



**A REVIEW ON BERBERIS ARISTATA**

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**ABSTRACT**

Berberis aristata, also known as Indian barberry, "chutro" or tree turmeric, is a shrub belonging to the family Berberidaceae. In India, Berberis aristata is used in traditional herbal medicine. Its stem, roots, and fruits are used in Ayurveda. The plant is used traditionally in inflammation, wound healing, skin disease, diarrhoea and jaundice. Pharmacological studies on the plant reveals the proven activity of its as hypoglycaemic, antibacterial, antifungal, antipyretic, anti-inflammatory, hepatoprotective, antioxidant, anticancer. This paper presents a review on phytochemical and pharmacological studies of Berberis aristata.

**KEYWORDS:** Berberis aristata, Berberine, anticancer, antibacterial, hypoglycemic.

**INTRODUCTION**

Berberis aristata, also known as Indian barberry, "chutro" or tree turmeric, is a shrub belonging to the family Berberidaceae and the genus Berberis. The genus comprises approximately 450-500 species of deciduous evergreen shrubs and is found in the temperate and sub-tropical regions of Asia, Europe, and America. B. aristata is native to the Himalayas in India and in Nepal. It is also naturally found in the wet zone of Sri Lanka.<sup>[1]</sup> Berberis aristata is used in ayurvedic medicines from very long time. The plant is used traditionally in inflammation, wound healing, skin disease, menorrhagia, diarrhea, jaundice and affection of eyes. A very valuable ayurvedic preparation 'Rashut' is prepared by this plant.<sup>[2, 3, 4]</sup>

**Taxonomical classification**

Kingdom: Plantae  
Division: Magnoliophyta  
Class: Magnoliopsida  
Order: Ranunculales  
Family: Berberidaceae  
Genus: Berberis  
Species: aristata

**Vernacular Names**

Sanskrit: Katamkateri, Dirvi Bengali: Daruharidra  
English: Indian Berberry Gujrati: Daruharidra,  
Daruhuladur Hindi: Daruhaldi, Darhald Kannada:  
Maradarishana, Maradarishina, Daruhaladi Malayalam:  
Maramannal, Maramanjal Marathi: Daruhalad Oriya:  
Daruharidra, Daruhalidi Punjabi: Sumalu Tamil:  
Gangeti, Varatiu manjal Telugu: Manupasupu Urdu:  
Darhald.<sup>[5]</sup>

**Morphology**

Berberis aristata is characterized by an erect spiny shrub, ranging between 2 to 3 m (6.6 to 9.8 ft) in height. It is a woody plant, with bark that appears yellow to brown from the outside and deep yellow from the inside. The bark is covered with three-branched thorns, which are modified leaves, and can be removed by hand in longitudinal strips. The leaves are arranged in tufts of five to eight and are approximately 4.9 cm (1.9 in) long and 1.8 cm (0.71 in) broad. The leaves are deep green on the dorsal surface and light green on the ventral surface. The leaves are simple with pinnate venation. The leaves are leathery in texture and are toothed, with several to many small indentations along the margin of the leaf.<sup>[6]</sup>



Figure-1: Berberis aristata flower.



Figure-2: Berberis aristata fruits.

### Phytochemistry

The plant contains barberine, oxyberberine, berbamine, aromoline, karachine, palmatine, oxyacanthine and taxilamine. Berberis aristata contains protoberberine and bis isoquinoline type of alkaloid. Root of plant Berberis aristata contains alkaloid which are berbamine, Berberine, oxycanthine, epiberberine, palmatine, dehydrocaroline, jatrorhizine and columbamine, karachine, dihydrokarachine, taximaline, oxyberberine, aromoline. Four alkaloids, pakistanine, 1-O methyl pakistanine, pseudopalmatine chloride and pseudoberberine chloride were also isolated from Berberis aristata. A secobisbenzisoquinoline or simple isoquinoline alkaloid was isolated from Berberis aristata. The major alkaloid found in Berberis aristata is Berberine having yield of 2.23% followed by palamatine. Variation of Berberine content in root and stem of Berberis aristata with altitude was determined. It was found that plants growing at lower altitude have more Berberine content. Berberine content in plant is also influenced by potassium and moisture content of soil. HPTLC fingerprinting of Berberine in Berberis aristata was done to quantify the amount of Berberine. Total alkaloidal content of Berberis aristata was also done.<sup>[7]</sup>

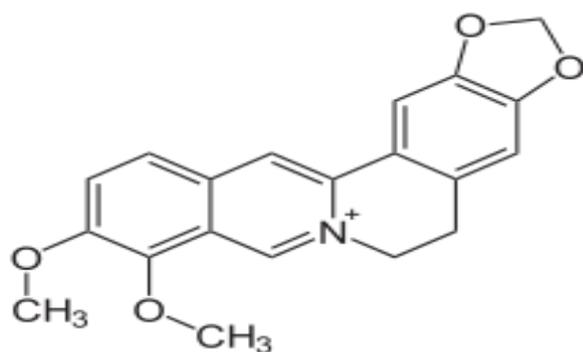


Figure-3: Chemical structure of Berberine.

### Traditional uses

In the Berberidaceae family, the genus Berberis comprises of ~450–500 species, which represent the main natural source of berberine. Plants of this genus are used against inflammation, infectious diseases, diabetes, constipation, and other pathologies. The oldest evidence of using barberry fruit (Berberis vulgaris) as a blood purifying agent was written on the clay tablets in the

library of Assyrian emperor Asurbanipal during 650 BC. In Asia, the extensive use of the stem, stem bark, roots, and root bark of plants rich in berberine, particularly Berberis species, has more than 3000 years of history. Moreover, they have been used as raw material or as an important ingredient in Ayurvedic and traditional Chinese medicine. In Ayurveda, Berberis species have been traditionally used for the treatment of a wide range of infections of the ear, eye, and mouth, for quick healing of wounds, curing hemorrhoids, indigestion and dysentery, or treatment of uterine and vaginal disorders. It has also been used to reduce obesity, and as an antidote for the treatment of scorpion sting or snakebite. Berberine extracts and decoctions are traditionally used for their activities against a variety of microorganisms including bacteria, viruses, fungi, protozoa, helminthes, in Ayurvedic, Chinese, and Middle Eastern folk medicines. In Unani medicine, Berberis asiatica has multiple uses, such as for the treatment of asthma, eye sores, jaundice, skin pigmentation, and toothache, as well as for favoring the elimination of inflammation and swelling, and for drying ulcers. Decoction of the roots, and stem barks originating from Berberis aristata, B. chitria, and B. lycium (Indian Berberis species), have been used as domestic treatment of conjunctivitis or other ophthalmic diseases, enlarged liver and spleen, hemorrhages, jaundice, and skin diseases like ulcers. On the other hand, the use of decoction of Indian barberry mixed with honey has also been reported for the treatment of jaundice. Additionally, it has been reported the use of decoction of Indian barberry and Emblic myrobalan mixed with honey in the cure of urinary disorders as painful micturition. Numerous studies dealing with its antimicrobial and antiprotozoal activities against different types of infectious organisms have been assessed so far. Moreover, it has been used to treat diarrhea and intestinal parasites since ancient times in China. and the Eastern hemisphere, while in China it is also used for treating diabetes. Nowadays, a significant number of dietary supplements based on plants containing berberine are used for reducing fever, common cold, respiratory infections, and influenza.<sup>[8]</sup>

### Pharmacology

B. aristata DC, the official species of Ayurvedic Pharmacopeia of India has a niche over reported pharmacological and clinical uses. Attention has been paid to the antioxidant and anti-inflammatory activity of

natural products and compounds isolated from natural products which are often characterized by high efficacy and low adverse effects. Berberine is an isoquinoline alkaloid, widely present in different medicinal herbs, especially in the genus *Berberis*. It is mainly used as antidiarrhoeal, antibacterial, antifungal, and antiprotozoal agent. However, current research has also highlighted on its beneficial role in neurodegenerative diseases, mainly due to its powerful antioxidant effect. The therapeutic potential of Berberine in different neurodegenerative diseases such as Alzheimer, Parkinson and Huntington disease has been brought to evidence by numerous studies<sup>67</sup>. According to Ayurvedic pharmacopeia of India *Berberis aristata* DC is also used in diabetes. Diabetes mellitus is one of the most common chronic diseases and is associated with hyperlipidemia and co-morbidities such as obesity and hypertension. In order to establish scientific facts for the utility of this plant in the treatment of diabetes, the hypoglycemic activity. Diabetes mellitus study revealed that it is a heterogeneous metabolic disorder old as mankind and its incidence considered to be high (4-5%) all over world. The use of medicinal plants for the treatment of diabetes mellitus dates back from the Ebers papyrus of about 1550 B.C. A multitude of herbs spices and other plant materials have been described for the treatment of diabetes throughout the world. The medicinal plants might provide a useful source of new oral hypoglycemic compounds for development of pharmaceutical entities or as a dietary adjunct to existing therapies. Few of the plants used for the treatment of diabetes have received scientific or medicinal scrutiny and even the WHO expert committee on diabetes recommends that this area warrant further attention Previous studies suggested that hyperglycemia and hyperlipidemia are the common characteristics of streptozotocin induced diabetes mellitus. The maximum reduction in serum glucose levels was seen in methanolic extract of *Berberis aristata* DC at the dose of 500 mg/kg. Hence the methanolic extract of *Berberis aristata* DC had a beneficial effect on carbohydrate metabolism in diabetic condition.

A women's university in India, Shri Padmavathi Mahila Viswavidyalayam Tirupati, conducted a study to evaluate the effectiveness of ayurvedic medicine. They designed a study to provide scientific evidence for the use of *Berberis aristata* in the treatment of urinary troubles caused as a side effect of the anti-cancer chemotherapy drug, cisplatin. Cisplatin is known to cause nephrotoxicity which is a renal disease or dysfunction. In conclusion, the researchers found that the side effects of cisplatin were reversed by the antioxidant properties of the decoction of root bark of *Berberis aristata*. Other research universities in India also studied the medicinal properties of *Berberis aristata* along with effects of berberine as active component in various studies of the anti-diabetic activity of the plant, diabetic rats treated with the ethanol extract of the roots showed a significant reduction of serum glucose level, however, it also showed a significant increase in the level of HDL

cholesterol. Additional research must be conducted to determine if the hypolipidemic properties of the plant could serve as a protective mechanism against the development of atherosclerosis (Atherosclerosis; also known as arteriosclerotic vascular disease or ASVD) is a specific form of arteriosclerosis in which an artery wall thickens as a result of invasion and accumulation of white blood cells (WBCs)), which is usually associated with diabetes.

Tincture of the root is found to be better than quinine and cinchona as it does not cause cardiac depression in the treatment of intermittent fever and powdered root mixed with butter is used for the treatment of bleeding piles. Its ripe fruits are used as a mild laxative for children and exhibits hypochlolestromic activity. The leaves for preventing acetaminophen-induced liver damage and most important clinical use includes treatment of diarrhoea due to bacterial, fungal, viral and protozoal infection. Increased levels of calcium and phosphorus in serum and significant decreased in urine are due to the use of *Berberis aristata* aqueous-methanol extract, which possess the potent antiosteoporosis activity and substantiates the ethnic use in treatment of postmenopausal osteoporosis. It also has property to reduce serum cholesterol, triglycerides and low density lipoprotein levels and moreover, there is an increase in thrombin and fibrinogen time.

The traditional Indian and Chinese medicine systems revealed that almost every part of the plant has some significant medicinal value. Its roots, stem, bark, leaves, rhizomes and fruits are used in many classical ayurvedic preparations like Rasaut, Darvyadikvatha, Darvyadileha, Darvyaditaila, Rasanjana, Dasangalepa and in formulations for eye care, wounds, skin diseases, jaundice, rheumatism and diabetes. Traditionally a popular medicine Rasaut, prepared from the root of this plant for eye disorders and also mixed with honey is useful in the treatment of aphthous sores abrasions and ulcerations of the skin. Different extracts of *B. Aristata* have remarkable antibacterial and antifungal potentials against clinical and standard strains, thus could be used to derive antimicrobial agents especially against *V. cholerae*, *Staphylococcus*, *Candida* and *Aspergillus* species. The antimicrobial (minimum inhibitory concentration (MIC)) and minimum actericidal concentration (MBC) against all strains of Shigellain both ethanolic and aqueous extract are between 125 to 500 µg/mL and 300 to 600 µg/mL, respectively and MIC& MBC values of berberine are almost comparable to standard ciprofloxacin<sup>61</sup>. Its methanolic extract is confirmed to be a potential anticancer herb against colon cancer due to its COX-II inhibitory property on proliferation of human colon cancer cell line (HT29). The decoction of root bark of *Berberis aristata* use in the treatment of urinary troubles caused as a side effect of the anti-cancer chemotherapy drug, cisplatin. Different types of oral hypoglycemic agents are available along with insulin for the treatment of diabetes mellitus but

their long-term use produces undesirable side effects such as skin rashes, transient leucopenia, thrombocytopenia, severe hypoglycemia, and increase chances of cardiovascular death of unknown mechanism. The ethanol extract of root of *B. aristata* 100 mg/kg body weight showed a significant ( $P < 0.01$ ) reduction of serum glucose level in alloxan induced diabetic rats at 15th day as compared to diabetic control group. Cholesterol and triglycerides level were increased very significantly ( $P < 0.01$ ), in diabetic animal when compared with normal control group. The level of cholesterol and triglycerides reduced very significantly ( $P < 0.01$ ), when compared with diabetic control group. The level of HDL cholesterol was significantly ( $P < 0.05$ ) increased in the extract treated group when compared to diabetic control group. In oral glucose tolerance test ethanol extract of *B. aristata* increase the glucose tolerance. It is concluded that the ethanol extract of *B. aristata* possess anti-diabetic activity in alloxan induced diabetic rats. The ethanol extract of *B. aristata* is very promising to develop standardized phytomedicine for diabetes mellitus. *B. aristata* roots showed a significant reduction of serum glucose level, however, it also showed a significant increase in the level of HDL cholesterol and it is very promising to develop standardized phytomedicine for diabetes mellitus.<sup>[9]</sup>

## CONCLUSION

Review of literatures has revealed that *Berberis aristata* contains Berberine as active component its use in antimicrobial, hepatoprotective, immunomodulatory, and antidepressant. Further studies need to prove the antileprotic antifertility, anti-neoplastic etc.

## REFERENCES

1. [https://en.wikipedia.org/wiki/Berberis\\_aristata](https://en.wikipedia.org/wiki/Berberis_aristata)
2. Kurian A, Sankar M. A. Medicinal plant horticulture sciences, New India publishing agency, New Delhi, 2007; (2): 299-300.
3. Parmar C and Kaushal MK. *Berberis aristata*: Indian: Wild Fruits. Kalyani Publishers, New Delhi, India. 1982; 10-14.
4. Rashmi, Rajasekaran A, Pant J, The genus *Berberis* Linn: a review. *Pharmacognosy review* 2008 Jul-dec; 2(4): 368-385.
5. Sharma K, Bairwa R, Chauhan N, Shrivastava B, Saini N K, *Berberis aristata*: A Review, *International Journal of Research in Ayurveda & Pharmacy*, 2011; 2(2): 383-388.
6. Parmar C, & Kaushal MK, (1982). *Berberis aristata*. Wild Fruits. New Delhi, India: Kalyani Publishers. pp. 10-14.
7. Mazumder P M, Das S, Das S, Das M K, *Phytopharmacology of Berberis aristata DC: A review*, *Journal of Drug Delivery & Therapeutics*, 2011; 1(2): 46-50.
8. Maria A N, Andrel M, Javier E, Raluca MP, Corina IB, Glanina C, Anca D B, Berberine botanical occurrence, traditional uses, extraction methods, relevance in cardiovascular, metabolic, hepatic and renal disorders, *Frontier in pharmacology*, 2018; 9(557): 1-30.
9. Vikas C, Aswal JS, Rajendra D, Uniyal DP, A review on Pharmacological potential of Berberine; an active component of Himalayan *Berberis aristata*, *The Journal of Phytopharmacology*, 2017; 6(1): 53-58.