

THERAPEUTIC USES OF RASNA (*PLUCHEA LANCEOLATA*): A REVIEW ARTICLEDr. Manisha<sup>#</sup> and Dr. Naresh Kumar Garg\*

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## ABSTRACT

Medicinal plants like eg. *Pluchea lanceolata* etc. have been a major source of treatment for human diseases since time immemorial. They are the richest biosource of drugs of traditional system of medicine, modern medicines, food supplements, folk medicines, pharmaceutical intermediates and chemical interties for synthetic drugs. Plant products still remain the principle source of pharmaceutical agents used in traditional medicine. In recent years, there has been a great demand for plant derived products in developed countries. These products are increasingly being sought out as medicinal products, nutraceuticals and cosmetics. The increasing knowledge of metabolic process and the effect of plants on human physiology have enlarged the range of application of medicinal plants.

**KEYWORDS:** Rasna, medicinal plants.

## INTRODUCTION

*Pluchea lanceolata* (D.C.) Oliver and Hiern belongs to the genus *Pluchea* (Family: *Asteraceae*). It is small shrub grows mainly in sandy and saline soil, found in hotter parts of India including Punjab, Rajasthan, Upper West Bengal, Uttar Pradesh and neighboring Asian countries together with North Africa. It is known locally as “Rasna”, Gandhamula Rasya and Yuktarasa. Many controversies exist about the identification of Rasna but *Pluchea lanceolata* is the most widely accepted plant. The plant is used for the inflammation and bronchitis, psoriasis, cough and piles. It is also used as antipyretic, analgesic, dyspepsia, rheumatoid arthritis, bitter, laxative and nerve tonic. The decoction of the plant is used to prevent the swelling of joints in arthritis, rheumatism and neurological disorders. The roots are antipyretic, bitter, laxative and thermogenic, used for allaying and the pain caused by the sting of scorpions.

Rasna, *Pluchea lanceolata* is a natural cure for all problems of nervous system especially of the nerves. Rasna helps in the conditions like neuritis, sciatica and chronic inflammation of the nervous system. Because last part of the intestine is well controlled by the Vata so problems like constipation and flatulence which are associated with the last part of the intestine are well treated by rasna. Rasna works as a Rasayana and a drug of choice to delay process of aging. *Pluchea lanceolata* is used as digestive disturbances like flatulence, abdominal colic and indigestion. It is very useful in respiratory problems like asthma, bronchitis, pleuritis,

chest pain. Being Vedana Sthapana and Vat pacifier, rasna is useful in rheumatoid arthritis and Vata disorbers. *Pluchea lanceolata* is useful in health problems related to female genital system like amenorrhoea, dysmenorrhoea, ring worm and eczema. In skin diseases, a paste of rasna roots prepared in cow's urine is applied. Its decoction is also used to wash the affected area. *Pluchea lanceolata* is anti-toxic and has the property of reducing “Kaf and Vat”. For the treatment of rheumatism, it is given as Rasnaguggulam or Rasnapanckak orally and as Mahanarayan oil or Mahamesa oil externally. Anti-inflammatory activity in the crude extract of *Pluchea lanceolata* has been reported earlier.

In Ayurveda, the management of malaria considered as visham jwar, *Pluchea lanceolata* is a one of the ingredient of poly-herbal formulations has been used to treat jwar (fever) including. “visham jwar”. According to Ayurveda herbs are taken in combination with other herbs to neutralize the toxicity of one herb with the opposing effect of the other or to enhance the particular effect of one herb with the help of other. *Pluchea lanceolata* is one of the ingredient of more than 80 poly-herbal formations.

**Physicochemical Studies**

Medicinal plants have played a significant role in ancient traditional system of medicine. An impressive number of modern drugs have been isolated from natural sources. Plant derived substances has recently become a great

interest owing to their versatile applications. According to the WHO, the first step for identification, purification and standardization of herbal drugs is the pharmacognostic (macroscopic and microscopic) and physicochemical studies which are essential for any phytopharmaceutical products used for standard formulation. Preliminary phytochemical studies are helpful in finding out chemical constituents in the plant material that may well lead to their quantitative estimation. *Pluchea lanceolata* is one of the important medicinal plants having many therapeutic uses. It is therefore necessary to establish the quality control parameters for the leaf stem and roots of *Pluchea lanceolata* with various pharmacognostical and standardization techniques. It comprises of macroscopical and microscopical characters, physicochemical constants, extractive values with various solvents, fluorescence analysis, its reaction after treatment with chemical reagents under visible and in UV light, preliminary phytochemical screening of leaf, stem and root extracts following official compendia. The results help to establish the standardization of the drug.

#### Macroscopic Characters

The plant *Pluchea lanceolata* is an erect allelopathic, perennial under shrub growing up to 30-100 cm high. Stem is cylindrical, 2-3 mm in diameter. Outer surface is whitish green, having branched and branches are pubescent. Leaves are simple, alternate, sessile, oblong or lanceolate, apex with tiny point and round, base is narrow, margin is entire. Leathery and minutely velvety on both surface. Flowers are 3.5 mm in diameter, purplish in color, ovoid in shape, arranged in corymbs at the end of branches. Roots are about 3-20 mm in diameter, 10 to 20 inches in length, somewhat twisted and gradually tapering. The external surface is white when young while it is light to dark brown in mature one and the wood is brownish. External surface showed longitudinal rough striations, odour indistinct and fracture is short.

#### Microscopic Characters

##### Leaf

The transverse section passing through midrib of leaf of *Pluchea lanceolata* reveals its isobilateral nature that has upper and lower epidermis with thick circle, traversed with stomata. The leaf has both covering and granular trichomes; the covering trichomes were uniseriate, multicellular (2 - 5 cells of about 90  $\mu$ m in size and lignified while the granular trichomes were sessile as well as stocked. The function of collenchymatous tissues, vascular bundles and parenchymatous bundle has also been studied. Further studies revealed that the transverse section of the leaf passing through lamina shows a row of small sized palisade under both upper and lower epidermis in continuation within midrib.

##### Stem

The transverse section of the stem of *Pluchea lanceolata* is almost circular in outline covered with thick circle. Epidermis consists of single layer of thick walled cells along with covering and granular trichomes. Covering trichomes are uniseriate, multicellular with two to many thick walled cells while granular ones are sessile as well as stalked. Collenchymatous hypodermis lies underneath the epidermis, followed by 5 - 7 layered parenchymatous cortex.

##### Root

The transverse section of the root of *Pluchea lanceolata* is almost circular in outline. Epiblema is single outer most layers made up of parenchymatous cells along with uniseriate multi cellular root hairs. Cortex is next to epiblema and consists of parenchymatous cells with sufficient intercellular spaces. The cells of cortex contain starch grains, oil cells and lignified cells. Cortex is followed by endodermis and pericycle. The presence of phloem, parenchyma, phloem fibers, xylem and parenchymatous has also been discussed.

#### Physicochemical Analysis

Air dried plant material of *Pluchea lanceolata* were used for quantitative determination of physicochemical values. Total ash, acid insoluble and water soluble ash of all *in vivo* (leaf, stem, root) and *in vitro* (callus) plant samples were determined following WHO/QCMMPPM guidelines (1992) for five times and their mean SE were recorded. The total ash value was found to be maximum in stem and minimum is leaf. The extracts of all *in vivo* (leaf, stem, root) and *in vitro* (callus) plant samples were prepared with different organic solvents such as hexane, benzene, chloroform, ethylacetate, acetone, ethanol, methanol and water following WHO guidelines. The extractives were determined five times and their mean SE was recorded. Water soluble extractive was found to be very high when compared to other extractives.

#### Fluorescence Analysis

The dried powdered *Pluchea lanceolata* plant samples (leaf, stem, root) was extracted with desired quantity of different organic solvents (hexane, benzene, chloroform, acetone, ethylacetate, ethanol and methanol) and after 24 hours fluorescence of each extractive was observed and recorded in both day and UV light. This analysis determines the constituents in the plant that gives a definite idea of the chemical nature

It is thus concluded that the macroscopical and microscopical findings of the plant *Pluchea lanceolata* will lay down the standards which will be useful for detection of the identity and authenticity. The other parameters viz. ash value, extractive values and fluorescence analysis will help to its quality control and assurance for future studies.

### Phytochemical Studies

Preliminary phytochemical analysis was carried out in the petroleum ether, ethylacetate, ethanol and methanol extracts *in vivo* (leaf, stem, and root) and *in vitro* (callus) plant samples of *Pluchea lanceolata*. The presence of different constituents viz. alkaloids, flavonoids, steroids, terpenoids, tannins, glycosides, saponins, proteins, carbohydrates, sterols and phenols were tested using standard procedures. The qualitative phytochemical screening of *in vivo* and *in vitro* plant part of *Pluchea lanceolata* revealed that the ethanolic and methanolic extracts of the plant was found better suited for maximum metabolites. Leaves part was found to be richer in metabolites as compared to others *in vivo* (stem and root) and *in vitro* (callus) plant parts. Based on the phytochemicals of interest, it is necessary to use appropriate solvent for extraction and isolation. Further, preliminary phytochemical screening revealed the presence of major bioactive compounds. The pharmacognostic profile and phytochemical screening showed favorable effects for the standardization parameters of plant parts.

### Phytochemical Constituents

The plant *Pluchea lanceolata* contains different secondary metabolites which have been isolated using various isolation procedures viz. successive extraction, column chromatography. Thin layer chromatography, paper chromatography, gas liquid chromatography, GC-MS, HPTLC etc. Their structures were established by various physicochemical and spectroscopic methods

### Biological Studies

Recently much attention has directed towards extracts and biologically active compounds isolated from popular plant sources. In the discovery of newer drug, molecules, many plant products are evaluated on the basis of their traditional uses. The curative properties of medicinal plants are mainly due to the presence of various complex chemical substances of different compositions which occur as secondary metabolites.

The plant *Pluchea lanceolata* contains different secondary metabolites viz. flavonoids, terpenoids, sterols, taraxasterols, alkaloids, phenols etc. Since these compounds and extractives of hexane, benzene, chloroform, acetone, ethylacetate, ethanol, methanol and water, obtained from *Pluchea lanceolata*, are of pharmacological interest coupled with the use of this plant in traditional medicine prompted the research scientists to check *in vitro* and *in vivo* plant parts of *Pluchea lanceolata* for different activities.

### Anti-inflammatory and anti-arthritic activities

Arthritis means joint inflammation, is chronic progressive and disabling auto-immune disease. It can progress very rapidly causing swelling and damaging cartilage and bone around the joints. It is systemic disease which can affect the hands, feet, wrists, shoulders, knees, spine, lips and internal organs such as

the lungs, heart, eyes and other parts of the body. Arthritis can cause any part of the body to be inflamed creating severe disability which affects a person's ability to carry out every day works. There are mainly two types of arthritis i.e. osteoarthritis and rheumatoid arthritis. Rheumatoid arthritis is an auto-immune disease that occurs when the body's own immune system mistakenly attacks the synovium (cell living inside the joints) which causes joint pain, stiffness, swelling and loss of joint function. Osteoarthritis is degenerative joint disease resulting from the wear and tear from day to day life, which leads to pain, tenderness, swelling and decreased function of joints. The nature has a remedy for these conditions and there are a number of herbs that synergistically to reduce chronic joint inflammation such as osteoarthritis and rheumatoid arthritis. Various extractives viz. hexane, ethylacetate, ethanol, methanol, n-butanol, water and isolated chemical compounds viz. taraxasterol, taraxasterol acetate, psi-taraxasterol, quercetin, quercitrin, isorhamnetin, neolupenol, neolupeol, sorghumol, sorghumol acetate, boehmerol acetate, moretenol, moretenol acetate and other constituents from *Pluchea lanceolata*, were studied for anti-inflammatory and anti-arthritic activities.

The ethanolic extract of the aerial part of *Pluchea lanceolata* exhibited significant anti-inflammatory activity. The ethanolic extract was further fractionated into hexane, chloroform, n-butanol and water fractions. These fractions were screened for anti-inflammatory activity within the acute carrageenin induced oedema test on mice and rats. The highest activity was found with the hexane extract from which psi-taraxasterol acetate was isolated as one of the active constituent.

Neolupenol, a pentacyclic triterpene isolated from *Pluchea lanceolata* flowers was studied to determine its anti-inflammatory activity against carrageenin induced rat-paw oedema. The degree of oedema inhibition was found to increase with dose as well as time interval and was found to be maximum at 300 min. Neolupenol when administered at 100 mg/kg p.o. was found to exhibit 70% oedema inhibition which was greater than that of reference compound ibuprofen (50 mg/kg. p.o., 65% inhibition and 300 min).

The terpene sorghumol, sorghumol acetate, boehmerol acetate, moretenol, moretenol acetate, neolupenol, neolupeol and psi-taraxasterol acetate isolated from *Pluchea lanceolata* were subjected for anti-inflammatory testing which exhibited significant anti-inflammatory and anti-arthritic activities in carrageenin induced paw-oedema model in albino rats at 50 mg/kg p.o. dose level.

*Pluchea lanceolata* has been used in massage oil in traditional system of medicine. The plant *Pluchea lanceolata* is extracted with different organic solvents viz. methanol, ethanol, petroleum ether and chloroform. The different extracts obtained are then boiled separately with oil, till the solvent is completely evaporated. The oil

obtained from these solvent extracts was checked for its anti-inflammatory activity with carrageenin induced rat-paw oedema. The prepared oil was compared with the marketed sample of maharayan oil. The ethanolic oil extract has shown to be having highly active anti-inflammatory agent.

The anti-inflammatory activity was carried out by HRBC (Human Red Blood Cell) membrane stabilization method and anti-arthritic activity by the inhibition of protein denaturation method. The methanolic extract of all plant parts exhibited notable anti-inflammatory activity and remarkable anti-arthritic action. The membrane stabilization was found to be maximum in leaves (86.8% at dose of 1000 g/ml) and that of protein denaturation was also found to be maximum in leaves (70.85% at a dose of 1000 g/ml) as compared to other *in vivo* (stem and root) and *in vitro* (callus) plant parts. The study supported the isolation and use of active constituents from *in vivo* and *in vitro* plant parts of *Pluchea lanceolata* in treating inflammations and rheumatism. The effect of *Pluchea lanceolata* extracts on gynaecological disorders was also studied and found that the extracts exhibited significant uterine relaxant activity.

#### Neurological Activity

Cholinesterase inhibitory activity of the essential oil of *Pluchea lanceolata* was evaluated using mouse brain homogenate. The experimental results showed that hydrodistillate of *Pluchea lanceolata* significantly inhibited anti-cholinesterase activity as compared to reference compound physostigmine. The study supported the use of *Pluchea lanceolata* for the management of neurodegenerative ailments like Dementia and Alzheimer's disease.

It has been investigated that the effect of major pentacyclic triterpene and its naturally occurring acetate derivative isolated from *Pluchea lanceolata* as lipopolysaccharide (LPS) stimulated neuro-inflammatory condition associated to inflammatory cytokine production in rat astrocytoma cell line. The log concentration dependence of *Pluchea lanceolata*, taraxasterol significantly ( $p < 0.05$ ) attenuates the release of pro-inflammatory cytokines, which *in situ* produced acetyl derivative, taraxasterol acetate, did not inhibit the LPS induced IL-6 production at lower concentration ( $p < 0.05$ ). The Surface-Dock molecular modeling study was also conducted to stimulate the binding capacity of compounds into the active site of the cytokines and proteins. The differential inhibition of cytokines by taraxasterol and taraxasterol acetate was further confirmed by high docking scores showing the high affinity to target proteins. The findings thus supported the comparatively greater role of *Pluchea lanceolata* triterpene than its *in situ* produced acetate derivative in neuro-inflammation associated disorders.

#### Antimalarial Activity

The antimalarial activity of methanol, ethanol, ethylacetate, chloroform and hexane extracts of *Pluchea lanceolata* together with taraxasterol acetate isolated from hexane extract were tested. Hexane extract and taraxasterol acetate exhibited promising antimalarial activity *in vitro* and *in vivo* condition. Taraxasterol acetate attributed in inhibition of the pro-inflammatory cytokines as well as afford to significant increase in the blood glucose and haemoglobin level when compared with vehicle treated infected mice. *In vitro* and *in vivo* safety evolution study revealed that hexane extract is non-toxic at higher concentration. The study thus validated the ancient Indian traditional use of *Pluchea lanceolata* as an antimalarial agent.

#### CONCLUSION

The present review represents physicochemical, phytochemical and biological studies carried out on the plant *Pluchea lanceolata*. The macroscopical and microscopical findings and fluorescence analysis will lay down the standards which will be useful for the detection of the identity and authenticity. The phytochemical screening described the presence of a large number of phytochemicals and it will be useful for further studies. The biological activity of the plant gives an idea about the current status of the plant research. The generated information of the present study will provide a significant scope to develop a broad spectrum use of *Pluchea lanceolata* in herbal medicine and as a base for the development of novel potent drugs and phytomedicine

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