

A REVIEW ON, PHARMACOLOGICAL ACTIVITIES OF BARLERIA PRIONITIS LINN

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ABSTRACT

Barleria prionitis, belonging to Acanthaceae family, is a small spiny shrub, normally familiar as “porcupine flower” with a number of vernacular names. It is an indigenous plant of South Asia and certain regions of Africa. The therapeutically use of its flower, root, stem, leaf and in certain cases entire plant against numerous disorders including fever, cough, jaundice, severe pain are recognized by ayurvedic and other traditional systems. As a significant source of secondary metabolites including saponin, tannin, flavonoid, alkaloid, glycoside, phenolic compounds recent pharmacognostical screening renders its effectual functions as potent antioxidant, anti-microbial, anti-inflammatory, hepatoprotective, gastro-protective agent etc. Although

having a potential remedial significance, it is still underutilized. This review can be considered as a bird’s eye view highlighting the current progress of *Barleria prionitis* in pharmacological and pharmacokinetically field with its prominent folk uses.

KEYWORDS: *Barleria prionitis*, Introduction, Plant profile, traditional uses, pharmacological activities.

INTRODUCTION

The word Herb has been shaped from the Latin word, herb and an old French word herb. These herbs that have restorative quality give discerning intends to the treatment of numerous interior alients, which are generally viewed as hard to cure. *Barleria prionitis* plant is an enduring, thick therapeutic plant. *Barleria* family containing 300 species for therapeutic and Ayurveda.^[1] The entire plant is utilized for therapeutiac and ayurvedic prescription. *Barleria prionitis* generally known as Vajardanti it is utilized for different illnesses, for example, asthma, whooping hack, ailment, fever, heaps, ulcers, bothering, control wound healing,

bleeding diseases liver diseases, bubbles, aggravation, solidness of appendages expanding force, gout, oedema, jungle fever, leukoderma scabies, toothache, joints torment, urinary contamination, jaundice, gastrointestinal clutters, hepatoprotective, snakebites, liver diseases and neuralgia. A ton of endeavours have been made by a few analysts to substantiate the viability of plant over the span of natural and pharmacological exercises to cure of ailments.^[2,3,4,5,6,7]

The examination of logical writing uncovered the outstanding biological activities of the plant, for example, antibacterial, ant diabetic, antifungal, pain relieving, mitigating, anti-oxidative, hostile to diuretic, anti-leukemic, pain relieving, anti-fertility and cytoprotective movement.^[8,9] *Barleria prionitis* plant are utilized for various sort of malady and utilized for animal's illnesses. Diverse parts of the characteristic mixes got from plant are utilized as customary prescriptions as they are very much tried for their viability and are for the most part accepted to be alright for human use.^[10,11,12]



Figure 1: Picture of Barleria prionitis linn.

DISTRIBUTION

In India it is normally found in Andaman and Nicobar, Andhra-pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Lakshadweep, Maldives, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.^[13,14]

PLANT PROFILE

Plant Description

Barleria prionitis is developed as a decorative and restorative plant in Asia. It is an erect, thick, thorny under shrub coming to up to 0.6-1.5 m high. *Barleria prionitis* considered yearly or perpetual plant amid the dry season. Its stems, leaves and blooms pass on yet roots alive. The vegetation develops stormy season.

Stem: Erect 1.8mm thick, terete, hard, glabrous, hubs swollen, spreading at hubs, youthful stem dark, somewhat four calculated with 3-4 divariate spines at hub of leaf. Stem tube shaped with longitudinally orchestrated remotely greyish to light dark coloured. A couple of develop stems marginally empty. ^[15,16]



Figure 3: Stem of *Barleria prionitis*.

Flowers: Tubular yellow-orange 4.0 cm long blooms with distending stalks. Sessile, regularly single in the lower axils, getting to be noticeably spicate above; bracts foliaceous, 16 by 4.5 mm, elongated, intense, abound tipped, about glabrous; bracteoles 1.3 cm long, barely straight, subulate, swarm tipped; calyx, isolated nearly to the base, one of the external sepals preferably more than 1.3 cm long, the inverse sepal under 1.3 cm long, 3.4 mm wide both oval lanceolate, mucronate; the two internal sepals 1.5 mm wide and long as a shorter of the ones, direct lanceolate, mucronate crown, 3.2-4.5 cm long, yellow marginally pubescent outside, glabrous inside fairly two lipped; upper lip 2cm long profoundly four lobed, the projections elliptical, obovate, round, bring down lip oval, obovate, round whole tube 1.9-2.2cm long, stamen two prolific as two staminodes; fibber's of the ripe stamens applied past the crown tube, those of the staminode short. ^[17,18]



Figure 4: Flower of *Barleria prionitis*.

Leaf: Oval-ellipsoid moulded, variable in scrutinize to 10 cm long and 4 cm wide, elliptic whole, intense reticulate, unicostate, labours above, underneath petiole short.^[19,20]



Figure 5: Leaves of *Barleria Prionitis linn.*

Seeds: Oval-took care of business to 2cm since a long time ago seed, case containing two expansive 8mm long, 5mm wide level seeds with plush hairs.^[21,22,23]



Figure 2: Seeds of *Barleria prionitis linn.*

Scientific Classification

Botanical name	Barleria prionitis
Family	Acanthaceace

Taxonomical Classification

Kingdom	Plantae
Sub-kingdom	Tracheobionta
Super Division	Spermatophyta
Division	Magnoliopsida
Sub Class	Asteridae
Order	Lamials
Genus	Barleria Linn.
Species	Porcupine flower

Vernacular Name

Hindi Name	Katsareya, sahachara
Sanskrit Name	Karnataka, Koranda
Gujrati Name	Kanta salio
Unani name	Piyabaasa
Marathi Name	Koranti, Koreta
English Name	Porcupine flower
Tamil Name	Shammullin

SYNONYMS

- Barleria hystrix Linn.
- Barleria pubiefiora benth
- Prionitis hystrix
- Prionitis Pubiflora.^[24,25]

CHEMICAL CONSTITUENTS.

Parts	Chemical Constituent
Leaf	Flavonoids, saponin, sterols, tannin, terpenoids.
Flowers	Flavonoids, Neohespericloside.
Arterial Parts	Balarenone, terpenoid, barlerinoside barlerinoside, balarenone
Whole Plant	Glycoside, saponin, flavonoids, phenolic compounds, tannins, steroids, carbohydrates, phytosterols, acetyl-barlerin, β -sitosterol, potassium, iridoids, lupullinosoide. ^[26,27]

PROPERTIES

Taste	Bitter and sweet
Qualities	Light for digestion
Potency	Hot
Action	Reduce cough

AYURVEDIC USES

Kapha	destroy poison
Mutral-	used for urination
Vatahar	used for vata
Keshya	used for hair problems

MEDICINAL PROPERTIES AND TRADITIONAL USES

- Remove additional mucous from the body.
- Relieve toothache.
- Reducing aggravation.
- Prevent stiffness.
- Helps in urinary issues, stone, oedema.
- Rheumatic affections
- Jaundice
- Haemoptysis

Pharmacological activities**1. Anti-helminthic Activity**

Ethanollic and aqueous extracts of whole plant exhibited paralysis in lower doses (50, 75 and 100 mg/ml) and triggered death at higher concentration of 100 mg/ml against *Pheretima* posthuman worms.^[28]

2. Anti-arthritic Activity

Ethyl acetate fraction (125 and 250 mg/kg) of leaf significantly suppressed the joint swelling after 8-10 days administration in formaldehyde induced arthritis model and it also decreased significant level of arthritic score with weight gain in FCA induced arthritis rat model.^[29,30]

3. Anti-hypertensive Activity

Enalapril, methanolic extracts at 200 and 400 mg/bw of leaf possessed anti-hypertensive effect as 136.5±2.51, 146±2.21 and 143±3.11mm Hg on systolic blood pressure and 103±2.54, 100.5±2.74 and 105.5±2.35 mm Hg diastolic blood pressure after six weeks treatment.^[31]

4. Diuretic Activity

Aqueous root extract (100 mg/kg) produced significant diuresis (12.58 ± 0.80 urine volume in 24hr) compared with furosemide at 20mg/kg (12.58 ± 0.80 urine volume in 24hr) and increased sodium elimination.^[32]

5. Antioxidant activities

The MeOH extract of root leaves and stems showed potent antioxidant activity. EtOH extract of whole plant of *B. prionitis* showed significant antioxidant activities. It was reported that the antioxidant activity of MeOH extract of leaf and stem were showed IC_{50} values $63.41 \pm 0.32, 81.69 \pm 0.40$, respectively. Reducing power of the MeOH extract of *B. prionitis* was observed maximum.^[48,49,50] MeOH leaf extract showed significant high antioxidant activity (61.73) in 6000 ppm concentration followed by PET bark extract (59.11).^[51] In vitro antioxidant activity of crude MeOH extract of *B. prionitis* was reported by Khobragade et al., (2012).^[33]

6. Anti-diabetic activities

A significant reduction in blood glucose level and glycosylated haemoglobin has been found in animals treated with *Barleria prionitis* leaves extract. Beside this, significant increase in serum insulin level and liver glycogen level and decrease in the body weight was also observed. All these result indicate antidiabetic activity of *Barleria prionitis*.^[34]

7. Larvicidal activity

LC₅₀ values were found to be 34.756, 31.351 and 28.577 $\mu\text{g/mL}$ in ACE, CHCl₃ and MeOH extract of leaf against *Culex tritaeniorhynchus*, respectively.^[35]

8. Anti-fertility activities

The roots extract of *B. prionitis* showed the antifertility potential⁶⁷. Oral administration of MeOH root extract reduced the sperm formation in male albino rats^{67,68}. Root extract decreased the formation of round spermatids, sperm motility, spermatogonia, preleptotene spermatocytes population and mature leading cells.^[36]

9. Antibacterial activities

Acetone, ethanol, methanol extract of bark and ciprofloxacin showed significant activity against *Streptococcus mutants* ($14.95 \pm 1, 11.94 \pm 1, 15.65 \pm 0.57$ and 27.32 ± 0.57 mm), *Staphylococcus aureus* ($14.31 \pm 0.57, 14.0 \pm 0, 16.32 \pm 0.57$ and 34.66 ± 0.57 mm), *Pseudomonas*.

(18.32±0.57, 17.65±0.57, 19.32±0.57 and 33.66±0.57 mm) and *Bacillus* sp. (27.32±0.57, 23.97±1, 28.65±0.57 and 29.65±0.57 mm) in well diffusion method. Lowest MIC was found to be 5 mg/ml for chloroform extract of leaf against *Salmonella typhi*, *Bacillus subtilis*, *Vibrio cholera*- 813, *Micrococcus luteus* and *Citrobacter*. On the other hand, petroleum ether and ethanol extract of leaf showed 3.33 and 10 mg/ml against *Bacillus subtilis* in MIC method.^[37]

10. Central nervous system depressant activity

Ethyl acetate portion (at dose concentration of 125 and 250 mg/kg) and diclofenac (4 mg/kg) treatment significantly increased fall off time of motor co-ordination in rota rod test⁽³⁷⁾. EtOH extract of *B. prionitis* leaves by using acto-photometer reported fluoxetine stimulant activity in mice as 91.93% while the test drug stimulated the animal only by 49.72%.^[38]

11. Anti-inflammatory Activity

The Anti-inflammatory activity of *Barleria prionitis* whole plant extract have also been investigated and documented against carrageenan-induced paw edema in rats⁽³⁹⁾. A recent study showed that anti-inflammatory activity of extracts was clearly related to their inhibition of cyclooxygenase enzymes with subsequent inhibition of prostaglandin synthesis. Moreover; the flower extract was also documented with significant Antiinflammatory activity against Carrageenan and Cotton pellet induced granuloma in rats.^[40]

12. Antiviral activities

Two iridoid glycosides (i.e., 6-O-trans-p-coumaroyl-8-O-acetylshanzhiside methyl ester and its cis isomer from *B. prionitis* were reported by Chen et al. (1998)⁵⁵. These bioactive phytochemicals revealed the potent antiviral activity against respiratory Syncytial virus (RSV) with EC₅₀ and IC₅₀ values of 2.46 and 42.2 µg mL⁻¹, respectively^{12, [41,42]}

13. Anti-dental decay activity

Crude extract of *B. prionitis* Linn. reported good antimicrobial activity against dental decay pathogens. It was reported that MeOH extract of bark showed much more potent activity against oral pathogens like *S. mutans*, *S. aureus*, *Pseudomonas* sp., *Bacillus* sp. and *C. albicans*, *S. cerevisiae*.^[43]

14. Anti-diarrheal activity

Butanol fraction of *B. prionitis* leaves showed the anti-diarrheal activity. Iridoid rich fraction of butanol (BuOH or n(BuOH)) of leaf extract possess dose dependent anti-diarrhoeal activity at the concentration of 25-100 mg/kg in rats against castor oil induced diarrhoea.^[44,45] The hepatic glutathione content and reduced the hepatic lipid peroxidation in response to the hepatotoxicity in mice and rats.^[45]

15. Anti-nociceptive Activity

Extract of flower (200 mg/kg) increased analgesia-meter-induced force and exhibited resistance against pain. It also inhibited acetic acid induced pain as 30.6% where phenylbutazone (100 mg/kg) presented 34.6%.^[46]

16. Antifungal Activity

Acetone, ethanol, methanol extract of bark and amphotericin-B showed significant activity respectively against *Saccharomyces cerevisiae* (11.64±0.57, 11.31±0.57, 13.95±1 and 11.94±1mm), *Candida albino*s strain1 (13.65±0.57,12.94±1, 15.31±0.57 and 13±0 mm) and *C. albino*s strain 2 (16±0, 11.31±0.57, 16.96±1 and 12.94±1 mm) in well diffusion method.^[47]

17. Analgesic activity

The analgesic activity of *B. prionitis* flowers extract was reported using an Ugo Basile Analgesy meter induced artificial pain and acetic acid induced writhing models.^[52] In vivo study showed that the flower extract dose dependently provided a significant increase in the analgesio-meter-induced force and exhibited significant resistance against pain in mice.^[52] At a dose concentration of 50 mg kg⁻¹ body weight, the flower extract provided statistically significant reduction of writhing by 5.24%.^[52]

18. Hepatoprotective activity

The iridoid glycosides enriched fraction from hydro-ethanolic extract of leaves and stems of *B. prionitis* was reported to show significant hepatoprotection against carbon tetrachloride, galactosa mine and paracetamol induced hepatotoxicity in mice and rats ⁽⁵³⁾. The oral administration of iridoid fraction significantly reduced the hepatotoxin induced elevated levels of serum alanine aminotransferase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP), bilirubin and triglycerides in a dose dependent manner. The fraction was also increased.^[53]

19. Wound healing

Here wound healing is depicted and described in a discrete timeline of physical attributes (phases) comprising the post trauma repair process. In undamaged skin, the epidermis (surface layer) and dermis (deeper layer) form a protective barrier against the external environment. When the barrier is broken, an orchestrated cascade of biochemical events is set into motion to repair the damage. This process is divided into predictable phases: blood clotting (haemostasis), inflammation, tissue growth (proliferation) and tissue remodelling (maturation).

20. Bleeding time

Bleeding time is a crude test of hemostasis (the arrest or stopping of bleeding). It indicates how well platelets interact with blood vessel walls to form blood clots.

Toxic effect

In a study it was reported that the alcoholic extract of roots and leaves of *B. prionitis* did not reported any toxic effects in adult albino rats⁶². In a study Dheer and Bhatnagar (2010) observed that the oral administration of alcoholic extract at the dose concentration up to 2.5 g kg⁻¹ body weight throughout the 14 days of study period without any mortality. Singh et al. (2005) ⁷⁸ reported that the iridoid glucosides rich aqueous portion *B. prionitis* did not produced any signs of abnormalities or any mortality up to the single oral administration of 3000 mg kg⁻¹ dose in mice during the 15 days of study period. Nevertheless, the intra-peritoneal LD₅₀ was determined as 2530 mg kg⁻¹ for the aqueous portion in mice⁷⁸. In another study the acute oral toxicity of MeOH extract of *B. prionitis* was reported using Sprague – Dawley rats (n=5). The LD₅₀ was found to be more than 200 mg/kg, with no sign of abnormality or any mortality observed for 14 days after single dose administration^[54,55]

CONCLUSION

Due to the presence of curative properties, medicinal plants always have got special emphasis from prehistoric era and current outgrowth of pharmacological industry cannot ignore its dominance for its unique phytochemicals containing infinite potential against numerous diseases. Consequently, tremendous research efforts are required to justify their previous established role commonly used by local practitioners and identify novel pharmacological and pharmacognostical features. From this review it is conspicuous that several portions of *Barleria prionitis* individually or jointly administered successfully by traditional practitioners specifically against fever, severe pain, asthma, ulcer etc. Moreover, pharmacological assays

identify its dominant role as anti-microbial, free radical scavenging, gastro Bleeding time liver protective agent. But as an established medicinal plant, it is still underutilized, and its huge potentials are still uncovered but significant presence of several new secondary metabolites strengthen the demand of further research based on its Phyto therapeutically importance. Besides its numerous folk use, this review also illustrates its phytochemical profile as well as pharmacological augmentation which will be helpful for future researchers.

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