IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
February 2024 Vol.:30, Issue:2

Pharmacognostical, Phytochemical and Pharmacological Studies of *Adenocalymma alliaceum*

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Submitted: 19 January 2024
Accepted: 24 January 2024
Published: 29 February 2024

HUMAN JOURNALS
ijppr.humanjournals.com

Keywords: *Adenocalymma alliaceum* (Lam.) A.H. gentry, garlic creeper, traditional uses, phytochemical analysis, pharmacological activities

ABSTRACT

Adenocalymma alliaceum (Lam.) A. H. Gentry, a member of the *Bignoniaceae* family, is sometimes referred to as "false garlic" or "garlic vine." is a native plant that the Indigenous Indian tribes of the Amazon region use. Because it contains multiple elements with significant pharmacological qualities, it has significant ancestral value for the local community and is also employed in traditional medicine**.** *M. alliacea* is frequently used in baths to treat feverish conditions, flu, body pains, cramps, weariness, mosquito and snake repellent, epilepsy, uterine disorders, and many other diseases. It is also widely used in folk medicine remedies for many other ailments, including colds and fertility issues**.** Dimethyl sulfide, diallyl disulfide, diallyl trisulfide, propyl allyl, daucosterol, beta-sitosterol, fucosterol, stigmasterol, iridoids and isothiocyanates, naphthoquinones, alkaloids, saponins, and flavones are among the components of plants. The pharmacological properties of *M. alliacea* include larvicidal, anti-plasmodial, antibacterial, antifungal, and anti-inflammatory properties. It is a very effective plant treatment for fever, flu, and colds as well as for pain and inflammatory illnesses including rheumatism and arthritis. Typically, leaves are used as a decoction or infusion. In addition to being used in tinctures and cold macerations, roots are typically consumed as a tonic for the entire body. Traditionally employed, the plant's properties included antibacterial, anti-cholesterolemic, antifungal, anti-inflammatory, antioxidant, anti-rheumatic, antispasmodic, antitussive, and antiviral properties. A portion of Jangali Lahsun, also known as Lahsun Bel, is used medicinally. There hasn't been any phytochemical or pharmacognostic research done on these leaves yet. The current study focuses on establishing the quality parameters for *Mansoa alliacea* (Lam.) leaves by evaluating their phytochemical composition qualitatively.

INTRODUCTION

Adenocalymma alliaceum (Lam.) A. H. Gentry is a member of the *Bignoniaceae* familyand is sometimes referred to as "false garlic" or "garlic vine." is an herb that native people use. Native American tribes in the Amazon region, it is highly valued by the locals for its ancestral qualities and is used in traditional medicine since it contains multiple compounds withsignificant pharmacological qualities[1].

Mostly found in Brazil's moist and dry forests, as well as in Argentina and southern Mexico[2]. When crushed, leaves have a strong garlic flavor[3] and scent, although they do not odor if the plant is not attended to. The indigenous people of the Amazon jungle use *A.alliaceum* leaves as seasonings and spices[3]. For the production of salads, sandwiches, and other foods, fresh, tender leaves and stems have been used. Fresh leaves that have been crushedor powdered and dried can be used for garlic in cooking. This garlic creeper[4] blooms multipletimes a year and is incredibly floriferous and vigorous. One characteristic of flowers is a white compact and spherical inflorescence with a core that, as it ages, fades to softer tones. This plantis commonly grown as an indoor pot plant[5] and as a decorative. Numerous illnesses, such as colds, as a fertility booster, are frequently used in baths to treat feverish conditions, flu, body pains, cramps, exhaustion, epilepsy, uterine diseases, and so on. Dialyl disulphide, diallyl trisulphide, dimethyl sulphide, daucosterol, betasitosterol, fucosterol, stigmasterol, iridoids and isothiocyanates, naphthoquinones, alkaloids, saponins, and flavones are the components ofplants. The pharmacological actions of M. alliacea include anti-inflammatory, antibacterial, antifungal, larvicidal, anti-plasmodial, anticancer, hypocholesterolemic[1], and antioxidant properties. The pictorial representation of *Adenocalymma alliaceum* are shown in Figure 1.

Figure 1: *Adenocalymma alliaceum*

1.1 Taxonomical Classification

Kingdom : Plantae

Subkingdom : Viridiplantae

Super division : Embryophyta

Division : Tracheophyta

Class : Magnoliopsida

Superorder : Asteranae

Order : Lamiales

Family : *Bignoniaceae*[5]

Genus *: Adenocalymma* DC

Species : *Adenocalymma Alliaceum* (Lam.) A.H.Gentry[6]

1.2 Synonym(s)[7]

Mansoa alliacea

Adenocalymma pachypus Adenocalymma sagotii

Bignonia alliacea

Pachyptera alliacea

Pseudocalymma alliaceum Pseudocalymma pachypus Pseudocalymma sagotii

1.3 Vernacular names[7]

English : Garlic Vine, False garlic, Wild garlic

Hindi : Lahan Bel

Tamil : Vellullipachai

Malayalam : Veluthullichedi

Kannada : Bellulli balli

Manipuri : Chanameli

Bengali : Lata parul

1.4 Habitat

A.alliaceum is an evergreen, semi-woody climber that resembles a vine or shrub. It generates several woody vines from its root, each of which only reaches two to three feet long.Tall and have a shape akin to a bush[3]. It is a common ornamental plant in tropical gardens because of its confined habitat and nearly constant blossoms. Tropical rainforests are home to the majority of them. They require firm soil that is rich in organic matter, humus, and moisture retention. They are not found close to bodies of water because the area is prone to flooding. *A.alliaceum* is also found in tiny primary forests and shady places with sparse vegetation. It happens in tropical regions with temperatures between 20 and 30´C and rainfall of 1800–3500 mm annually.

1.5 Distribution

The plant is indigenous to South America, specifically the Amazon region, and has been documented in Bolivia, Brazil, multiple Caribbean islands, Columbia, Panama, and other places. Ecuador's Costarica, French Guiana, Suriname, Peru, and Guyana[1].

1.6 Botanical descriptions

Evergreen climbing shrub *M.alliacea* has semi-woody branches that it uses as growth supports to cling to bigger trees. The 3 m-tall plant has leaves that are glabrous surface, papery texture, symmetrical and tapering base, venation reticulate, bright green, somewhat coriaceous,opposite, apex mucronate, border entire, and two ovate. When crushed, the leaves release a strong garlic flavor and odor, but if the plant is left alone, the leaves remain odorless. Fruits are up to 25–35 cm long, elongated capsules. Lengthy, with transversely oblong seeds that havelarge wings. Racemosa inflorescences with terminal or axillary flowers are violet in color. Their funnel-shaped corolla can reach a length of 6 to 9 cm, while their campanulate calyx measures 5-8 mm[1]. The white core of flowers eventually fades to softer tones as they age. In apical meristems, new branch growth begins between two fully developed leaves. Every year, there are flowering and fruiting seasons. The stem measures 10–20 mm in diameter and 7-8 cm in length. Because of the tiny pits that are on the surface, it is abrasive. The old stem is light brownish, while the young stem is green in color. The shape

of the stem is cylindrical. Typically,growth begins during the wet season.

1.7 Traditional uses

Dried Ariel parts infusion In Surinam, *M.alliacea* has been used as a vermifuge to relieve rheumatic pain and fever[9]. By burning them, they keep flies and bats away. departs. A leaf infusion is used to cleanse and purify during magical ceremonies. Additionally, fresh and dried leaves, bark, stem, and roots are used in advertisements as a scent fixative, an ingredient in fragrances, or a medication to treat illnesses related to atherosclerosis and rheumatism (using a tincture of bark and roots). Crushed leaves are applied to the affected area of arthritis to reduce pain. Tea produced from bark is used to cure epilepsy. Crushed leaves are applied as a tonic or as a forehead patch for headaches. The herb was employed by the Native Americans in mystical or magical rites to ward off evil spirits. In Brazil, foliage *M. alliacea* infusions have been used as a condiment, analgesic for headaches, and a remedy for conditions including fever and cold. In Guiana, decoctions of stems and leaves are applied externally to treat ailments like soreness and muscle exhaustion. Tea leaves are used for constipation, tea preparation, coughing and nausea. Rheumatism and arthritis are two conditions that benefit from the application of alcoholic maceration of root barks and leaf patches. Roots macerated in water as a tonic and leaf infusion for cold or fever. Dried leaves are used as an insecticidal[10] and to treat ailments like malaria, pneumonia, and the common cold in Peru. Pregnant women[11] in Surinam are known to benefit from drinking stem-soaked water. In Venezuela whole plant is used for an emetic. In the Amazonian region, the leaf is used in the bath to relieve sudden shock or a nervous state which is caused by terror called Manchiari. Tapajos Indians used it for body aches and flu. The Esa'eja Indian used against cold and the Amuesha used to increase fertility as an infusion or oral form[12].

2 PHARMACOGNOSTICAL STUDY OF *Adenocalymma Alliaceum*

2.1 (a) Organoleptic Characteristic[13]

The organoleptic characters such as colour, odour and taste of the leaf were recorded.

The pictorial representation of mature leaves *Adenocalymma alliaceum* are shown in figure 2.

Table 1: Organoleptic characters of leaf of *A.alliaceum* (Lam.) leaf

Sl No	Organoleptic character	Dried powder of mature leaf
1.	Colour	Light green
2.	Odour	Pungent & disagreeable
3.	Taste	Pungent
4.	Fracture	Fine

Figure 2: Leaves of *Adenocalymma alliaceum*

2.2 (b) Macroscopic Characteristics[14]

The leaves are used for morphological observation. The macromorphological feature of leaf was observed under a magnifying lens photographed using digital camera (DSC W220, Sony Corp, Japan).

(b) Macroscopic characters

Table No.2: Macroscopic characters of leaf of *M. alliacea* (Lam.).

Sl No.	Macroscopic character	Dried powder of mature leaf
1.	Part	Leaf
2.	Taste	Pungent
3.	Size	7-15 cm × 4-5 cm in size
4.	Shape	Ovate to lanceolate apex mucronate and Acuminate
5.	Surface	Glabrous and glaucous, surface, texture sub coriaceous, base symmetric and tapering, venation reticulate.

2.3 (c) Microscopic Characteristics[15]

Free hand section of the leaf was taken and stained by the reagent safranin to confirm its lignification. Powder microscopy was also carried out and their specific diagnostic characteristics were recorded. Photomicrographs were obtained by observing the sections under a compound binocular microscope and the figures of the section were drawn with the help of Camera Lucida.

(c) Microscopic: The diagnostic characters of leaf **lamina** are shown in figure 3.

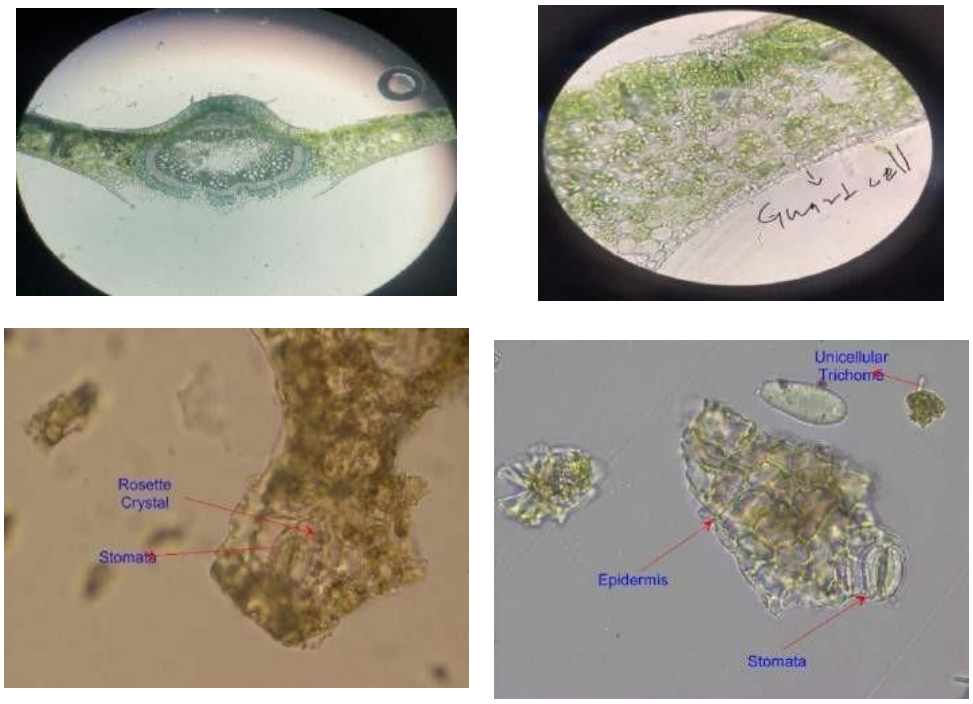

Figure 3: Showing T.S. of Leaf (Stained), showing Grand cell in T.S. of leaf, showing Rosette crystal & Stomata in Powder microscopic, showing unicellular Trichomes and Epidermis cell in Powder microscope.

- **Upper epidermis:** The transverse section of Lamina shows an upper epidermis covered by thin cuticle and covering trichomes and stomata are present. Underlying the upper epidermis is a single-layered.

- **Mesophyll:** Underlying the upper epidermis is a single-layered, compact, radially elongated palisade having scattered rosette crystals of calcium oxalate followed by spongy mesophyll composed of 2-3 layers of loosely arranged parenchymatous cells.

- **Palisade parenchyma:** One layer of palisade parenchyma, radially elongated palisade having scattered *Rosette crystals* of calcium oxalate followed by spongy mesophyll.

- **Lower epidermis:** Resembles upper epidermis, but a number of trichomes and stomata are more.

Covering trichomes - single-celled, blunted, thick walled, unicellular.Stomata - Anisocytic stomata.

The diagnostic characters of leaf midrib are

- **Collenchyma:** Midrib consists of well-developed collenchyma beneath theepidermis.

- **Vascular bundles:** Vascular bundles are bicollateral. Ground tissue consists of loosely arranged polygonal parenchymatous cells and cicatrix.

Xylem - Hexagonal with broad lumen.Phloem - Oval to elliplical 5-6 layer.

The pictorial representation of powder of *Adenocalymma alliaceum* shown in figure 4.

Figure 4

Table No. 3: Powder Microscopic Characters of *M. alliacea* (Lam.)

Sl No	**Organoleptic Character**	**Powder of *M. alliacea***
1.	Part	Leaf
2.	Colour	Light green
3.	Odor	Pungent & disagreeable
4.	Taste	Pungent
5.	Touch	Fine

Table No. 4: Diagnostic characters of the Powder Microscope.

Sl. No.	Diagnostic Characters	Powder of leaf of *M. alliacea*
1.	Epidermis cells	Straight walled, Rectangular thick walled.
2.	Crystal	Rosette crystal are present in mesophylls.
3.	Stomata	Anisocytic stomata with long axis of guard cells
4.	Fibers	Pericyclic Fiber are found
5.	Trachoma	Glistening & Unicellular
6.	Vascular bundle	Present

a. Microscopy characters of the Root: The diagnostic characters is cork are 4-5 layer of cubical rectangular cells cortex very wide and thin-walled having intracellular space. Parenchyma cells are small consist thin walled and polygonal in shape. Xylem Consist of vessels, tracheids, parenchyma and few fibers. Medullary rays are Multiseriate composed with thick walled cells and rosette crystals and pith are present. The pictorial representation of T.S Rootshown in figure 5.

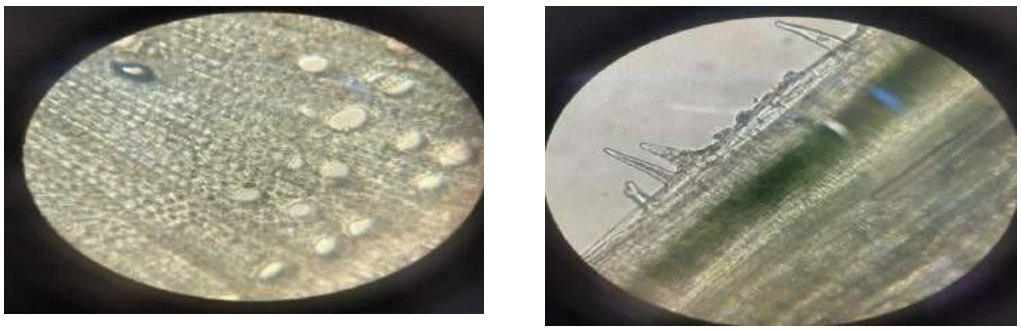

Figure 5: Showing Xylem & Medullary rays in T.S. of Root, Showing Simple & Unicellular Trichomes.

b. Microscopic characters of the Stem: The diagnostic characters are epidermis consists of single layer of straight walled oval cells covered by thin cuticles. The cortex contains many layers of parenchymatous cells having scattered groups of lignified pericyclic fibers. Stele consists of bicollateral vascular bundles having many patches of sieve tubes cells embedded in phloem parenchymatous cells. Pith has pitted parenchymatous cells with intercellular space and rosette crystals and clusters of calcium oxalate present in most of the phloem parenchyma.

c. Trichomes unicellular are present. Medullary rays are multiseriate composed of thick walledcells. The pictorial representation of T.s of stem is shown in figure 6.

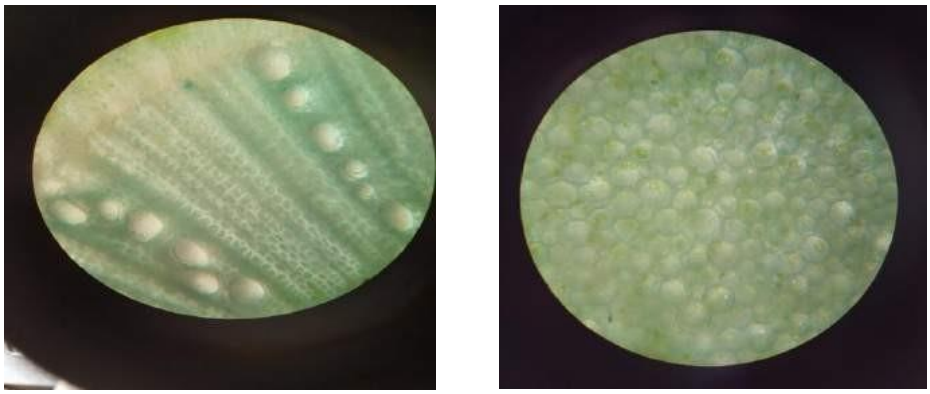

Figure 6: Showing T.S. of Stem, Pericycle in T.S. of Stem,

Showing Medullary rays and xylem vessels, Showing Rosette crystalseen in Mesophyll.

3. PHYTOCHEMICAL SCREENING[16]

3.1 Physico-Chemical TestsForeign Matter[17]:

The sample shall be free from visible signs of mold growth, sliminess, stones, rodent excreta, insects, or any other noxious foreign matter when examined as given below. Take a representative portion from a large container, or remove the entire contents of the packing if 100g or less and spread in a thin layer in a suitable dish or tray. Examine in daylight with unaided eye. Transfer suspected particles, if any, to a petri dish and examine with 10x lens in daylight.

Determination of Total Ash[18]:

Incinerate about 2 to 3g accurately weighed, of the ground drug in a tared platinum or silica dish at a temperature not exceeding 4500 until free from carbon, cool and weigh. If a carbon-free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness and ignite at a temperature not exceeding 4500. Calculate the percentageof ash with reference to the air-dried drug.

Determination of Acid-Insoluble[19]:

Ash To the crucible containing total ash, add 25 ml of dilute hydrochloric acid. Collect the insoluble matter on an ashless filter paper (Whatman 41) and wash with hot water until the filtrate is neutral. Transfer the filter paper containing the insoluble matter to the original crucible, dry on a hot-plate and ignite to constant weight. Allow the residue to cool in a suitable desiccator for 30 minutes and weigh without delay. Calculate the content of acid-insoluble ashwith reference to the air-dried drug.

Determination of Water Soluble Ash[20]:

Boil the ash for 5 minutes with 25 ml of water, collect insoluble matter in a Gooch crucibleor on an ashless filter paper, wash with hot water and ignite for 15 minutes at a temperature not exceeding 450. Subtract the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash. Calculate the percentage of water solubleash with reference to the air-dried drug.

Determination of Alcohol Soluble[21]:

Extractive Macerate 5g of the air dried drug, coarsely powdered, with 100 ml of alcohol to the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat-bottomed shallow dish and dry at 1050, to constant weight and weight. Calculate the percentage of alcohol-soluble extractive with reference to the airdried drug for determination of methanol soluble extractive use methanol on place of alcohol.

Determination of Water Soluble[22]:

Extractive Proceed as directed for the determination of alcohol soluble extractive, using chloroform-water instead of ethanol.

Determination of Moisture Content[23] (LOD):

Procedure set forth here determines the amount of volatile matter (i.e., water drying off from the drug). For substances appearing to contain water as the only volatile constituent, the procedure given below, is appropriately used. Place about 10g of drug (without preliminary

drying) after accurately weighing (weighed to within 0.01g) it in a tared evaporating dish. For example, for unground or unpowered drug, prepare about 10g of the sample by cutting shredding so that the parts are about 3mm in thickness. Avoid the use of high speed mills in preparing the samples and exercise care that no appreciable amount of moisture is lost during preparation and that the portion taken is representative of the official sample. After placing the above said amount of the drug in the tared evaporating dish, dry at 1050 for 5 hours and weigh. Continue the drying and weighing at one-hour interval until difference between two successive weighing corresponds to not more than 0.25 per cent. Constant weight is reached when two consecutive weighs after drying for 30 minutes and cooling for 30 minutes in a desiccator, show not more than 0.01g difference.

Determination of pH Values[24]:

The pH value of an aqueous liquid may be defined as the common logarithm of the reciprocal of the hydrogen ion concentration expressed in gm per liter. Although this definition provides a useful practical means for the quantitative indication of the acidity or alkalinity of a solution, it is less satisfactory from a strictly theoretical point of view. No definition of pH as a measurable quantity can have a simple meaning, which is also fundamental and exact. The pH value of a liquid can be determined potentiometrically using the glass electrode, a reference electrode and a pH meter either of the digital or analogue type.

Table 5: Physicochemical parameters of *Mansoa alliacea* leaf powder

Sl.No	Parameters	Values %w/w
1	Foreign matter	Nil
2	Loss on drying	7.25 ± 0.22
3	Total ash	8.15 ± 0.92
4	Acid – insoluble ash	3.45 ± 0.18
5	Alcohol soluble extractive	10.25 ± 2.02
6	Water soluble extractive	2.12 ± 0.72
7	Petroleum ether soluble extractive value	0.92 ± 0.02
8	Chloroform soluble extractive value	4.25 ± 0.32
9	Ethyl acetate soluble extractive value	6.89 ± 0.03

Physico-chemical parameters are important analytic features during standardization. Foreign

matter is directly related to the presence of impurities. If foreign matter is very high which may affect its treatment. Foreign matter value obtained are Nil. The Ash value of a drug gives an idea of the earthly matter or the inorganic composition and other impurities present along with the drug. Hence the average Total Ash Value obtain is 8.15% in sample. Acid insoluble ash which are important parameter for detecting the presence of inorganic substances were found to be 0.56%. Alchohol soluble extractives were found to be 10.25%. Water extractivewas found to be 2.12 % and alchohol soluble extractive value found to be 10.25%. Water soluble extractive (W.S.E.) and alcohol soluble extractive (A.S.E.) value are indication of thesolubility of the active principle of the plant.

3.2 PRELIMINARY SCREENING[25]

Tests performed for the presence of qualitative phytochemical analysis

a) Tests for alkaloids[26]

1) Dragendorff's test:

To 1 ml of each of the sample solutions taken in a test tube few drops of Dragendorff's reagent (potassium bismuth iodide solution) were added. A reddish brown precipitate was observed indicating the presence of alkaloids.

2) Meyer's test:

To 1ml of each of the sample solutions few drops of Meyer's reagent (potassium mercuric chloride solution) was added. A creamishwhite precipitate was formed indicating the presence of alkaloids.

3) Wagner's test:

To few ml of each of the sample solution, Wagner's reagent (Iodine in potassium iodide) was added, which resulted in the formation of reddish-brown precipitate indicating the presence of alkaloids.

b) Tests for Flavonoids[27]

1) Lead acetate test:

When aqueous basic lead acetate was added to test sample produces reddish brown

precipitate.

2) Ferric chloride test:

To few ml of test samples taken separately, few drops of ferric chloride were added which resulted in the formation of blackish red precipitate.

3) Shinoda test: (Magnesium hydrochloride reduction test):

To the test solution few fragments of magnesium ribbon and concentrated hydrochloric acid were added drop wise and reddish to pink colour was resulted.

4) Alkaline reagent test:

When sodium hydroxide solution was added to the test samples formation of intense yellow color, which turns to color less on the addition of few drops of dilute acid indicates the presence of Flavonoids.

c) Test for Tannins and Phenol[28]

1) Ferric chloride test:

When a few drops of ferric chloride were added to sample solution a blackish precipitate appears.

2) Gelatin test:

When gelatin and water were added to test samples formation of white precipitate was resulted.

3) Lead acetate:

Few ml of test samples were taken in different test tubes followed by the addition of aqueous basic lead acetate. It results in the formation of reddish-brown bulky precipitate.

4) Ellagic acid test:

When 5% glacial acetic acid and 5% sodium nitrite were added to test samples a muddy niger brown color appears, which is a positive result for phenols.

d) Tests for Glycosides[29]

1) Legal's test:

When the test samples were treated with pyridine and sodium nitroprusside solution blood red colour appeared.

2) KellarKiliani test:

1ml of concentrated sulphuric acid was taken in a test tube then 5ml of extract and 2ml of glacial acetic acid with one drop of ferric chloride were added, formation of a blue colour.

3) Concentrated Sulphuric acid test:

Conc.H2SO4 was added to test sample which resulted in the appearance of reddish colour.

e) Tests for Sterols[30]

1) Libermann-Buchard test:

When samples were treated with few drops of acetic anhydride, boiled and few drops of concentrated sulphuric acid from the sides of the test tube were added, shows a brown ring at the junction of two layers and the upper layer turns green which shows the presence of steroids.

2) Salkowski test:

Few drops of concentrated sulphuric acid were added to the test samplesin chloroform, a red colour appears at the lower layer indicating the presence of sterols.

f) Tests for Quinones[31]

1. Alcoholic KOH test:

When alcoholic KOH was added to the test samples red to blue color appears reacting positively for quinines.

g) Tests for Saponins[32]

1. Foam test:

5ml of the extract was shaken vigorously to obtain a stable persistent froth. The froth was

then mixed with three drops of olive oil and observed for the formation of an emulsion, which indicated the presence of saponins.

3.3 Tests Performed For The Presence Of Quantitative Phytochemical Analysis Total flavonoids determination[33]

The total flavonoid content (TFC) of different parts such as leaves, stem bark, root bark and callus of Oroxylumindicum(L.) Ventwas determined using the aluminium chloride assay through colorimetry. Each plant extract (0.5 ml of 1:10 g ml-1) in methanol were separately mixed with 1.5 ml of methanol, 0.1 ml of 10% aluminum chloride, 0.1 ml of 1 M potassium acetate and 2.8 ml of distilled water. It remained at room temperature for 30 min; the absorbance of the reaction mixture was measured at 415 nm with a double beam Perkin Elmer UV/Visible spectrophotometer (USA). The concentrations of flavonoids in the test samples were calculated from the calibration plot and expressed as mg quercetin equivalent/g of the sample.

Total phenols determination[34]

Total phenols were determined by the FolinCiocalteu reagent. A dilute extract of each plant extract (0.5 ml of 1:10 g ml-1) or gallic acid (standard phenolic compound) was mixed with FolinCiocalteu reagent (5 ml, 1:10 diluted with distilled water) and aqueous Na2CO3(4 ml, 1 M). The mixtures were allowed to stand for 15 min and the total phenols were determined by colorimetry at 765 nm. All determination was performed in triplicate.A standard calibration plot was generated at 650nm using known concentrations of gallic acid. The concentrations of phenols in the test samples were calculated from the calibration plot and expressed as mg gallic acid equivalent of phenol/g of the sample.

3.4 QUALITATIVE PHYTOCHEMICAL ANALYSIS Leaf extract[35]

The screening for the phytochemicals present in the leaf extract of *Mansoaalliacea(Lam.)* revealed the presence of alkaloids, tannin, phenol, flavonoids, glycosides and sterol in all the organic solvent. While saponin was absent in all the three organic solvent. Lignin was presence in aqueous extract, while negative in methanol and hexane. Quinone was positive in aqueous extract, while negative in methanol and hexane extract. A similar report was reported in *Asteracantha longifolia* and *Pergularia daemia*.

Root extract [36]

All the solvent extract of root were gives positive result for alkaloids, tannin, phenol, Flavonoids while quinines were completely absent in all the solvent extract of root. Glycosides were positive in aqueous extract while negative in methanol and hexane extract. Lignins were screened positive in methanol, whereas aqueous extract and hexane extract.

3.4(1) Phytochemical analysis[37]

Leaves contains essential oils are allyl methyl trisulfide, allyl propyl trisulfide, dithiacyclopentene, allyl propyl disulfide, allyl methyl trisulfide, allyl isobutyl sulfide, allyl isobutyl disulfide, diallyl monosulfide, diallyl disulfide, diallyl sulfide, diallyl trisulfide, diallyl tetrasulfide, 3-vinyl1, 2-dithi-4-en, allyl tri-sulfite, tetra sulfite, di-2-propinil, trisulfide, di-2-propenyl, 1-octen-3-ol, allyl methyl disulfide, allyl methyl tetra sulfide, propenyl propyl trisulfide, 3-vinyl-1, 2-dithi-4-ene, 3-vinyl-1, 2-dithi-5-ene, tri thiacyclohexene, diisoamyl disulfide, 2-methyl-2- pentenal,nonanethiol, cis-dipropenyl disulfide, 3,4- dimethyl-2, 3-dihidrothiophen-2-one, methyl salicylate, trans-dipropenyl disulfide[38].

Petroleum extract[43] of leaves contains n-alkanes C25-C35, n-alkanols, 24- ethylcholest-7-ene-3 β-ol, fucosterol, 3β-hydroxyurs-18-en-27-oic acid, 32- hydroxyhexatriacontan-4-one[39], 19-hydroxyhexatriacontan18-one, 34-hydroxy-8-methyl heptatriacontan-5-one, pentatriacont-1-en-17-ol, β-sitosterol, and stigmasterol. Flowers show44 the presence of essential oils are diallyl disulfide, diallyl tetrasulfide, diallyl trisulfide, and 1-octen3-ol[40]. Methanolic extract of flowers contains alliin, β-amyrin, apigenin, apigenin-7-glucoside, apigenin-7-glucuronide scutellarein-7-glucuronide, apigenin-7-glucuronyl glucuronide, apigenin-7-O-methyl glucuronide, cyaniding3- rutinoside, β-sitosterol, β-sitosteryl d-glucoside, luteolin, 7-O-methyl scutellarein, ursolic acid[41]. Bark Methanolic extract contains 9-methoxy-α-lapachone, 4-hydroxy-9- methoxy- α-lapachone. Ethyl acetate extract of the whole plant contains p-coumaric acid, ferulic acid and resveratrol[42].

TABLE 6: Phytochemicals Analysis of on leaf extract of *Mansoaalliacea*

Test for phytocompound	Name of test	Methanol	Hexane	Aqueous
Alkaoids	Mayers	+	+	+
	Wagners	-	+	-
	Dragendroff	+	-	-
Tannis and Phenol	Gelatin	+	+	-
	FeCl3	-	-	-
	Lead acetate	+	+	+
Saponins	Foam test	-	-	-
Flavonoids	Alkaline reagent test	+	-	+
	Mg ribbon test	+	+	-
	Lead acetate	+	-	+
Glycosides	Legal test	+	-	+
	Kellar killani test	-	-	-
Sterols	Libermann burchard test	-	+	-
	Salkowski test	-	+	-
Quinones	Alcoholic KOH	+	-	+
Lignin	Labat test	+	-	-

+ Presence; - Absence

TABLE 7: Phytochemicals Analysis of on root extract of *Mansoaalliacea*

Test for phytocompound	Name of test	Methanol	Hexane	Aqueous
Alkaoids	Mayers	+	+	+
	Wagners	-	+	-
	Dragendroff	+	-	-
Tannis and Phenol	Gelatin	-	-	-
	FeCl3	+	-	+
	Lead acetate	+	+	+
Saponins	Foam test	+	+	+
Flavonoids	Alkaline reagent test	+	+	+
	Mg ribbon test	-	-	-
	Lead acetate	+	+	-
Glycosides	Legal test	+	-	+
	Kellar killani test	-	-	-
Sterols	Libermann burchard test	-	+	-
	Salkowski test	-	+	-
Quinones	Alcoholic KOH	-	+	-
Lignin	Labat test	-	-	-

+ Presence; - Absence

4 PHARMACOLOGICAL ACTIVITIES

4.1 Anti-inflammatory activity[45]

Hydroalcoholic extract of *A.alliaceum* leaves shows anti-inflammatory activity in albino rats by inhibiting the induced edema in a graded fashion. In the carrageenan-induced paw edema acute model, the standard anti-inflammatory drug (Indomethacin 10mg/kg P.O) as well as the

test drug mansoa alliacea leaves (100&200mg/kg) exhibited a significant reduction($p<0.001$) in the volume of paw edema in rats as compared to control rats. The action is due to the release of inflammatory mediators like serotonin, histamine, prostaglandins, bradykinin, and TNF-α.

4.2 Anti-oxidant activity[34]

Ethanolic extract of *A.alliaceum* leaves shows anti-oxidant activity, is investigatedby methods like hydrogen peroxide scavenging assay, reducing power assay, and phosphomolybdenum method. A considerable amount of flavonoids and phenols reveals high antioxidant activity. Phenolic compounds are known as powerful chain-breaking antioxidants, important plant constituents because of their scavenging ability due to their hydroxyl group and contribute directly to anti-oxidative action.

4.3 Anti-cancer activity

Water extracts of *A.alliaceum* at lower doses show anticancer activity on cancerous cell lines. Doses between 1.254- 10.04mg/ml of extract applied to T3-HA cancer cells inhibited cell growth but higher doses like 29.92-89.6mg/ml destroyed the colonies of cancer cells. Application of extract to NIH Swiss mouse cell cultures resulted in the inhibitionof growth at higher concentrations, but at a concentration of 10.14mg/ml, cell growth began to increase after three days. Cell death was less at a lower concentration than that of the T3-HA cancer cells, in lower concentrations inhibit the cell growth and non-cancer cells. Thus extract selectively targets T3-HA mouse cancer cells but not NIH Swiss embryonic mouse cell lines. M.alliacea phytoconstituents like allicin, allyl sulfide or diallyl sulfide show tumor suppression effect[8].

4.4 Anthelmintic activity[46]

Anthelmintic activity of *A.alliaceum* against Pheretima Posthuma by using in-vitro and in-silico approaches. Studies reveal that the methanolic extract has the most important dose-dependent anthelmintic efficacy at various levels. By in-silico studies, show that the four phytochemicals like Apigenin 7-O-methyl glucuronide, scutellarin, luteolin, and ursolic acid of *A.alliaceum* are likely against the β-tubulin were identified by using the PyRx tool. Utilizing the contemporary strategies, these phytocompounds from a natural origin might establish a reliable medication or support lead identification.

4.5 Antifungal activity[47]

A.alliaceum leaf extract of 4.1% significantly ($p < 0.05$) inhibited the fungal growth, spore formation, spore germination, and fungal biomass of Colletotrichum acutatum, which causes anthracnose diseases. The minimum inhibitory concentration (MIC) value of *M.alliacea* was about 0.7% on fungi with inhibitory power of 5.25mm. Antifungal activity of *M.alliacea* due to the presence of high amount of phenol and alkaloids.

4.6 Hypocholesterolemic activity[48]

Dried flower of *A.alliaceum* shows hypocholesterolemic activity in rats were fed about 6 weeks with 2% level in the diet. The flower causes the lowering of absorption of dietary cholesterol from intestine and also due to the presence of organosulphur compounds.

4.7 Larvicidal activity[49]

The essential oils and hydrolat of *A.alliaceum* show larvicidal activity in aqueous, ethanol and methanol extracts. The extracts of 10% reduced in 6.15, 3.42 and 5.57 days, were inhibited the normal growth and development of mosquito larvae, prolonging and delaying the larval and pupal duration. Larvicidal activity is due to the presence of major constituents like diallyl disulfide and diallyl sulfide.

4.8 Antibacterial activity[50]

n-hexane, chloroform, ethanol and aqueous leaves extract of *A.alliaceum* shows the antibacterial activity against the strains of Gram-positive bacteria like Bacillus subtilis and Staphylococcus aureus and Gram-negative bacteria like Escherichia coli and Pseudomonas aeruginosa at minimum inhibitory concentration (MIC) of 10-2.5mg/ml. *A.alliaceum* leaves can be used as natural product to inhibit the growth of bacteria. Antibacterial activity is due to the presence of secondary metabolites such as anthraquinone, flavonoids, alkaloids, steroids, tannins, and saponins.

4.9 Antinociceptive effect[51]

Hydro-ethanolic extract of *A.alliaceum* shows the antinociception effect in inflammatory pain model with arthritis through the intraplantar injection of complete Freund's adjuvant (CFA) in mice. The M.alliacea extract did not lower the CFA-induced edema and

myeloperoxidase activity and also non-selective and δ-selective opioid receptor antagonists with I max of 98±2% and 93±2%, respectively. Antinociceptive is due to the presents of phytoconstituents like ferulic and chlorogenic acids, luteolin, apigenin, etc. and theactivity is mediated by δopioid receptors.

CONCLUSION

Adenocalymma alliaceum (Lam.) A.H.Gentry belongs to the family *Bignoniaceae*, commonly called as 'Garlic vine' and or 'false garlic'. This review gives information about the taxonomy, habit and habitat, morphological characters, chemical constituents, traditional uses, phytochemical and pharmacological properties of *M.alliacea.* The plant has immense medicinal values. In folk treatments, the plant parts are widely used for cold, as an aid to fertility, and commonly added to baths to treat feverish conditions, flu, body aches, cramps, fatigue, mosquito and snake repellent, epilepsy, uterine disorders, etc. The detailed pharmacognostic study for the leaves, Stem, Root of *Mansoa alliacea* are laid down for the first time in this study. Morphological and anatomical studies of plant parts will enable to identify the crude drug. All these indicate *Mansoa alliacea* shows the medicinal properties. All these indicate Mansoa alliacea shows medicinal properties. Phytochemical analysis and physicochemical properties proved that the plant having some properties like phytosteroids, alkaloids, carbohydrates, saponins, phenol, flavonoids, gums and mucilage present in sample. Which areresponsible for various pharmacological activities. Chemical composition of plant includes diallyl disulphide, diallyl trisulphide, alliin, allicin, propyl allyl, divinyl sulfide, diallyl sulfide, dimethyl sulfide, daucosterol, etc. This review will act as an eye opener of potential of the M. alliacea and encourage on further research on the phytoconstituents and other unexplored medicinal values.

ACKNOWLEDGEMENT

The authors are acknowledging The Chairman and Managing Trustee Sri. Mohammed Siddique K M, Jamia Salafiya Pharmacy College Pulikkal, Malappuram, Kerala, for providing all the support.

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