

A REVIEW ARTICLE ON HERB PHYL A NODIFLORA (PODUTHALAI) IN AYUSH PAEDIATRIC THERAPEUTICS

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Abstract

Phyla nodifloralinn (Verbenaceae) is a small creeping herb, commonly known as Poduthalai and are used traditionally for several ailments. The Plant is used to cure many problems in children. Particularly it is used for Mantham, Kanam, Suram,Sanni,Karappan. It is also used for diarrhoea,pain in knee joints, lack of bowel momentsused in ulcers and boils and swollen cervical glands, gonorrhoea, asthma, hair afflictions and anthelmintic action. The plant has showed antibacterial activity, anti-microbial activity, anti-fungal activity, diuretic activity, hepato protective and anti-oxidants, anti-tumour activity, neuropharmacological activity, anti-urolithiatic activity and anti-inflammatory activity.

In thispaper the plant has been reviewed for its role in treating ailments of children based on siddha literature and modern pharmacological science.

Keywords: Phyla nodiflora, poduthalai, siddha literature, modern pharmacology.

1. Introduction

Phyla nodiflora L.is a creeping herb that is found to grow in damp habitat and can survive in both tropical and temperate climatic belts.It is commonly known as frog fruit.

It is a low-growing perennial herb that creeps along the ground. The plant is gathered from the wild for local domestic medicinal use as well as for ornamental use. It is found in tropical to warm temperate regions of the world.

In Taiwan *Phyla nodiflora* is used as a herbal drink, a nourishing agent, immunomodulator and anti-inflammatory agent to prevent many diseases [Yang et al 1998]. *Phyla nodiflora* is used for curing pimples, carbuncle and skin diseases in folk cosmetics [Abbasi et al 2010].

The leaves of *Phyla nodiflora* have higher levels of terpenoids and have significant levels of the component Beta caryophyllene and its oxide. Both these constituents along with natural acetates contribute to its excellent anti-microbial properties. It is used to ward off fungal, bacterial and parasitic infections (eg. Hookworm).

1.1 Classification

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Order	:	Lamiales
Family	:	Verbenaceae
Genus	:	<i>Phyla</i>
Species	:	<i>Nodiflora</i>



Figure 1.1 Habitat of *Phyla Nodiflora*

The different names of the herb referred in different regions are given in the table 1.1

Table 1.1 Vernacular names of the Herb

S.No	Vernacular	Name
1.	Tamil	Poduthalai
2.	English	Purple Lippia
3.	Malayalam	Nirthippali
4.	Telugu	Bokkena
5.	Kannada	Nelahippali
6.	Hindi	Jalpapli
7.	Sanskrit	Toyavallari

2. In Siddha Text

The synonyms of poduthalai in Siddha literature are **poorsaadham** and **poduthilai**. The importance of the herb *Phylanodiflora* (Poduthalai) has been given by the ancient Siddhar Agathiyar in his book *Gunavaadam*.

*“poduthalaiyinperuraihalporaamappokkum
 Aduthalaiseikaasamagalum-kadukivaru
 Bethiyodusoolainooipesariyavenmegam
 Vaathamumpomeiyurakumvaalthu”*

(Agathiyargunavagadam)

As per agathiyargunavagadam literature evidence it cures abdominal dyspepsia, Chronic Obstructive Pulmonary Disease (COPD), acute diarrheal disorder, spasmodic colicky abdomen, chronic leucorrhoea and chronic body pain. It rejuvenates the cells and acts as anti-oxidant.

According to siddha system of Medicine Phyla nodiflora is an appetizer, stomachic, anthelmintic, diuretic&febrifuge action. It is useful in conditions of pitham, burningsensation, abdominal colic, dyspepsia, helminthiasis, diarrhoea, asthma, bronchitis, irritation of internal haemorrhoids, hepatitis and fever.

The leaf juice is used as an ingredient of KeedariThailam, a siddha preparation used as an external application alopeciaareataa affliction of hair characterised by the sudden appearance of one or more bald patches without obvious changes in the skin.

2.1 Actions

The actions of the herb Poduthalai are Demulcent, Deobstruent, Diuretic, Astringent, Expectorant and Tonic. These actions are compared with the modern pharmacological science and are given in table 2.1.

Table 2.1 Comparison of Actions of Poduthalai based on Siddha and Modern Pharmacological Science

S.No	Actions	Siddha Literature	Modern Pharmacology	Chemical Constituents
1.	Demulcent	Ullazhalatri	Anti-Inflammatory	Cyclo-PentanoPhenanthrenol
2.	Deobstruent	Veekamkaraichi		
3.	Diuretic	Siruneerperukki	Diuretic	Methanol and aqueous extract of aerial parts of nodiflora
4.	Tonic	Uramaakki	Hepatoprotective and Anti-oxidant	Folinciocalteu phenol reagents

2.2 Phytochemistry

The Plant is rich in many important medicinal useful compounds. The plant contains a variety of constituents such as triterpenoids, flavonoids, phenols, steroids and many others. Among these flavonoids were the most commonly found. Nodifloretin B-sitosterol glycoside and stigmasterol glycoside from the leaves of *L.nodiflora* Nodifloridin along with lactose, maltose, fructose, and xylose were isolated from the plant. Two new flavone glycosides lippiflorin along with the known compound nepetin and batalifilin from the ethanol extract of *L.nodiflora* were isolated⁶. From the flowers of *L.nodoflora*, two flavones glycosides, hydroxyluteolin Oapioside and luteolin, glucoside, and three flavones, hydroxyluteolin, nepetin, and batatifolin were isolated⁷. From the alcoholic extracts of *L.nodiflora*, two phenylpropanoid compounds acteoside and O-acetylchinacoside and a flavone demethoxycentaureidin were isolated. From *L.nodiflora*, twelve flavones sulfates Hispidulinsulfate, Hispidulin, disulfate, Jaceosidin, disulfate, Nepetin, disulfate, Nodifloretin, disulfate, Hydroxyluteolin, Nodifloretin, sulfate Hydroxyluteolinsulfate, Hydroxyluteolin, sulfate, Jaceosidin, sulfate, Nepetin, sulfate, and Hispidulinsulfate along with the known compounds Nepetin, Hispidulin, and Jaceosidin. Halleridone and Hallerone as their acetyl derivatives from the leaves of *L.nodiflora* were isolated. From the methanolic extract of the aerial parts of *L.nodiflora*, a new triterpenoid lippiacin, a new steroid 4', 5' dimethoxybenzoxystigmasterol along with the known stigmasterol and B-sitosterol were isolated.

The plant was fractionated several constituents from the phyla nodoflora using multi component solvent systems; Hexane :Toluene:Ethyl acetate (2:1.5:0.5) for methanol extract and Hexane : Ethyl acetate (3:1) for chloroform and petroleum ether extract. Five different phenolic components were isolated and were compared using aa HPTLC, among these extracts, the highest number of constituents were isolated from the butanol extract. The molecular basis of a compound, cyclo pentane phenanthrenol, which exhibit anti inflammatory property was also given. Nodofloretin, a new flavone was also discovered⁹. Chemical and biological investigations of medicinal herbs phyla nodiflora was done. Steroidal constituent from the aerial parts of Lippianodiflora Linn was also obtained.

2.3 Pharmacological Activities

2.3.1 Antimicrobial Activity

The Methanolic extract of *Phyla nodiflora* had been evaluated for antibacterial. The anti microbial screening was performed by agar diffusion method using a paper disc. The ethanol extract showed significant antibacterial activity due to the presence of bio-active compounds when compared with petroleum – ether and aqueous extract¹⁰.

2.3.2 Antibacterial Activity

The Methanolic extract of *Phyla nodiflora* had been evaluated for antibacterial (*S.aureus*, *M.luteus*, *P.mirabalis*). The anti microbial screening was performed by agar diffusion method using a paper disc. The antibacterial activity against *E.Coli*, *P.aeruginosa*, and *staphylococcus aureus* was seen. The antibacterial activity was seen in the essential oils of this plant. The antibacterial activity was also shown by the methanolic extract of the seeds of *Phyla nodiflora*¹¹.

2.3.3 Antifungal Activity

The antifungal activity of crude extracts of *L.nodiflora* Linn. against the human pathogenic fungi was reported. The crude extract of various solvents of *Phyla nodiflora* had been screened for antifungal activity against *Aspergillusniger*, *A. Flavus*, *Paecilomycesvarioli*, *Microsporungypseum*, *Trichophytonrubrum*. There are some terpenoids in *L.nodiflora* composition, it shows antifungal activity¹².

High antifungal activity in *L rehmanii* due to presence of the oil content β -caryophyllene and β -caryophyllene oxide which were the major compounds that are present in *L.nodiflora* as sesquiterpenes.

2.3.4 Larvicidal Activity

The essential oils of the leaves of *Lippiaalba*, *Lippiaaff. gracilis*, *Lippiagracillis*, *Lippiamicrophylla* and *L.nodiflora* were tested for larvicidal activity against the instar larvae of *aedesaegypti*. The higher larvicidal activity (LC50 = 26.3 $\mu\text{g/ml}$) was observed for the oil of *L.nodiflora*¹³.

2.3.5 Skin Disorders

Phyla is used as the traditional medicine for the treatment of various skin diseases and used as folk cosmetics among the tribal communities of north-west frontier province, Pakistan¹⁴

2.3.6 Hepatoprotective and Antioxidant Potential

The Methanolic extract of Lippianodiflora (MELN) has been evaluated for antioxidant activity and hepatoprotective effects in paracetamol induced liver injury (750mg/k.g,b.w). MELN was administered orally for 7 days. The higher dose of MELN was found to be more effective than the lower dose in paracetamol induced liver damage. MELN produced significant hepatopreventive effect by decreasing the activity of serum enzymes such as SGOT, SGFT, ALPbilirubin and lipid peroxidation. The MELN was found to be hepatoprotective probably due to the antioxidational potential on hepatocytes and the methanol extract of L.nodiflora for total phenolic content, indicated by the folin-ciocalteu phenol reagent was found to be 114.8 µg/ml. Total phenolics for 1 mg of the extract¹⁵.

2.3.7 Antitumor Activity

The Methanolic extract of Lipianodiflora has been evaluated for antitumour activity using Erich's ascites carcinoma (EAC) bearing swiss albino mice. The methanolic extract indicated significant ($p < 0.001$) decrease in tumor volume, viable cell count and packed cell volume, the life span of the mice was also found to be increased. For the mice treated with the methanolic extract the hemotological profiles reverted to more/less normal levels, while these serum enzymes, Total proteins and bilirubin were altered narrowly. The methanolic extract increased the levels of reduced glutathione (GSH), catalase (CAT) and superoxide dismutase (SOD) and reduced the levels of lipid peroxidation. The plant was found to bear good antitumour activity, which was supposed to be due to the increased antioxidant activity¹⁶.

2.3.8 Anti-Diuretic Activity

The diuretic potential of methanolic and aqueous extracts of the aerial parts was assessed in albino rats using in-vivo Lipschitz test model. The volumes of urine, urinary concentration of sodium and potassium ions were the parameters of the study. Furosemide was used as standard. Both the methanolic and aqueous extracts show significant diuretic activity¹⁷.

2.3.9 Anti-Inflammatory Activity

The crude methanolic extract and the isolated compound of cyclopentanophenanthrenol from L.nodiflora were assessed for anti-inflammatory activity.

Thus the compound was concluded to exhibit anti-inflammatory activity¹⁸.

2.3.10 Antiurolithiatic Activity

The ethanolic extract of *Phyla nodiflora* Linn had been evaluated against calculi producing diet induced urolithiasis¹⁹. *Phyla* was studied for its antiurolithiatic activity against most common type of renal stones i.e calcium oxalate type. Calcium oxalate urolithiasis was induced by administration of gentamycin and calculi producing diet (5% ammonium oxalate in standard rate pellet feed). The present study clearly demonstrates the antiurolithiatic activity of *P. Nodiflora* supporting the traditional claim.

2.3.11 Antidiabetic and Hypolipidaemic Activity

The effect of methanolic extract of *Lippianodiflora* Linn Streptozotocin induced diabetic rats was reported²⁰. The methanolic extract of *Lippianodiflora* at three dose levels were administered orally to Streptozotocin (STZ) (40 mg/kg bw) induced diabetic rats for 15 days. The extract at three dose levels showed a significant increase in the Liver, muscle glycogen and serum insulin level and a significant decrease in fasting blood glucose, glycosylated hemoglobin levels and serum marker enzyme levels. The total cholesterol and serum triglycerides levels were also significantly increased upon treatment with the *L.nodifloramethanolic* extract. Histochemical study of pancreas also confirmed the biochemical findings. Acute toxicity studies revealed the non-toxic nature of the methanolic extract of *L.nodiflora* exerts significant antidiabetic and hypolipidaemic effect in STZ-induced diabetic rats.

2.3.12 Neuropharmacological Activity

The neuropharmacological profile of petroleum, chloroform and ethanolic extracts of aerial part of *lippie nodiflora* Linn was reported. The ethanolic and chloroform extracts showed the central inhibitory activity due to the presence of flavonoids²¹.

2.3.13 Miscellaneous Activity

Zheng suggested that since *L.Nodiflora* contains nodifloretin, β -sitosterolglucoside, stigmasterolglucoside, nodifloridin A, and nodifloridin B, it could be used in proper doses for the treatment of hepatitis²². Narayanan et al suggested that the plant extracts of any of the two plants *Daturametel*, *Murrayakoenigii*, *L.nodiflora* and *Wrightiatinctoria* possess anti dandruff application²³.

The anti inflammatory, analgesic and anti pyretic activity in rodents of plant extracts was used in African medicine. A pilot study was done on the simple siddha remedy for puzhuvettu (alopecia areata)²⁴.

Table 2.2 Role of Poduthalai in Paediatric Therapeutics

Name of the Medicine	Physical Form	Main Ingredient	Dose	Indication*	Mode of Action
KazhichalukkuKudineer	Liquid	Poduthalai(Phyla nodiflora), Omam (carumcpticum)	30 ml	Kazhichal in children	Diarrhoea
Mantha Kanji	Semi solid	Poduthalai(Phyla nodiflora), Rice	Acc.to requirement	Mantham	Flatulence, Dyspepsia
NochiSaaru	Liquid	Poduthalai(Phyla nodiflora), Nochi (Vitexnegundo)	15-30 ml	All types of mantham	Flatulence, Dyspepsia
Poduthalaisurasam	Liquid	Poduthalai(Phyla nodiflora), Salt	Acc.to requirement	All types of mantham	Flatulence, Dyspepsia
Veliparuthikarkam	Solid	Poduthalai (Phyla nodiflora), Uttamani (Pergulariadaemia)	Acc.to requirement	All types of mantham	Flatulence, Dyspepsia
ManchanathiKudineer	Liquid	Poduthalai(Phyla nodiflora), Nuna (Morindatinctoria)	15-30 ml	All types of mantham	Flatulence, Dyspepsia
UttamaniKudineer	Liquid	Poduthalai (Phyla nodiflora), Uttamani (Pergulariadaemia)	15-30 ml	All types of mantham	Flatulence, Dyspepsia
Vaividangaurundai	Pill	Poduthalai(Phyla nodiflora), Vaividangam (Embeliaribes)	1 Pill	All types of mantham	Flatulence, Dyspepsia
OmumKudineer	Liquid	Poduthalai (Phyla nodiflora), Omam(carumcpticum)	15-30 ml	Vida mantham	Septicaemia

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AmaiiodukarukuKudineer	Liquid	Poduthalai(Phyla nodiflora), Uttamani(Pergulariadaemia), Nuna (Morindatinctoria)	15-30 ml	Porrmantham	Irritable E Syndrome
EerkuKudineer	Liquid	Poduthalai(Phyla nodiflora),Thippili(Piper longum),Thulasi(Ocimum sanctum)	15-30 ml	Porrmantham	Irritable E Syndrome
Uttamanisurasam	Liquid	Poduthalai (Phyla nodiflora), Uttamani (Pergulariadaemia)	15-30 ml	Porrmantham	Irritable E Syndrome
Poduthalaikaikarkam	Solid	Poduthalai(Phyla nodiflora), Vasambu (Acoruscalamus)	6 gm	Pal mantham	Lactos intoleran
Mukadukadhimathirai	Tablet form	Poduthalai(Phyla nodiflora), Milagu (Piper nigrum)	Acc to age 1/4,1/2, 1tab	Vazhimantham	Convuls disorde
PungueerkuKudineer	Liquid	Poduthalai(Phyla nodiflora), Pungu (pongamiapinnata)	30-60 ml	Manthakanam	Tubercu Enterit
SaranaiKudineer	Liquid	Poduthalai(Phyla nodiflora), Trianthemaportulacast rum	80 ml	Neerkanam	UTI in ch
Eerulikarkam	Solid	Poduthalai(Phyla nodiflora), Eeruli(Allium cepa)	--	Suzhikanam	Childho bronch asthm
Thulasiennai	Oil	Poduthalai(Phyla nodiflora), Thulasi (ocimum sanctum)	--	Suzhikanam	Childho bronch asthm
Veliparuthiennai	Oil	Poduthalai(Phyla nodiflora), Veliparuthi (pergulariadaemia)	--	Aamakanam	Enteric F

Thumbaipakuvamor	Liquid	Poduthalai (Phyla nodiflora), Thumbai(Leucasaspera)	30 ml	Peramakanam	
Poonduenai	Oil	Poduthalai(Phyla nodiflora), Velluli (allium sativa)	48 ml	Adithalal	Rectal pro
Vidathariennai	Oil	Poduthalai(Phyla nodiflora), Kuppaimeni (acalyphaindica)	External application	All types of karappan	Eczen
Aathondaiennai	Oil	Poduthalai (Phyla nodiflora), Atandam (cappariszeylanica)	160 ml	18 types of karappan	Eczen
Vellainei	Oil	Poduthalai (Phyla nodiflora),Thai velai (Gynandropsisgynandra)	--	18 types of karappan	Eczen
Nunaeerkukiyalam	Liquid	Poduthalai(Phyla nodiflora), Masikai (Quercusinfectorius)	--	Mantha kana suram	
UttamaniKudineer	Liquid	Poduthalai(Phyla nodiflora), Uttamani(Pergulariadaemia), Thippili(Piper longum)	Acc. to age and requirement	Aamasuram	
Velaiyathiennai	Oil	Poduthalai(Phyla nodiflora), Nalvelai (cleome viscosa)	16 ml	Aama,perama,athisuram	
AamasanniKudineer	Liquid	Poduthalai (Phyla nodiflora), Chiragam (cuminumcyminum)	80 ml	Aamasanni	Hyper Py
Nei	Ghee	Poduthalai(Phyla nodiflora),Uttamani(pergulariadaemia)	4.4 gm	Vayitruporumal	Flatulen childre
Ennai	Oil	Poduthalai(Phyla nodiflora), Nochi (vitexnegundo),Omum	4.4 gm	Vayiruuthal	Abdomi distensi

		(carumcapticum)			
Kudineer for Suram	Liquid	Poduthalai(Phyla nodiflora), Milagu(Piper nigrum)	15-30 ml	All types of suram in children	Fever children

*Diseases cured by the plant Phyla Nodiflora as per Siddha text

Note: The modern terminologies denoted in table 3 are based on symptoms in siddha diagnosis.

CONCLUSION

Phyla nodiflora is a vital drug in siddha pharmaco therapeutics especially in the field of Balavagadam. More work has to be done on biological activity of isolated compounds and further research(experimental and clinical) are required to explore to isolate biologically active compounds to combat ailments to the children.

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