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Phytochemical and pharmacological studies on *Polyalthia longifolia*

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Abstract
Polyalthia longifolia (Sonn.) Thwaites (PL) is a tall handsome evergreen tree, is belongs to Annonaceae family. It is distributed in all over India and many tropical countries. It is commonly used as ornamental street tree due to its effectiveness in reducing noise pollution. The compounds present in this plant are steroids, alkaloids, terpenoids, phenolics and flavonoids used in traditional system of medicine for treatment of fever, skin diseases, diabetes and heliminthiasis. *Polyalthia longifolia* has significant biological and pharmacological activities such as anti-microbial, hypotensive, anti-oxidant, anti-bacterial, anti-inflammatory, anti-cancer, hepatoprotective, anti-hyperglycimic, anti-fungal, anti-leishmanial, anti-ulcer and termicidal activity.

Keywords: *Polyalthia longifolia*, pharmacological, phytochemistry

Introduction
Medicinal plants play significant role in human life. Herbs and humans have a great relation with each other. At present days medicinal plants play vital role in scientific development and holds much more hidden treasure to be explored as almost eighty percent human population in developing countries dependent on plant resources for their primary health care [1]. Medicinal plants used as traditional medicine in developing countries. Medicinal plants contain wide range of phytochemicals these are useful for the treatment of chronic and infectious diseases at present (or) future diseases [2].
One such medicinal plant is *Polyalthi longifolia* (Sonn.) Thwaites (PL) Belongs to Annonaceae family. Polyalthia is the Greek word poly means much (or) many and althea from lathes means cure, which shows multiple health benefits. It is commonly used as ornamental street tree due to its effectiveness in reducing noise pollution. *Polyalthia longifolia* is also known as false Ashoka, Buddha Tree, Green champa, Indian mast tree and Indian fire tree. It exhibits symmetrical pyramidal growth. It consist of weeping pendulous branches and long narrow lanceolate leaves with undulate margins. The height of tree is 30 ft. It is used as traditional medicine for various herbal preparation used for treating duodenal ulcers. The plant is used in traditional system of medicine for the treatment of fever, skin diseases, diabetes, hypertension and helminthiasis. The leaves of the plant are aromatic. These are generally used for decoration. The bark is used for the treatment of pyrexia and other bleeding disorders in India [3].

Description of family Annonaceae
The Annonaceae are a family, the custard apple family [4, 5], of flowering plants consisting of trees, shrubs, or rarely lianas [6, 7]. With 108 accepted genera and about 2400 known species it is the largest family in the Magnoliales. Several genera produce edible fruit, most notably *Annona*, *Anonidium*, *Asimina*, *Rollinia*, and *Uvaria*. Its type genus is *Annona*. The family is concentrated in the tropics, with few species found in temperate regions. About 900 species are Neotropical, 450 are Afrotropical, and the other species Indomalayan.

Taxonomical classification of *Polyalthia longifolia* (Sonn.) [7]

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Sub class	:	Magnoliidae
Order	:	Mognoliids
Family	:	Annonaceae
Tribe	:	Annoneae
Genus	:	Polyalthia
Species	:	Longifolia

Vernacular names and synonyms of *Polyalthia longifolia* (Sonn.) [8]

Hindi	:	Ashok
Marathi	:	Devdar
Malayalam	:	Hemapushpam
Telugu	:	Naramaamidi
Kannada	:	Ubbina
Tamil	:	Nettilingam
Assame	:	Umboi
Konkani	:	Asok
Sanskrit	:	Ulkatah
Synonyms	:	*Uvaria longifolia* Sinn., *Guatteria longifolia* (Sonn.) Wallich, *Unona longifolia* (Sonn.), Kasthadaru

Botanical description of *Polyalthia longifolia* (Sonn.)
The genus *Polyalthia* includes about 120 species. These are mainly occurring in Africa, South and South-Eastern Asia, Australia, and New Zealand. India has 14 species of *Polyalthia* [9]. The distribution of major *Polyalthia* species in

India are *Polyalthia cerasoides* Bedd. A shrub or small tree, found through out India, *Polyalthia fragrance* Benth a large tree found in Western Ghats and *P.longifolia* found in India and Sri Lanka and it has been introduced as gardens of many tropical countries. Evergreen tall tree can grow up to 15-20 meters tall.

Branch
Young plants have straight trunks and weeping pendulous branch. The longest branch is seen at the base and shorter at the end of the trunk, it gives conical crown appearance.

Leaves
Leaves are long narrow dark green and glossy. Leaf blade are ovate-oblong shape to ovate-lanceolate shape with wavy margins. Reticulate veins rose on both surfaces of leaf. Transfer section of leaf through the midrib shows bowl shaped abaxial parts and straight adaxial side. The epidermal cells are wide, polygonal, and thin walled. The walls are straight or slightly wavy. Below epidermal cells six layers of collenchyma cells appears on both sides. In the mid rib region, vascular bundle is encircled by a sclerenchymatous ring.

Flowers
Flowers are delicate pale green colour with wavy petals. The flowers last for a short period. It is usually two to three weeks. Seals are ovate-triangular. Petals are greenish yellow. Carpels are 20-25 in number. Stigmas are sessile.

Fruits
Fruits are borne in clusters of 10-20.It is usually void in shape. Initially fruits are green in colour but later it turns in to purple or black when ripe.

Seeds
Seeds are pale brown in colour and ovoid in shape. [10]

Propagation
It is generally propagated through seeds, but sometimes through soft wood cuttings [7].

Traditional Uses [11]
- The tribal of Andhra Pradesh, use the bark of the tree in treatment of fever and to prevent abortion.
- In Tamil Nadu, it is known as Nettilingam and the juice extracted from the fresh bark is used to treat indigestion.
- For gonorrhea, the stem bark is powdered and mixed with butter to apply genital region.
- In Madhya Pradesh the stem bark is given in malignant treatment.
- In West Bengal, the bark is used in treatment of diabetes and high blood

Pressure
- The leaves, possess antifungal and anti bacterial properties.
- The decoction of bark is used for curing mouth ulcers.
- The stem bark along with Sesamum indium/Til and Piper nigrum/Pippali is used to treat bone fractures.
- In Uthiramerur, the stem bark extract is given orally for indigestion.

Some species of *Polyalthia*: [12]
- *Polyalthia angustissima*
- *Polyalthia cerasoides* (Roxb)
- *Polyalthia chysotricha*
- *Polyalthia coffeoides* (Hook. f. & Th.)
- *Polyalthia elmeri* Merr.
- *Polyalthia fragrans* (Dalz.)
- *Polyalthia glabra* (Hook.f. & Th.)
- *Polyalthia hirtifolia*
- *Polyalthia hookeriane* King
- *Polyalthia hypogaea* King
- *Polyalthia korinti* (Dunal)
- *Polyalthia laddiana*
- *Polyalthia lancilimba*
- *Polyalthia lateritia*
- *Polyalthia litseifolia*
- *Polyalthia longifolia*
- *Polyalthia macropoda*
- *Polyalthia nitidissima*
- *Polyalthia panchyphyll*
- *Polyalthia palawanensis*
- *Polyalthia pingpienensis*
- *Polyalthia rufescens*
- *Polyalthias hendurunii*

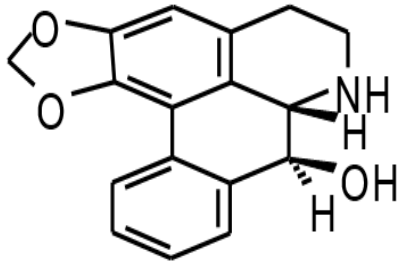
Past Phytochemical Studies

Table 1

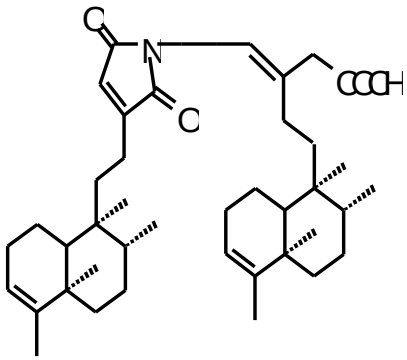
S. No	Plant Part Used	Compounds Isolated	Reference
1.	Leaves	16α-hydroxy-cleroda-3,13(14)Z-dien-15,16-olide 16-oxocleroda-3,13(14)E-dien-15-oic acid 3α,16α-dihydroxycleroda-4(18),13(14)Z-dien-15,16-olide 3β,16α-dihydroxycleroda-4(18),13(14)Z-dien-15,16-olide. Longimide A Longimide B Longitriol.	[13], [14], [15]
2.	Bark	γ-methoxybutenolide γ-hydroxybutenolide. γ-hydroxybutenolide with an oxiran ring. 16-hydroxycleroda-13-ene-15,16-olide-3-one.	[16], [17], [18]
3.	Stem	16-hydroxycleroda-4(18),13-dien-16,15-olide 16-oxocleroda-4(18),13E-dien-15-oic acid, cleroda-4(18),-13-dien-16,15-olide. 6α,16-dihydroxycleroda-3,13-dien-15-oic acid	[19], [20], [20]

		6α,16-dihydroxycleroda-4 (8),13-dien-15-oic acid 4α,18β-epoxy-16- hydroxyclerod-13-en-15-oic acid.	
4.	Leaves and berries	Methyl-16-oxo-cleroda-3,13(14)E-dien-15-oate 3β,16α-dihydroxy-cleroda-4(18), 13(14)Z-dien-15,16-olide solidagonal acid	[21]
5.	Whole Plant	16-hydroxy-ent-halima-5(10),13-dien-16,15-olide Ent-halima-5(10),13E-dien-15-oic acid Ent-halima-1(10),13E-dien-15-oic acid 16-oxo-ent-halima-5(10),13E-dien-15-oic acid, Ent-halima-5(10),13-dien-16,15-olide Ent-halima-1(10),13-dien-16,15-olide.[19] 3β, 5β, 16α-trihydroxyhalima-3(14) en-15, 16-olide. Polylongine, polyfothine, isooncodine, Darienine (+)-O-methylbulbocapnine-β-N-oxide, (+)-O-methylbulbocapnine-α-N-oxide, (+)-N-methylnandigerine-β-N-oxide oliveroline-β-N-oxide. (-)-8-oxo-polyalthiaine pendulamine A pendulamine B (-)-8- Oxo-10- hydroxy-2,3,9-trimethoxyberberine (-)-8-Oxo-2,11-dihydroxy-3, 10- dimethoxyberberine, (-)-8-Oxo-11-hydroxy- 2,3,9,10-tetramethoxyberberine (-)-8-Oxo- 2, 10-dihydroxy-3,9,11-trimethoxyberberine.	[19], [22], [23], [24], [23], [24], [22], [25], [20]

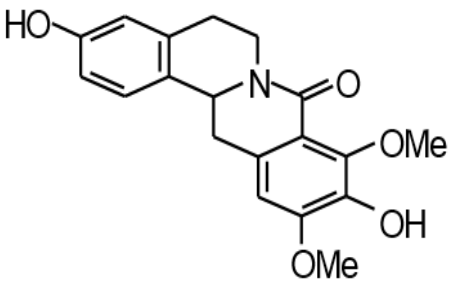
Some Isolated Compounds [7]:



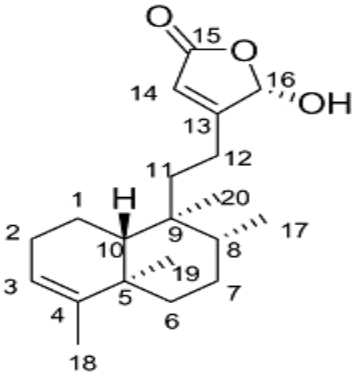
Noroliveroline



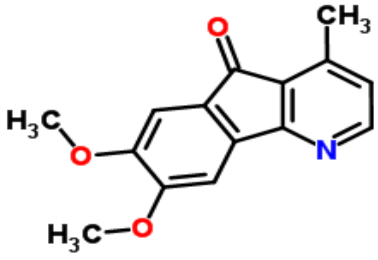
Longimide Bs



Pendulamine A



16α-hydroxy-cleroda-3,13(14)Z-dien-15,16-olide



Polyfothine

Past Pharmacological Studies

Antibacterial activity

The preliminary antibacterial activity of various solvent extract (petroleum ether, chloroform ethyl acetate, ethanol and aqueous) of *Polyalthia longifolia* leaves was studied against six different bacteria by disc diffusion method. The study revealed that all the extract possesses potent antimicrobials against all the test pathogenic organisms. The antibacterial

activity was screened by measuring the zone of inhibition. Among various extracts, chloroform extract showed the higher degree of inhibition followed by ethylacetate, ethanol, and petroleum ether. The aqueous extract showed minimum inhibitory effect compared to all other extracts The highest antibacterial activity was reported against Bacillus subtilis (26 mm) in chloroform extract, followed by Staphylococcus aureus (25 mm), Escherichia coli (24 mm), Pseudomonas aeruginosa (24 mm), Proteus vulgaris (23 mm) and Salmonella typhi (21 mm).The leaf extract shows favourable antibacterial activity with minimum inhibitory concentration (MIC) against Bacillus subtilis (0.01 mg/ml) and Staphylococcus aureus (0.01 mg/ml).The inhibitory activity of the extract was compared with the standard antibiotics Ciprofloxacin, Roxithromycin and Cefuroxime. The extract shows significant antibacterial activity against all the tested bacteria which was suggested as potential antibacterial agent [26, 27, 28].

Antioxidant activity

The in vitro antioxidant potential of ethanolic stem bark extract of *P. longifolia* was evaluated for its role on reactive oxygen species in tumor initiation and progression. The extract scavenged DPPH radicals, reduced ferric ions and inhibited lipid peroxidation with IC50 values of 18.14, 155.41 microg/mL, respectively. In addition, the methanolic stem bark extract of *P. longifolia* was evaluated for its radical scavenging potential. The extract at 100 µg/ml concentration showed maximum scavenging of the radical cation in ABTS observed up to 54.79 % followed by scavenging of stable radical DPPH (75.36 %), Super oxide dismutase (78.40 %) at the same concentration. The IC50 values of this extract in these models were calculated as 77.07, 46.84, 88.54 and respectively at 1mg/ml concentration. Another study, was to evaluate the antioxidant activity of seed extracts of *P.longifolia*. Petroleum ether, chloroform, methanol and aqueous extracts of seeds of *P. longifolia* were evaluated for preliminary antioxidant activity using DPPH and FRAP assays. Among the various extracts methanol and petroleum ether extracts showed good antioxidant activity with IC50 98.43 and 62.52 for DPPH assay while 1.40 and 0.81 for FRAP assay. Whereas, aqueous extract showed very low activity in both of the antioxidant assays tested. The antioxidant activity of ethanol extract of the seeds and leaves of *P. longifolia* was determined by measuring the radical scavenging activity against 2, 2 – Diphenyl– 1-picryl hydrazyl radical (DPPH). The highest radical scavenging effect was observed in leaves with IC50 0.5824mg/ml than in seeds with IC50 1.4677 mg/ml. Phenolic compounds and flavonoid contribute to this activity [29].

Anti-inflammatory activity

The anti-inflammatory activity of various solvent extract (petroleum ether, hexane, toluene, chloroform, acetone and methanol) of *P. longifolia* leaf was evaluated using acute inflammatory studies in Wistar albino rats. Methanolic extract revealed most potential antinflammatory effect hence; three doses of methanolic extract (300, 600, 900 mg/kg) were used to evaluate its potential as an anti-inflammatory agent. The three doses of methanolic extract showed anti-inflammatory activity comparable to that of the standard (Diclofenac sodium). Thus the results indicates the methanolic leaves extract of *P. longifolia* possess a significant anti-inflammatory activity. Another study as evaluated the antiinflammatory potential of ethanolic and aqueous extracts of *P. longifolia* leaf in albino wister rats. Anti-inflammatory activity was also reported using Cotton pellet granuloma study which is a sub-acute anti-inflammatory model. Where the weight of cotton pellet was determined at the end of the study and the percentage decrease in granuloma tissue weight was also found out. All the extracts were found to produce significant ($P<0.001$) decrease in the granuloma tissue as evident by the decrease in the weight of cotton pellet when compared to the disease control. Both ethanolic and aqueous leaf extracts revealed anti-inflammatory activity comparable ($P<0.05$) with indomethacin and at dose 300 mg/kg being the most active, exhibited maximum anti-inflammatory activity. However, the aqueous extracts showed better ($P<0.05$) antiinflammatory activity when compared to the ethanolic extracts at dose of 200mg/kg body weight [30, 31].

Hepatoprotective activity

The hepatoprotective activity of extracs (petroleum ether, hexane, toluene, chloroform, acetone and methanol) of *P. longifolia* leaf was evaluated using Wistar albino rats. The methanolic leave extract showed a significant hepatoprotective activity. Therefore, the extract was further subjected into three different concentrations (300, 600, 900 mg/kg) to determine its potential as an hepatoprotective agent. Diclofenac sodium was used as the toxicant in hepatoprotective studies, in which various serum biochemical parameters and liver glycogen were assessed. All the serum biochemical parameters studied revealed the hepatoprotective nature of the methanol extract, but a concentration effect was not observed. Another study was to ascertain the hepatoprotective effect of dried leaf *of P. longifolia*. Ethanolic leaf extract of *P. longifolia* was evaluated and subjected for hepatoprotective activity in Wistar strain of albino rats of either sex against CCl4 induced hepatic damage. SGOT, SGPT, ALP and total bilirubin were used as biochemical marker for assessment of the activity. The increased serum level of enzymes SGOT, SGPT, ALP and bilirubin were monitored in rats administered carbon tetrachloride, which were very much reduced in the animals treated with the ethanolic fraction. In vivo hepatoprotective activity of *P. longifolia* methanol extract in paracetamol intoxicated mice. They found that the therapy of *P. longifolia* showed the liver protective effect on biochemical and histopathological alterations. Moreover, in their histological studies also supported the biochemical finding that is, the maximum improvement in the histo architecture of the liver. Their results revealed that the *P. longifolia* leaf extract could protect the liver against paracetamol-induced oxidative damage by possibly increasing the antioxidant protection mechanism in mice [32].

Antihyperglycemic activity

Hypoglycemic and antihyperglycemic activity of various solvent extracts of *P. longifolia* leaf extracts which was evaluated in alloxan induced experimental diabetes in rats.

Diabetes was induced by them using 180 mg/kg i.p. of alloxan consecutively two times at an interval of 24 h. The test drugs were administered for 7 days. On 8th day various biochemical parameters like serum cholesterol, serum urea, serum creatinine, serum triglyceride, total serum protein, serum alkaline phosphatase, blood glucose and glycogen from liver were estimated. The authors reported that *P. longifolia* extracts and powder produced glucose lowering activity. However, the extracts did not modify any of the biochemical parameter significantly. Hence they concluded that the extracts and crude powder are devoid of anti-diabetic properties, but has gross glucose lowering properties. The presence of anti-hyperglycemic effect against sucrose loading induced hyperglycemia is a significant finding and they considered that this effect is most important property in a drug used in diabetes treatment [34].

Anti-cancer activity

The in vitro and in vivo antitumor activity of ethanolic stem bark extract of *P. longifolia* was evaluated. The extract was reported for in vitro cytotoxicity using murine cancer cells and human cancer cells by Trypan blue exclusion assay and MTT assay, respectively. The extract showed concentration-dependent cytotoxicity in Ehrlich's ascites carcinoma (EAC) and Dalton's ascites lymphoma (DLA) cells with IC50 values of 45.77 and 52.52 microg/mL, respectively. In the MTT assay, the IC50 values of extract against HeLa and MCF-7 g/mL, respectively. The extract was further subjected for in vivoμcells were 25.24 and 50.49 antitumor activity against Ehrlich's ascites tumor and Dalton's solid tumor models by administering 50 and 100 mg/kg extract, i.p., for 7 consecutive days. Stem bark extract of *P. longifolia* at a dose of 100 mg/kg, significantly enhanced mean survival time (MST) and marginally improved hematological parameters when compared to EAC control mice. And the same dose significantly reduced the tumor volume as compared to control DLA inoculated mice. Positive control, cisplatin (3.5 mg/kg, i.p., single dose), significantly enhanced MST and improved hematological parameters when compared to EAC and significantly reduced the tumor volume when compared to DLA control. Apart from that, another study was further evaluated the *P. longifolia* extract for its in vitro anticancer activity using various cancer cell lines namely HeLa-B75, HEP-3B. The potential anticancer activity towards cancer cell lines determine based on IC50 values 68.22, 39.15 respectively. It also reported for the first time the anticancer potential of *P. longifolia* leaf extract (A001) and its chloroform fraction (F002). They reported that both inhibited cell proliferation of various human cancer cell lines in which colon cancer cells SW-620 showed maximum inhibition with IC(50) value 6.1 microg/ml. Furthermore, F002 induce apoptosis in human leukemia HL-60 cells as measured by several biological end points. F002 induce apoptotic bodies formation, DNA ladder, enhanced annexin-V-FITC binding of the cells, increased sub-G(0) DNA fraction, loss of mitochondrial membrane potential (DeltaPsi(mt)), release of cytochrome c, activation of caspase-9, caspase-3, and cleavage of poly ADP ribose polymerase (PARP) in HL-60 cells. They concluded that all the parameters they evaluated revealed that F002-induced apoptosis through the mitochondrial-dependent pathway in HL-60 cells [32, 36].

Anti-leishmanial Activity

A clerodane diterpene; 16a-Hydroxycleroda3,13(14)Z-dien-15,16-olide from *Polyalthia longifolia* was found to be a potential antileishmanial and non-cytotoxic, as evidenced by long-term survival (>6 months) of treated animals. A very rapid and dose-dependent death occurred with Compound 1 at concentrations between 2 and 50 mg/ml. The IC50 was calculated to be 8.04 mg/mL against the reference drug miltefosine. The in vitro antileishmanial activity of methanolic extract from *P.longifolia* leaf was evaluated against Leismania donovani promastigotes by in vitro promastigote cell toxicity assay by using MTT [3-4,5-dimethylthiazol-2-yl)- 2,5 diphenyltetrazolium bromide]. The extract markedly inhibited the growth of L.donovani promastigotes in vitro in a dose dependent manner and demonstrated IC50 value of 4.18 µg/ml [42].

Antifungal Activity

Different solvent extracts viz., petroleum ether, benzene, chloroform, methanol and ethanol extracts of *P.longifolia* were tested for their antifungal activity where petroleum ether extract showed highly significant antifungal activity than other solvent extracts. Antifungal activity of aqueous (10-50% concentration) of *P.longifolia* were tested against ten seed borne fungi of paddy (*Oryza sativa* L.) in vitro condition. The fungus strain A. alternata recorded a maximum inhibition of 92.88% followed by *F. solani* (87.10%), *F. moniliforme* (86.40%), *D. Halodes* (86.07%), *F. oxysporum* (85.14%), *C. lunata* (83.33%) and *D. tetramera* (83.02%) at 50% concentration compared to synthetic fungicide, Dithane M-45, Captan, Benlate, Thiram and Bavistin at 2% recommended dosage. The leaf and pericarp aqueous extracts of *P. longifolia* were assessed in vitro for inhibitory activity against Fusarium oxysporium and Pythium aphanidermatum which were isolated from rhizome rot specimen of ginger. The extract was found to be active and showed dose dependent antifungal activity [43].

Antimicrobial Activity

Previously reported clerodane diterpene (16á-hydroxycleroda-3, 13 (14) Z-dien-15, 16- olide) was isolated from *Polyalthia longifolia* against methicillin-resistant S. aureus through in vitro and in vivo assays. Minimum inhibitory concentration (MIC) of this compound exhibited significant antimicrobial activity (15.625 31.25 mg/ml) against reference strain. Methanol extracts of leaves, stem, twigs, green berries, flowers, roots, root-wood and root bark of *Polyalthia longifolia* var. pendula, were tested for their antibacterial and antifungal potentials. Bioassay monitored isolation work on the methanol extract of leaves and berries which possesses promising antibacterial activity with MIC values ranging between 7.8 and 500 ìg/ml. Different *P. longifolia* leaf extracts like 1, 4- dioxan, methanol and acetone extracts were investigated at two different concentrations for their antimicrobial potentiality against 91 clinically important microbial strains. All the three extracts at 500 ìg/disc concentration were active against 95% of the total gram positive bacterial strains. 1, 4-Dioxan extract was active

against 18.18% of the total gram negative bacterial strains while methanolic and acetone extracts were active against 12.72% of the total gram negative bacterial strains [38, 42].

Anti-ulcer activity

The ethanolic extract of *P.longifolia* was investigated for anti-ulcer activity against aspirin plus pylorus ligation induced gastric ulcer in rats, HCl – ethanol induced ulcer in mice and water immersion stress induced ulcer at 300 mg/kg body weight which showed a significant reduction in gastric volume, free acidity and ulcer index as compared to control. It also showed 89.71 % and 95.3% inhibition in ulcer inhibition in HCl- ethanol induced ulcer and ulcer protection index in stress induced ulcer respectively. Methanolic extract of *P.longifolia* showed gastroprotective potential on ethanol and ethanol/HCl induced ulcers at 270 mg/kg and 540 mg/kg body weight. The reduction of ulcer index in treated animals was found to be statistically significant with respect to control animals.

Termiticidal activity

Polyalthia longifolia showed termiticidal activity in comparison to their respective solvent extract viz. chloroform, methanol, ethyl acetate, n- hexane, distilled water, at various concentrations (0.5%-5% solution). Methanolic extract showed potent termiticidal activity. A significant mortality rate was recorded with 5 % chloroform extract of *Polyalthia longifolia* along with *Samanea saman*, *Cassia siamea*, *Pithecellobium dulce*, *Eucalyptus camaldulensis*, at various concentrations of 75, 75, 55, 50 and 45% mortality occurred respectively.

Table 1

S. No.	Plant Part Used	Activity Done	Reference
1.	Leaves	Anti-bacterial activity	[26, 27, 28]
		Anti-oxidant activity	[29]
		Anti-inflammatory activity	[30, 31]
		Anti-Cancer activity	[32]
		Anti-Hepatoprotective activity	[30, 33]
		Anti-Hyperglycemic activity	[34]
		Anti-leishmanial activity	[42]
		Anti-fungal activity	[43]
		Anti-pyretic activity	[44]
2.	Stem Bark	Anti-bacterial activity	[35]
		Anti-oxidant activity	[36, 37]
		Anti-Cancer activity	[36]
		Anti-pyretic activity	[44]
3.	Bark	Anti-bacterial activity	(38)
		Anti-Microbial activity Anti-oxidant activity	[39]
4.	Root Bark	Hypotensive activity	[40]
		Anti-pyretic activity	[44]
5.	Seeds	Antioxidant activity	[41]
		Anti-Microbial activity	[42]

Conclusion

The extensive literature survey revealed that *Polyalthia longifolia*. is important medicinal plant with diverse pharmacological and phytochemical spectrum. The plant shows the presence of many chemical constituents like steroids, alkaloids, terpenoids, phenolics and flavonoids which are responsible for varied pharmacological and medicinal properties like Anti-inflammatory activity, Anti-pyretic action, Anti-microbial activity, Anti-hepato-protective activity, Anti-oxidant activity. However, evaluation needs to be carried out on *Polyalthia longifolia* in order to explore the concealed areas and their practical clinical applications, which can be used for the welfare of the mankind.

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Conflicts of interest

There is no conflicts of interest.

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