[6]
8.	Oral lesions	Bark	Aqueous extract	<i>P. floribundum</i> can be an excellent ingredient in dentifrices thereby ensuring good oral health.	[36]

Table 4. Propagation and cultivation studies carried out on *Pittosporum floribundum*

No.	Paper title	Subject	Ref
1.	Micropropagation of <i>Pittosporum napulensis</i> (DC.) Rehder & Wilson – a rare, endemic Himalayan medicinal tree	For Micropropagation of the plant	[38]
2.	Vegetative propagation of <i>Pittosporum floribundum</i> – a lesser known multipurpose tree species	Vegetative propagation	[39]

No.	Paper title	Subject	Ref
3.	Multiplication of <i>Pittosporum floribundum</i> Wight & Arn. Through Air Layering	Multiplication Propagation	[40]
4.	Vegetative propagation of <i>Pittosporum floribundum</i> Wight & Arn. through cuttings under mid hill conditions of Himachal Pradesh	Vegetative propagation	[41]
5.	Seasonal variation in nutritional quality of <i>Pittosporum floribundum</i> in mid hills of Himachal Pradesh	Nutritional value for fodder use	[42]
6.	Analysis of fodder values in <i>Pittosporum floribundum</i> Wight & Arn.	fodder use	[43]

4. CONCLUSION

Pittosporum floribundum is a well-known medicinal plant being used ethno medicinally for treatment of various diseases worldwide. The present review reports the traditional use of root, bark, leaf, fruits and seeds, in more than 6 states of India and neighbouring countries like China, Pakistan, Nepal and Bhutan. The Plant *P. floribundum* is utilised in more than 20 diseased conditions, out of which 7 are external applications and 13 internal applications. The plant possess many phytoconstituents which are responsible for its anti-microbial, anti-fungal, and anti-inflammatory activities. Reported claims of anti-bacterial, anti-fungal and anti-inflammatory activities of stem bark can be further strengthened through pharmacological and clinical studies to establish the ethnic claims such as bronchitis, leprosy and rheumatic swellings. The plant can also be one of the good source as analgesic drug of Ayurveda in future.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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