





Table 1. Traditional uses of *Barleria Prionitis* in India.

Plants parts	Disorder	Application mode/References	References
Leaf	Skin diseases	Crushed leaves bare given to apply on skin	[10]
	Scabies		[11]
	Cough and cold	Paste form of fresh leaves	[12]
	Pus in ears	Not specified	[13]
	Catahrral affections of children	Applied as extract	[14]
	Irritation and stiffness of Limbs	Juice directly applied	[12]
	Glandular swellings and Boils Fever	not specified	[14]
	Whooping cough	given as juice directly	[15]
	Leucoderma	juice form or decoction is given	[12]
	Wound	crushed form directly applied	[14]
	Enlarged scrotum and	not specified	[16]
	Sciatica	directly as juice	[14]
	Dropsy	paste or juice form is applied over the affected area	
	Gastric problems		
Toothache			
Whole plant	Mouth ulcers	chewed and sap is swallowed	[16]
	Cyst	prepared oil is used externally	[17]
	Whooping cough	dried plant is used,	[16]
	Gout	paste is applied externally as an ointment,	[18]
	Dysuria		[18]
	Respiratory problem	used by formulation	
	Toothache	not specified	
	Pyorrhoea	plant decoction	
	Bronchial asthma mixed with honey [4]	mixed with honey	
	Tonsillitis	applied by formulation	
Greying of hair	oil extract is given ,4		
Stem	Dropsy and liver congestion	powder with cow milk, juice of bark directly [6],24	[11]
Root	Fever	directly powder is taken to cure	[11]
	Boils and glandular Swellings	paste form is directly applied	[12]
	Rheumatic fever	paste with goat milk is given	[11]
	Snakebite	decoction is taken orally	[11]
	Expel out spine	extract is applied locally on skin	
	Whooping cough	used as formulation	
Flower	Viral fever	Not specified 22	[19]
Seed	Edema	Paste is taken daily once	[16]
Shoot	Asthma, Whooping cough	Used by formulation, paste prepared with honey	[20]

## CHEMICAL CONSTITUENTS

The *Barleria prionitis* leaves and flowering tops are reported to rich in potassium salt [21]. Preliminary phytochemical analysis of hydromethanolic extract of *B. prionitis* whole plant indicated presence of flavonoid, glycoside, saponin, tannins and steroid [22]. Phytochemicals isolated from *B. prionitis* such as balarenone, pipataline, lupeol, prioniside A and Prioniside B [23]. Glycoside are isolated from the areal plant are barlerinoside, verbascoside, shanzhiside methyl ester, 6-*O*-trans-*p*-coumaroyl-8-*O*-acetylshanzhiside methyl ester, barlerin, acetylbarlerin and 7- methoxy diderroside. Chromatographic examination of the alcoholic extract of the leaves and stems of *Barleria prionitis* Linn, revealed the presence of iridinoid glycosides such as acetyl barlerin and barlerin [9,21,15]. The leaves were reported to contain scutellarein, melilotic acid, synergic acid and 6-hydroxyflavones [24].  $\beta$ -sitosterol, scutellarein 7-neohesperidoside and apigenine 7-*O*-glucoside are present in *B. Prionitis*. Two new anthraquinones compound isolated from *Barleria prionitis* and characterized as 1,8, dihydroxy-2,7-dimethyl 3,6-dimethoxy anthraquinone, 1,3,6,8-tetra methoxy-2,7-dimethyl anthraquinone.

## PHYTOCHEMISTRY

Preliminary phytochemical analysis of hydro-methanolic extract of *B. prionitis* whole plant indicated the presence of glycosides, saponins, flavonoids, steroids and tannins [25]. The leaves and flowering tops were reported to rich in potassium salts [5]. Several phytochemicals viz., balarenone (1), pipataline (2), lupeol (3), prioniside A (4), prioniside B (5) and prioniside C (6) has been isolated from the ethanolic extract of *B. prionitis* [10]. Numbers of glycosides include barlerinoside (7), verbascoside (8), shanzhiside methyl ester (9), 6-*O*-trans-*p*-coumaroyl-8-*O*-acetylshanzhiside methyl ester (10), barlerin (11), acetylbarlerin (12), 7-methoxydiderroside (13), lupulinoside (14) has been also isolated from the aerial parts [10]. Two anthraquinones derivatives has been also identified in this plant and their structures were characterized as 1,8, dihydroxy-2,7-dimethyl 3, 6-dimethoxy anthraquinone and 1,3,6,8-tetra methoxy-2,7-dimethyl anthraquinone [26]. The leaves were reported to contain scutellarein (15), melilotic acid (16), syringic acid (17), vanillic acid (18), *p*-hydroxybenzoic acid (19), 6-hydroxyflavones (20) [5]. Beside these phytochemicals, luteolin-7-*O*- $\beta$ -D-glucoside (21),  $\beta$ -sitosterol (22), scutellarein 7-neohesperidoside (23), apigenin 7-*O*-glucoside (24), 13, 14-seco-stigmasta-5, 14-diene-3- $\alpha$ -ol (25) were also reported to present in *B. prionitis* [27] (Figure 2).

Table 2. Phytochemical analysis of *B. Prionitis*.

Plant's part	Phytochemical/Nutrient	Test (extract details)	References
Leaf	Alkaloid TLC [30,31,33] Flavonoids Saponins TLC Tannin Phytosteroids Phenolic compound Terpenoids Not Specified Sterol (stigmasterol) Essential oil	(ME/ TLC)      HPLC	[28,29]
Aerial part	Glycosides NMR [34-35] Terpenoid (lupeol) Pipataline, Balarenone, NMR (EE) 13,14-Seco- stigmasta-5,14-	NMR EE	[29,8]
Whole plant	Glycosides Bortrager's test Saponins Flavonoids Phenolic compounds and Tannins Phytosterols Proteins and amino acid	(HE, ME, EE), Legal's test (HE, ME, EE) Frothing test (HE, ME, EE, AqE Ammonia test (HE), Alkaline reagent test (ME, CE, AqE), Shinoda test (CE, ME, AqE) FeCl <sub>3</sub> test (HE, AqE, ME, EE), Lead acetate test (ME, EE, AqE), Bromine water test (ME, AqE, EE) Liebermann's test (ME, AqE), Liebermann Burchard test (ME, AqE) Biuret test (ME, EE), Ninhydrin test (ME, EE)	[22,9]
Flower	Flavonoid Glycoside Neohesperidoside		[18]

### Anti-Diabetic Activity

The antidiabetic activity of alcoholic extract of leaf and root of *B. prionitis* was evaluated by using alloxan monohydrate. *B. prionitis* leaves showed significant decrease in blood glucose level, glycosylated hemoglobin and significant increase in serum insulin and liver glycogen level. *B. prionitis* root showed moderate but non-significant anti-diabetic activity in experimental animals [24].

### Antidiarrheal Activity

Butanol fraction of *B. prionitis* leaves showed significant anti-diarrheal activity. *In vivo* study showed that the butanol fraction dose dependently inhibited the castor oil induced diarrhea and PGE2 induced enter pooling in sprague-dawley rats. The butanol fraction also reduced the gastrointestinal motility in response to charcoal-induced gut transit changes [21].

### Diuretic Activity

Diuretic activity of *B. prionitis* flower extract was investigated using by administration of normal saline solution. Administration of aqueous flower extract was significantly increased the urination and sodium elimination but not potassium in rats. The diuretic effect of flower extract was comparable and significant with the reference drug furosemide [15].

### Toxicity Studies

Alcoholic extract of roots and leaves of *B. prionitis* did not showed any toxic effect in adult albino rats. During the 14 days of study period death was not observed on oral administration of extract [30]. Using different dose of iridoid fraction in the safety evaluation and maximum tolerance dose study the oral LD50 with no signs of abnormalities or any mortality observed [31].

### Gastro-Protective Activity

Maximum protections were found to be 66.26% and 59.42% by iridoid fraction (200 mg/kg) in PL induced ulcer and CRS-induced ulcer rat model. Iridoid fraction from leaves reduced ulcer index [21]. In ethanol induced gastric ulcer rat model, methanolic extract of leaf (500 mg/kg bw) and ranitidine provided 67.7 and 75.5% inhibition of ulcer. Same dose of extract and drug displayed 70.3 and 62.2% inhibition in indomethacin induced gastric ulcers model. Extract also showed efficacy against indomethacin induced gastric mucosal damage and increased liver enzymes in ethanol induced ulcer rat model [30].

### DISCUSSION

It is evident from different studies that *B. Prionitis* potentially carries medicinal properties and in India it has been traditionally used to cure various ailments. As per the studies of [10,11,14] refer (Table 1) leaves of *B. Prionitis* can be used to cure skin diseases, scabies, glandular swellings etc. if

applied directly as paste or juice given orally (as mentioned specifically in Table 1). Similarly, according to the studies of [11,16] and other authors (Table 1) Stem, root flower and whole plant can be used to treat various diseases like viral fever, rheumatic fever whooping cough, Edema etc. In the present study author has mentioned the case studies of 30 patients getting relief from renal stones when they were advised to take a paste of leaves orally followed by glass of butter milk for 3 days in continuation and more than 70% patients got relief within fortnight. This proves its amazing diuretic property and other medicinal properties makes *B. Prionitis* a special medicinal plant while it is still merely known to common PR actioners and pharmacists as well.

Besides, the phytochemical analysis of various parts of the plant also indicated the presence of glycosides, saponins, flavonoids, steroids and tannins [25]. The leaves and flowering tops were reported to rich in potassium salts [18] and other important phytochemicals (Table 2) has been reported by different scientists.

Moreover, anti-diabetic activity, antidiarrheal activity, anti-toxicity and Gastro protective activities has also been mentioned when tested on rats by different workers as mentioned in above paragraphs.

Hence, present review about amazing medicinal properties of *B. Prionitis* as suggested and reported by various authors will be helpful to disseminate the knowledge among practitioners, pharmacists and other workers and opens a gateway for further studies on the basis of existing scientific reports.

### CONCLUSION

In the present studies it has been found that *B. Prionitis* has tremendous medicinal properties and can be used as potential drug in various combinations to cure many diseases. Though it is a very commonly found herbal plant in almost every part of Asia but still its significant properties are rarely known and undiscovered. Hence further research is suggested to understand its pharmacological importance against numerous diseases and to identify its phytochemical metabolites. So that it can be used efficiently in pharmaceutical industry.

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