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# A comprehensive review on *Lepidagathias crisata* Wild.

Aditya V. Ubhale<sup>1</sup>, Pankaj H. Chaudhary<sup>2</sup>, Dipti B. Ruikar<sup>3</sup>

<sup>1</sup>Research Scholar, P. R. Pote Patil College of Pharmacy, Kathora road, Amravati, Maharashtra, India.

<sup>2</sup>Assistant Professor, Department of Pharmacognosy, P. R. Pote Patil College of Pharmacy, Amravati, Maharashtra, India.

<sup>3</sup>Principal, P. R. Pote Patil College of Pharmacy, Kathora road, Amravati, Maharashtra, India.

## ABSTRACT

The herb *Lepidagathias crisata* Willd. (Acanthaceae) is abundant in desert wastelands. The leaves, roots, flowers, seeds, and entire plant are all medicinally beneficial. The plant possesses a large number of phytochemicals that contributes to its different pharmacological activities. Fever, eczema, psoriasis, epilepsy, skin abscess, burns, mouth ulcer, snake bites, wounds, skin itching, and other skin problems are treated with this plant. As a result, the current study aims to shed light on the ethnomedicinal applications, phytoconstituents, pharmacological activity, and pharmaceutical preparations of the medicinal herb *Lepidagathias crisata* Willd, which belongs to the Acanthaceae family.

**Key words:** *Lepidagathias crisata* Willd, Acanthaceae, Ethnomedicinal applications, phytoconstituents, pharmacological activity, pharmaceutical preparation

## INTRODUCTION

Plants are one of the most important source of medicine and are said to be biosynthetic laboratory for most of the active principles like Alkaloids, Glycosides, Resins, Tanins, Flavonoids, Volatile oils, Gums, Oleo-resins etc. which exhibit different dose dependent pharmacological and therapeutic effects.<sup>[1]</sup> The World Health Organization reported that about 75%- 95% of world population of developing countries were chiefly rely on traditional medicines and major part of traditional therapies involves the use of plant extract products on their active constituents.<sup>[2]</sup> A considerable percentage of the peoples in both developed and

developing nations use medicinal plant remedies.

*Lepidagathias crisata* Willd. (Acanthaceae) (*L. crisata*) is a medicinal herb. The roots, leaves and inflorescence of *L. crisata* are medicinally useful. The roots of the herb are used in stomachic and dyspepsia, leaves are used for fevers and the inflorescence ash is used for itchy affections of skin and burns.<sup>[3,4]</sup> The plant is a stiff herb, and the branches procumbently arise from a hard central rootstock. Leaves are alternate, elliptic, serrate and usually lineolate. Flowers are sessile, capitate, the heads terminal or axillary densely crowded at the base of the plant, fruits glucose capsule.<sup>[5,6]</sup> This medicinal herb has been exploited tremendously by common people in many ways for various curative purposes. It is necessary to evaluate the herb in a scientific base for its potential use of folk medicine for the treatment of infectious diseases.

Hence the present study has designed to throw light on an medicinal herb *Lepidagathias crisata* Willd belongs to the family Acanthaceae for its ethnomedicinal uses, phytochemical constituents and pharmacological activities.

## Botanical description

*L.cristata* is commonly known as Nakkapidi, Lankapindi (Yanadi tribal), Mullabanthi (Telugu), Karappan poondu

### Address for correspondence:

Dr. Aditya V. Ubhale

Research Scholar, P. R. Pote Patil College of Pharmacy, Kathora road, Amravati, Maharashtra, India.

E-mail: ubhaleaditya7@gmail.com

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(Tamil), Karappanundu (Malayalam) and Otdhompō (Santhal tribe). In Maharashtra it is known as Bhuigend, Bhuiterda and in Korku language (Melghat, M.S.) as Kumbhi<sup>[7]</sup> It is distributed in central and eastern peninsular India; Konkan, Deccan North Circars, Carnatic and other regions. Usually, it appears in dry places and waste lands. It is a perennial herb, branches numerous from highly reduced main stem; Leaves-sessile, 3-6 × 0.5-1 cm, linear-lanceolate, pubescent, acute at both ends, margin entire to serrulate; Flowers-in globose heads, crowded at the base of the stem; bracts elliptic, spinose; bracteolate. Calyx- lobes 5, hairy; Corolla- white with brown or purple spots; Stamens 4, didynamous anther two celled and exerted; Style slender; Stigma simple, Fruit capsule, oblong and Seeds 2. Flowering seasons is January - March.<sup>[8,9]</sup>

#### Distribution

A stiff undershrub with numerous branches procumbent from a perennial rootstock found in Delhi, Rajasthan, Gujrat, Konkan and the Deccan. Commonly found in rocky to sandy habitats throughout Rajasthan.<sup>[10]</sup>

#### Cultivation and Propagation

*Lepidagathias cristata* is a small, perennial herb that grows in moist, shady areas. It can be propagated by seed or division. Seeds should be sown in a well-drained, sandy soil in a sunny location. Division should be done in the spring or fall. The plant should be divided into several sections and each section should be planted in a separate pot.<sup>[11]</sup>

#### Morphology

Rootstock perennial, stem scarcely many; branches numerous, spreading on all sides close to the ground, sometimes rooting, slender, quadrangular (sometimes almost winged), glabrous or nearly so. Leaves opposite, sessile, linear-oblong or lanceolate-oblong, lineolate above, hairy on the nerves beneath (Fig. 1). Flowers in a subtropical globose head (sometimes with 1 or 2 smaller heads added) on the lower part of the leafy branches; bracts 8 mm. long, ovate, acuminate, spinous-pointed, hairy, bracteoles membranous. Calyx 8 mm long, 4-partite about 3/4 the way down, densely

softly hairy on the both surfaces; the 2 larger outer segments 3 mm broad, elliptic, acute, the lower segment bi-fid, the 2- lateral segments, 1.2 mm broad, all ciliate and spinous-pointed. Corolla hairy outside, reaching 1.3 cm long, white or pale pink, dotted with brown or purple spots, 2-lipped about ½ - way down; tube narrow constricted below the limb and thus suddenly expanded upwards; upper lip 4 mm long, oblong, obtuse, notched at the apex lower lip 6 mm long, divided nearly to the middle into 3 obovate obtuse slightly crenulated lobes, the middle lobe the broadest. Stamens slightly exerted beyond the corolla-tube; filaments glabrous, anthers 2-celled, one of the cell rather higher up than the other. Ovary glabrous, style slightly pubescent. Capsule 5 mm long, ovoid, subacute, glabrous, grooved on the two sides, with scarious back, 2- seeded. Seeds large for the size of the capsule, 3 mm long, ovoid-oblong, rounder, densely clothed with long hygroscopic mucilaginous hairs.<sup>[12]</sup>

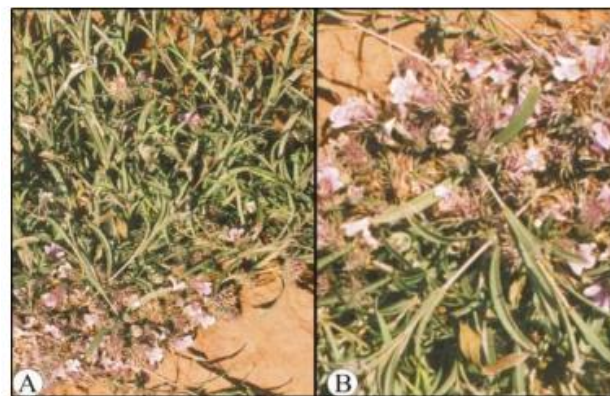


Fig. 1: A- Plant and B- Flowers of *Lepidagathias crisata* Willd



Fig. 2: A-B, *Lepidagathias crisata* Willd. (Corolla color variations)<sup>[13]</sup>

### Microscopy

**Root:** Root perennial. Stelediarch. Pith absent. Secondary growth anomalous; producing bands of included phloem that give an impression of growth rings. Wood with small and short vessels representing Class A (Extremely small: 141 - 171 x 24 - 36  $\mu\text{m}$ , 150 - 160 x 12 - 15  $\mu\text{m}$ ), Class B (Very short: 177 - 210 x 21 - 27  $\mu\text{m}$ ) and Class C (Moderately short 273 - 306 x 24 - 39  $\mu\text{m}$ )<sup>[14]</sup> Vessels scattered, solitary, paired or in series of 3-4. Small patches of thick walled paratracheal parenchyma produced. Rays uniseriate or biseriate; uniseriate being more frequent. Endodermis distinct. Cortex narrow, parenchymatous; cells getting stretched with growing girth in Fig 3.

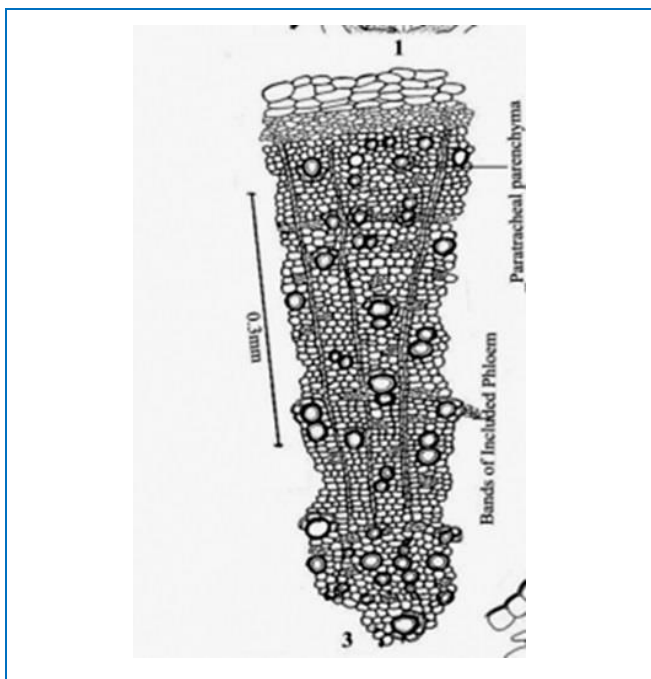


Fig. 3

**Stem:** Young stem roughly quadrangular, with 4 narrow wings. Wings forming pairs on dorsiventral side. Epidermis single layered, showing chlorophyllose bands with stomata and non-chlorophyllose bands. Stomata diacytic, hemi-bicyclic and bi-cyclic. Cystoliths solitary. Hypodermis collenchymatous. Wings filled with collenchyma up to half followed by chlorenchyma. Cortex narrow, 2 - 3 layered, parenchymatous; cells enclosing small intercellular spaces. Endodermis distinct; cells squarish. Pericycle not distinct. Internal phloem in the form of continuous band encircling the

pith. Phloem cells against protoxylem with stored food. Pith small; cells containing raphides and styloids Fig 4.

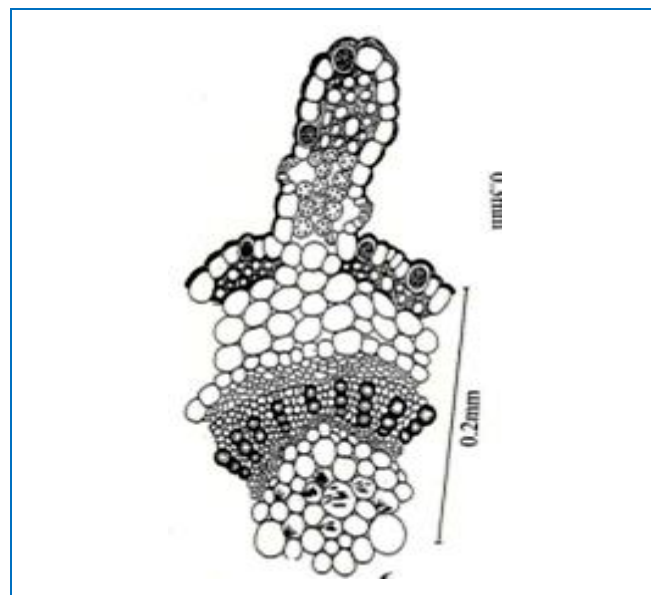


Fig. 4

**Node:** Unilacunar single trace

### Leaves

**Leaf base:** Leaf base grooved with two lateral wings. Epidermis cutinised and cuticularised, cystoliths solitary. Hypodermis collenchymatous, 1 - 2 layered on upper and lower side. Ground tissue parenchymatous; cells thin-walled, enclosing small intercellular spaces. Vasculature in the form of central crescent. Vessels arranged in series. Both abaxial and adaxial phloem present in the form of continuous band.

Leaves opposite, sessile, linear-oblong or lanceolate-oblong, lineolate above, hairy on the nerves beneath. Flowers in a subtropical globose head (sometimes with 1 or 2 smaller heads added) on the lower part of the leafy branches; bracts 8 mm. long, ovate, acuminate, spinous-pointed, hairy, bracteoles membranous. Calyx 8 mm long, 4-partite about 3/4 the way down, densely softly hairy on the both surfaces; the 2 larger outer segments 3 mm broad, elliptic, acute, the lower segment bi-fid, the 2- lateral segments, 1.2 mm broad, all ciliate and spinous-pointed.

Corolla hairy outside, reaching 1.3 cm long, white or pale pink, dotted with brown or purple spots, 2-lipped about 1/2 - way down; tube narrow constricted below

the limb and thus suddenly expanded upwards; upper lip 4 mm long, oblong, obtuse, notched at the apex lower lip 6 mm long, divided nearly to the middle into 3 obovate obtuse slightly crenulated lobes, the middle lobe the broadest. Stamens slightly exerted beyond the corolla-tube; filaments glabrous, anthers 2-celled, one of the cell rather higher up than the other. Ovary glabrous, style slightly pubescent. Capsule 5 mm long, ovoid, subacute, glabrous, grooved on the two sides, with scarious back, 2- seeded. Seeds large for the size of the capsule, 3 mm long, ovoid-oblong, rounder, densely clothed with long hygroscopic mucilaginous hairs.

**Lower Epidermis:** polygonal, slightly sinuous walled in *L. cristata* in Fig.5<sup>[15]</sup>



Fig. 5: Lower intercostal epidermis of *Lepidagathias crisata*

**Upper Epidermis:** polygonal to irregular, slightly sinuous to sinuous walled in Fig. 6



Fig. 6: Upper intercostal epidermides of *Lepidagathias crisata*

#### Taxonomical Classification<sup>[16]</sup>

**Kingdom:** Plantae

**Phylum:** Tracheophyta

**Class:** Magnoliopsida

**Order:** Lamiales

**Family:** Acanthaceae

**Genus:** *Lepidagathis*

**Species:** *Lepidagathis crisata* willd.

#### Ethnobotanical uses

The *Lepidagathis cristata* has been widely used by the Yanadi tribal of Andhra Pradesh, India which is localized in Chittoor, Cuddaph, Anthapur, Kurnool districts in Seshachala hillranges. It is used to cure fever, the aqueous extract of leaves mixed with Ocimum juice in 10:1 ratio and the tuberous flower ash mixed with coconut oil is applied externally on inflamed area.<sup>[17]</sup>

The root paste is mixed with seed powder of *Abrus precatorius* and *Karanj* oil applied for leucoderma<sup>[18]</sup> The powder of shade dried *L.cristata* plant mixed with honey in two spoonfuls is administered twice a day for about twenty days for asthma disease<sup>[19]</sup> In Chhattisgarh, the leaf extract used for malarial fever and to clean the cattle in rainy season and it is also used for skin itchy affection, burns and wounds. The leaf juice with copper sulphate is given during snakebite for gaining consciousness<sup>[20]</sup>

Whole plant powder is mixed with coconut oil to treat itchy infections in ethnic groups of Kurnool, Andhra Pradesh<sup>[21]</sup>

#### Phytochemical Studies

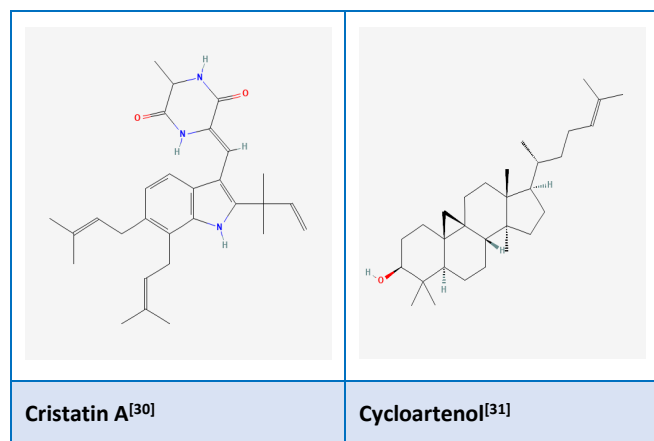
The chemical constituent in *L.cristata* is 6-hydroxyluteolin, 6-hydroxyluteolin-7-apioside a tryptophan derived alkaloid cristatin A which is responsible for treating eczema, psoriasis and other skin diseases<sup>[22]</sup> Cristatin A - an alkaloid, 6-hydroxyluteolin, 6-hydroxyluteolin 7-apioside an flavonoid<sup>[23]</sup>, oleic acid, 3-(octadecyloxy) propyl ester from inflorescence, Heptadecane, 9-hexyl, Ethyl isoallocholate, Heptadecane, 9-hexyl, 3-ethyl-5-octa (2-ethylbutyl)<sup>[24]</sup>

In *L.cristata*, bioactive compounds oleic acid, 3-(octadecyloxy) propyl ester from inflorescence<sup>[25]</sup>

Heptadecane, 9- hexyl , Ethyl iso-allocholate from leaf<sup>[26]</sup> and Heptadecane, 9- hexyl , Octadecane, 3-ethyl-5-(2-ethylbutyl)from root were analyzed by GCMS. <sup>[27]</sup>

An immunosuppressive, tryptophan-derived alkaloid Cristatin A (1), and two known compounds, cycloartenol and stigmasta- 5,11(12)-diene-3 beta-ol, were isolated from the whole plant 6-hydroxyluteolin-7-O- apioside isolated<sup>[28]</sup>

This plant has many important metabolites such as trans-3-Methyl-2-n-propylthiophane, beta-l-Arabinopyranoside, methyl, Aluminum, triethyl-, Acetic acid, trifluoro-, anhydride, 1,2,4-Cyclopentanetrione, 3-methyl-, Methyl 2,3-anhydro-.beta.-d-ribofuranoside, Cyclobutanecarboxylic acid, cyclobutyl ester, 4- Methylnonanoic acid, Borinic acid, diethyl-, Methyl 2,6-anhydro-.alpha.-d-altroside, Sulfurous acid, cyclohexylmethylheptadecyl ester, n-Hexadecanoic acid, .beta.-D-Mannothiofuranoside, S-n-octyl-etc<sup>[29]</sup>



**Table1. Qualitative phytochemical determination of active ingredients in crude extract of *L.cristata* Leaves<sup>[32]</sup>**

Plant constituents	Ethanolic extract
Flavonoids	Positive
Carbohydrates	Positive
Triterpenoids	Positive
Glycosides	Positive

Tannins	Positive
Saponins	Positive
Mucilages	Positive
Alkaloids	Negative
Proteins and Amino acid	Negative

**Table 2. Preliminary phytochemical screening of *Lepidagathias crisata* Root Extract<sup>[33]</sup>**

Plant constituents	Ethanolic Extract
Alkaloids	Positive
Phenol compounds	Negative
Glycosides	Negative
Tannins	Negative
Amino acids	Negative
Flavonoids	Positive
Saponins	Positive
Steroids	Positive
Terpenoides	Positive

## Pharmacological Studies

### Wound Healing Activity

Abubacker *et al.* 2016 conducted a study on Fresh plants of *L. cristata*, Willd (Acanthaceae). The pharmacological assessment of wound healing activity using an ethanolic extract of *L.cristata* was conducted through an excision wound healing model in Wistar albino rats. The wound healing efficacy was compared to both a simple ointment and the standard drug nitrofurazone over an 18-day period. The ethanolic extract demonstrated a noteworthy reduction in wound area compared to the control group starting from the 4th day ( $p < 0.01$ ) onwards, with significantly higher effects observed from the 8th to the 18th day ( $p < 0.001$ ). The results are presented as mean  $\pm$  SE, and statistical comparisons between experimental groups

were carried out using a student t-test (control vs. treatment), with results considered highly significant when  $p < 0.01$  and significant when  $p < 0.001$ . This highlights the beneficial effects of the extract in promoting wound healing, Wound Contracting ability, wound closure, decrease in surface area of wound, and Tissue regeneration at wound site were significant in treated rats.<sup>[34,35]</sup>

#### Antifungal Activity

Abubacker *et al.* 2015 conducted a study on Fresh plants of *L. cristata*, Willd (Acanthaceae). The plant material was washed under running tap water; air dried in shade and then the inflorescence was homogenized to fine powder. Different weight of dry inflorescence powder (2 mg, 4mg, 6 mg and 12 mg) were mixed with different volume of Sabourand dextrose agar (SDA) medium (HI media M063) to form different concentrations (100 mg/L, 200 mg/L, 400 mg/L and 800 mg/L). The Control-1 contained only 20 mL of SDA medium and Control-2 contained 2 mg of bavistin fungicide were added to 20 mL of SDA medium at 100 mg/L concentration. The inflorescence powder is mixed with the medium in Petri dish (9 cm) and inoculated with 0.5 mL spore suspension of fungi. The major bioactive compound isolated was tested for antifungal activities. The major bioactive compound oleic acid, 3-(octadecyloxy) propyl ester was isolated from the inflorescence of *L. cristata*. The bioactive compound was tested for antifungal potentials and found to be highly effective to plant pathogenic fungi *Colletotrichum fulcatum* NCBT 146, *Fusarium oxysporum* NCBT 156 and *Rhizoctonia solani* NCBT 196 as well as for the human pathogenic fungi *Curvularia lunata* MTCC 2030 and *Microsporum canis* MTCC 2820.<sup>[36]</sup>

#### Anti-emetic Activity

Rachapalli Sowjanya Kumar Reddy *et al* 2014 collected plant material and authenticated. Accurately weighed plant material was extracted with ethanol by using Soxhlet apparatus. 2-4days male chicks (32-52gms) were kept under laboratory conditions at room temperature with 12hr light and dark cycles. Anti-Emetic effect was determined by calculating the mean

decreases in number of retching. Chicks are divided into three groups of five chicks each chicks was kept in beaker at 25°C for 10 min. The extract of *Lepidagathias crisata* was dissolved in 1% Tween 80 and administered at a dose of 50mg/kg, 100mg/kg, 200mg/kg orally and volume of 10 ml/kg to test animal on the basis of body weight. Control group received only 1% Tween 80 Metoclopramide was used as standard drug (50mg/kg) B.W. (Intra peritoneally). 10 min. later 50mgs anhydrous copper sulphate /kg body weight was administered orally to each chicks, then the number of retches (an emetic action without vomiting gastric material) was counted for next 10 min., The Anti-Emetic Effect was assessed as the decreasing the number of retches in the treated group in contrast to the control.<sup>[37]</sup>

#### Antibacterial Activity

A. Egbert Selwin Rose *at el.* 2013 collected *L.cristata* from Chhattisgarh, washed, shade dried, packed properly and authenticated. The dried plant materials were pulverized by a mechanical grinder. The powdered plant material (500 g) was successively extracted with acetone, toluene, ethanol and methanol up to 48 hrs at room temperature using a Soxhlet apparatus. Antibacterial activity of solvent extracts of the entire plant was determined by disc diffusion method. The organism to be tested was uniformly spread on the sterile nutrient agar medium. Three solvent extract soaked discs were carefully placed on the inoculated medium aseptically. The plates were incubated for 24 hrs at 37°C and zone of inhibition if any around the disc was measured in millimeter (mm). The treatment also includes the antibacterial agent Gentamicin as the positive control and therespective solvents as the negative control.<sup>[38]</sup>

#### Antipyretic Activity

B. Deepak Kumar *et al.* 2013 collected the whole plant of *Lepidagathias crisata*. It was identified and authenticated. The collected whole plant was dried at room temperature, pulverized by a mechanical grinder, sieved through 40 mesh. About 100g of powdered materials were extracted with petroleum ether (60°-80°C) using soxhlet apparatus. The acute toxicity of Petroleum Ether extracts of *Lepidagathias crisata*

whole plant was determined as per the OECD guideline no. 423. The rats were divided into four groups of six Each. The normal body temperature of each rat was measured rectally at predetermined Intervals and recorded (Vogel, 2002). The rats were trained to remain quiet in a restraint cage. A thermometer probe was inserted 3-4 cm deep into the rectum and fastened to the tail by Adhesive tape. Temperature was measured on a Digital thermometer. After measuring the basal Rectal temperature, the animals were injected Subcutaneously with 10 ml/kg body wt. of 15% w/v suspension of brewer's yeast, suspended in 0.5% w/v methylcellulose solution. The rats were then returned to their housing cages. Nineteen hours after the yeast injection, the Animals were again restrained in individual cages. Antipyretic activity was evaluated by comparing initial rectal temperature (°C) before yeast injection, with rectal temperature (°C) after 18 hours of yeast injection at different time intervals.<sup>[39]</sup>

#### Analgesic activity

Purma Aravinda Reddy *et al.* 2013 conducted a study on analgesic activity of *L.cristata* flower. Flower was tested in chloroform, ethyl acetate and methanol solvents. The methanolic, ethyl acetate, chloroform extracts were prepared and were used for analgesic activity in two dose level of 200 and 400mg/kg body weight in two screening methods, Hot Plate (n=5) and Tail Immersion method (n=5). The flower extracts showed significant analgesic activity. The plant extracts did not exhibit any mortality up to the dose level 4000mg/kg. The methanol, chloroform and ethyl acetate extracts of flower was evaluated for analgesic activity. The flower ethyl acetate extract of *Lepidagathias crisata* showed 47% and 57.1% activity at 200 and 400mg/kg.b.wt, after 30 min by Eddy's Hot plate Method respectively. The flower chloroform extract showed 43.7% and 44.7% protection at 200, 400mg/kg respectively. The flower methanol, chloroform and ethyl acetate extracts showed dose dependent analgesic activity in thermal models. The flower ethyl acetate extract has maximum analgesic activity with 57.1% ( $p < 0.001$ ).<sup>[40]</sup>

The ethanolic, ethyl acetate, chloroform extracts were prepared and are used for analgesic activity in two

dose level that is 200 and 400 mg/kg body weight per oral in two screening methods, one is Hot Plate (n=5), another is Tail Immersion method (n=5), and the leaf extracts are showed significant analgesic activity. The plant extracts did not exhibit any mortality up to the dose level 4000 mg/kg. The methanol, Chloroform and Ethyl acetate extracts of leaf was evaluated for analgesic activity. The 400mg/kg dose of leaf chloroform extract has highest activity in both the experimental models with 62.5% protection after 30min and 47.3% after 60 min with the significance of  $p < 0.001$  when compared with 0 time interval and after 90 min it was shown 50% of protection and all the extracts has graded dose response.<sup>[41]</sup>

Purma Aravinda Reddy *et al.* 2013 tested Analgesic activity was tested in *L.cristata* root with methanol, ethyl acetate, chloroform solvents and these were in two dose level that is 200-400 mg/kg body weight in two screening methods, one is Hot Plate (n=5), another is Tail Immersion method(n=5). The root extracts were showed significant analgesic activity when compared with the 0 time intervals. The root methanolic extract (RME) was showed maximum analgesic activity with 50% ( $p < 0.001$ ) protection<sup>[42]</sup>

#### Hypoglycemic activity

A. V. Srinija *et al.* 2013 collected *L.Crisata* and Authenticated. The hypoglycaemic activity was studied in ethanolic extract of *L. cristata* in alloxan induced diabetic rats. Wistar rats weighing 200-250gms were selected and diabetes was induced by injecting alloxan monohydrate (120mg/kg bodyweight) intraperitoneally. Animals were divided into six groups, I group was kept as a normal, II group as a control group, III group was treated with standard drug Glibenclamide (5mg/kg). Remaining three groups were treated with different doses of 100,200 and 400mg/kg body weight of ethanolic extract of leaves of *L. cristata* for a period of 3 weeks. Results were analyzed by estimating the fasting blood glucose levels. The effect of EELC leaf extract on blood glucose, serum enzymes SGOT, SGPT, ALP and TC, TG, LDL and HDL were measured on days 7, 14 and 21. Data was expressed as mean  $\pm$  SEM, (n=6). Statistical analysis was done using



one-way analysis of variance (ANOVA) followed by Tukey's multiple comparison. Values were considered statistically significant when  $p < 0.05$ . Ethanolic extract showed a significant fall in fasting blood glucose at all the doses. But, at the dose of 400mg/kg were showed activity on par with standard.<sup>[32]</sup>

### Anti-inflammatory activity

Aravinda Reddy Purma et al. 2013 collected the plant and the specimen of the plant was stored in the department of the pharmacology (specimen. No. TPCP/LC/09/2011). The collected whole was dried and powdered using mechanical mixer and sieved. The extractions were carried with methanol, ethyl acetate, and chloroform until the solvent becomes colorless in the soxhlet and the extracts were concentrated under reduced pressure. Anti-inflammatory activity was determined in two dose level that is 200 and 400 mg/kg body weight in two screening methods, one is carrageenans induced paw edema method ( $n = 5$ ), another is Formalin induced paw edema method ( $n = 5$ ). Carrageenan induced paw edema model in rats The flower methanolic extract (FME) of *Lepidagathias cristata* showed 37 % ( $1.35 \pm 0.09$ ) protection at 400 mg/kg, FCE 50 % ( $1.46 \pm 0.09$ ) ( $P < 0.01$ ) at 400 mg/kg and the FEE 38.3 % ( $1.34 \pm 0.08$ ) ( $P < 0.01$ ), 400 mg/kg at 180 minutes and all the compounds showed maximum activity at 120 minutes with graded dose response. Formalin induced paw edema model in rats The FMC showed 29.1 % ( $1.51 \pm 0.10$ ) ( $P < 0.05$ ) at 400 mg/kg, FCE 40 % ( $1.9 \pm 0.11$ ) and FEE 43.4 % protection on 120 minutes at the dose of 400 mg/kg body weight. The values were significant when compared with zero intervals. The chloroform extract of *Lepidagathias cristata* was found to demonstrate highest anti-inflammatory activity at 400 mg/kg body weight.<sup>[43]</sup>

### Immunosuppressive activity

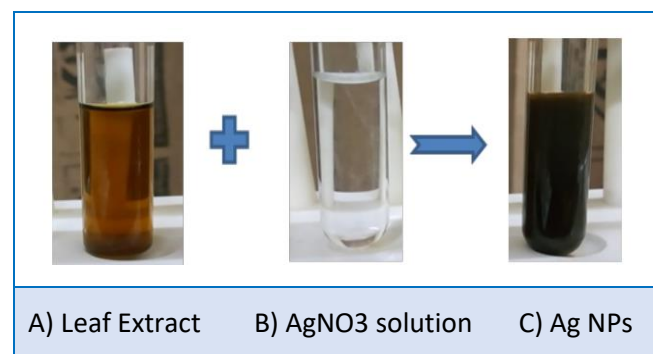
V. Ravikanth et al. 2001 collected *L. cristata* and authenticated. The immunosuppressive activity (IC<sub>50</sub>) of alkaloid- I (cristain) was assayed against con-A (2 µg/ml, T-cells) and LPS- induced (B- cells) proliferation of mouse splenic lymphocytes, here con- A and LPS were used as controls and cyclosporine A was used as standard drug. The immunosuppressive activity of

alkaloid - I (IC<sub>50</sub>) against con A and LPS induced proliferation is higher (1 µg/ml) than the immunosuppressive activity of tardioxopiperzine A against the con A LPS induced proliferation and lower than that of cyclosporine A (IC<sub>50</sub> 0.06 and 0.10 µg/ml).<sup>[44]</sup>

### Pharmaceutical Preparation

#### 1) Silver Nanoparticles of *Lepidagathias crisata* leaf Extract<sup>[45]</sup>

Kumar et al. 2018 collected the plant *Lepidagathias cristata* and authenticated. Leaves were washed to remove impurities with tap water and then double distilled water for 3 to 4 times and were dried at room temperature in dust and moisture free condition for 2 days. The fully dried leaves were powdered with sterile electric blender and 10 g of the fine dry leaves powder was dispersed in 100 mL of milli-Q-water in 250 mL round bottom flask and stirred for 45 min at 60°C. Then, the solution was carefully filtered by using Whatman no.1 filter paper and stored at 4°C for NPs synthesis In order to synthesize Ag NPs, 20 mL of the aqueous leaf extract was mixed with 80 mL of 1 mM AgNO<sub>3</sub> solution taken in 250 mL beaker and shake well. Then the reaction mixture was kept under domestic microwave (KOR-616T) and exposed to microwave radiation for 5 min at a power of 800 W with a fixed frequency of 2450 MHz. After microwave radiation treatment, the resultant solution was cooled to room temperature and stored in dark condition. The change in color wine red to dark brown designates the evolution of colloidal Ag NPs, the colloidal NPs solution was centrifuged at 3500 rpm for 20 min and the progress of the reaction was monitored with the help of UV-vis absorption spectrophotometer.



**2) Preparation of herbal ointment of *L.crisata*<sup>[46]</sup>**

Abubacker M. *et al.* had prepared herbal ointment *L.crisata* for Evaluation of wound healing activity of *Lepidagathias crisata*.<sup>[46]</sup>

**Table 2: Preparation of herbal ointment of *L.crisata***

Ingredients	Quantity (g)
Ethanollic Extract of <i>L.Crisata</i>	5.0
Polysorbate 60	5.0
White soft paraffin	25.0
Cetosteryl alcohol	4.0
Glycerin	12.0
Butylated Hydroxyl Anisole	0.02
Purified Water	q.s to100

**CONCLUSION**

Present Literature study and experimental results shows that *Lepidagathias Crisata* is a traditional remedy. The various bioactive compounds present in this herb are highly responsible for its antibacterial and antifungal activities against both plant and human's pathogens. According to investigations, this natural remedy is a cutting-edge option for the treatment of conditions like fever, eczema, psoriasis, epilepsy, skin abscess, burns, snake bites, mouth ulcer, skin itching and other skin diseases. It has various Pharmacological Activities like Analgesic, Antiemetic, Anti Inflammatory, Hypoglycemic, Immunosuppressive Activity, and Wound Healing Activity. This herb is used for fever, eczema, psoriasis, epilepsy, skin abscess, burns, snake bites, mouth ulcer, skin itching and other skin diseases. Morphology as well as various pharmacognostic aspects of the *Lepidagathias Crisata* was studied and described along with phytochemical and physicochemical parameters that can be useful in further isolation and purification of medicinally important compounds. A large number of phytoconstituents have been isolated and identified from different parts of *Lepidagathias Crisata* which

includes Flavonoids, Carbohydrates, Triterpenoids, Glycosides, Tannins, Saponins, Mucilages, Alkaloids Proteins and Amino acid.

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