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Review Article

A PRECISE STUDY ON "*BERBERIS ARISTATA*

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ABSTRACT

Indian barberry is a very common plant with miraculous therapeutic activity. This plant was being used from very ancient times. It generally has Habitat of North-western Himalayas, Nilgiris, Kulu, and Kumaon. Propagation of this herb is carried out during the spring season. It is listed in "Ayurveda" for the treatment of various dysenteries. It is well known as "Daruhaldi" in Ayurveda because it is having properties like turmeric. It is also used in different systems of medication like in Ayurveda, Siddha, and Yunani. Twigs are either white or pale yellowish-brown in colour. The bark is having a pale brown appearance on the outside and has deep yellowish colour inside. Leaves are obovate, with reticulated venation, and are arranged in tufts of five to eight. These leaves are having a glossy dark green appearance on the outside and a light green colour inside. Flowers are yellow and are usually bisexual. The fruits are bright red. The stem is subterete, pale brownish yellow. It chiefly contains "berberine" as an active phytoconstituent that belongs to alkaloids. Other than berberine it also contains contain barbamine, oxyberberine, palmatine, and taxilamine. Roots of *Berberis aristata* contain berberine, barbamine, Jatrorrhizine, columbamine and oxyberberine. This plant is having various therapeutic activities like; antibacterial, antiperiodic, antidiarrheal, antipyretic, antidiabetic, and anticancer activities. Several research works were performed for this plant with the use of systemic animal models. A significant result was obtained. Investigations suggested that it can be used as an antimalarial, antioxidant, anti-inflammatory, hypoglycaemic, and hepatoprotective.

Keywords: *Berberis aristata,* Signalling, Pharmacognostic study, Berberine, Extract, Phytoconstituent

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INTRODUCTION

Berberis aristata, also known as 'Indian Berbery' or very commonly known as 'Daruhaldi'. It is a large, erect, deciduous spiny shrub. It grows to a height 2-3 meters. It is found in the Assam, Bihar and Himalayas at an altitude of 1000-3000 m [1, 2]. It is also founded from Nilgiri Hills [3]. It contains mainly two substituted species. *B. asiatica* Roxb. ex DC and *B. lycium* Royle. It belongs to the family of Berberidaceae. It generally having Habitate of the North-western Himalayas, Nilgiris, Kulu and Kumaon. It chiefly contains "berberine" as an active phytoconstituent which belongs to alkaloids. Berberine hydrochloride and berberine sulphate aid in the diagnosis of malaria by liberating the parasites into the bloodstream. Berberine alkaloid has antibacterial and anti-inflammatory property. Because of its active constituents, it has antiseptic property and it can work in the intestinal level. It can be used as a bitter stomachic. It may also exhibit antineoplastic activity. (Derivative formed by synthesizing method is dihydroberberine and it is to be used in the treatment of brain tumour.)In research, Berberine has be founded as an inhibitor of enzymes trypsin (32%) and chymotrypsin (60%) [4-6].

Berberis aristata possess antibacterial, antiperiodic, antidiarrheal, antipyretic, antidiabetic, and anticancer activities. It is also used in the treatment of ophthalmic infections. Antibacterial potential-Berberine accumulates in the cells of the bacteria, attacks and damages DNA of bacteria. This leads to the death of bacteria.

Botanical name-*Berberis aristata* Dc., Family–Berberidaceae

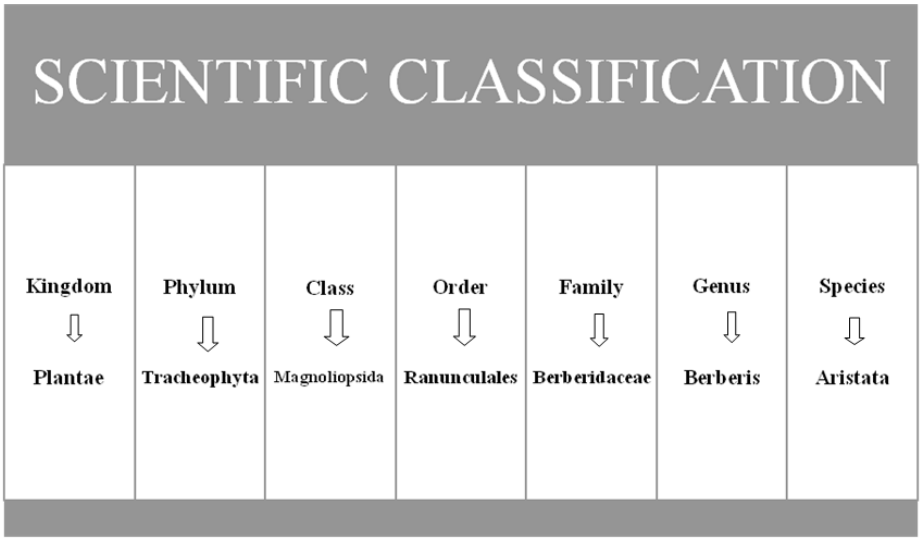

Fig. 1: Scientific classification (Taxonomic classification of *Berberis aristata*)

Table 1: Names of *Berberis aristata* in different languages

Names of *Berberis aristata* in different languages		
S. No.	**Language**	**Name**
1	Hindi	Daru Haldi
2	English	Indian berbery
3	Sanskrit	Darunisha, Peeta, Daruharidra, Darvi, Peetadru, Peetachandana, Hemakanti, kashta Rajani, Peetaka, Peetahva, Hemakanta, Hemavarnavati
4	Tamil	Mara Manjal
5	Bengali	Daruharidra
6	Punjabi	Daru Haldi
7	Marathi	Daruhalad
8	Gujarati	Daru Haldar
9	Telugu	Kasturipushpa
10	Farsi	Darchoba

Cultivation and collection

It cultivates fine in temperate weather. It thrives better under moist and humid climatic circumstances. This plant cannot stand in hot climate. It raises well at a higher altitude between 2000-3000 m above the sea level. It is very well dispersed rainfall in the range of sixty to seventy-five cm and at a range of temperature between 15 ° to 30 °C. It chiefly grows as a rain-fed crop. It cultivates on the variability of soils, fluctuating from sandy alluvial loam to red lateritic loam or even dark loam; soil is appropriate for its development. Propagation is carried out during spring season.

Self-sown seeds are the main propagation source in nature. It can be successfully propagated vegetatively by stem cuttings. The method of raising seedlings on the nursery bed and then transplanting can also be practiced. It is a perennial plant.

It is an erect, deciduous shrub about 1.75 to 3.5 metre in height. The plants are ready for harvesting after two years of plantation. The root bark is removed its maturity. It is cut into small pieces, sun-dried and stored in a well-closed container in dry place.

Morphological aspect

Berberis aristate (Daruhaldi) is basically a huge, straight, deciduous spiny shrub. It raises to the height of 2-3 meters. Twigs are either white or pale yellowish brown in colour. Bark is having pale brown appearance in the outside and having deep yellowish colour inside. It is deeply furrowed and rough. Leaves are obovate or elliptic, entire, or spinous toothed, approximately 4.9 cm long and 1.8 cm broad, arranged in tufts of five to eight, base is gradually narrowed. They are glossy dark green above and light green beneath. Flowers are yellow in color and forms racemose inflorescence Fruits are edible berries, succulent, acidic, bright red in color. Spiny evergreen shrub, about 2-4 m tall. Stem is subterete or subangled, pale brownish yellow, glabrous, internodes short, about four cm long, spines are short, two to three fid near the base, solitary towards the apex, about one point five to five cm long. Leaves closely arranged up to three to six in a node, obovate, oblanceolate-elliptic, four to eight x two to three cm across, base cuneate, margin entire small spinules 2, apex acute or obtuse with mucronate tip, subcoriaceous, dark green, glabrous or lustrous above, paler beneath, lateral veins four to seven on either side of the midrib, impressed above, prominently veined below, petiole sub sessile or four to eight mm long. Inflorescence subracemose or subumbellate or pseudoumbellate, five to twenty-five flowered, about five to six cm long, peduncles, about one to four cm long. Flowers are usually bisexual, greenish-yellow, about ten to fourteen mm across, pedicels about five to ten mm long, bracts lanceolate or ovate, apex acute, about three x one mm long, six sepals in two series, outer series smallest and inner series largest, outer series is three, ovate-lanceolate, apex obtuse, about two to three x zero point eight to one mm across, inner series longer, obovate, clawed at the base, apex obtuse, about five to seven x three to four mm across, six petals, obovate or oblong, base cuneate with two glands, margin entire, apex obtuse, about six to seven x three to four mm across. Stamens formed at the apex portion and connected apiculate, anther-locules opening by recurved valves, ovary simple, oblong, ovules three to five. about five x one point two mm across, club-shaped, ovules five to seven, style about one mm long, stigma about one point five mm broad. Fruits are numerous seeded berries and ovoid. They are mainly glabrous, shining, bright red when ripe, stylose [7].

Pharmacognostic investigation of root

Descriptive characters

The roots of *Berberis aristata* are thick, woody, yellowish brown in appearance, cylindrical in shape more or enclosed by a thin hard bark. Bark is pale brown inside, rough outside, and closely and deeply furrowed. Inside surface is bright yellow in colour, rough in texture, fibrous with small fine edges; hard texture of the fracture is short, it is odourless and bitter in taste [8]

Microscopic characters for root

The young root demonstrates a sole layered epidermis comprising of greater typically radially elongated cells shielded over by a cuticle. This is followed by the cortex, five to seven layers of cells wide, encompassing of circular, isodiametric, polyhedral, and tangentially elongated cells enclosing inside it a polyarc stele. Cork cambium arises in the 5^{th}-6^{th} layer of cortex. when the secondary growth occurred, cork cambium will produce cork on the exterior side and phelloderm on the innermost side. Therefore, in the mature root the cork is having nine to ten layers of the cells that are tangentially extended and having thin wall. This is followed by a narrow zone of phelloderm 3-5 layers wide with thick-walled ellipsoidal cells having very few intercellular spaces. Subsequent this, is a wide zone of secondary phloem that are composed mostly of phloem (vascular bundle) parenchyma with integral sieve tubes and sieve plates, that are greater on inside of the phloem. Some of the parenchymatous cells of the phloem are converted into fibres as well as stone cells. The fibres are much more in number than stone cells. The stone cells are in 1 or 2 fixed within the sets of fibres, that are existing in 2 to 3 irregular spherical rings surrounding the xylem. The fibres are powerfully lignified and are of 2 types.

1. One is thinner and sharp at their respective ends rather than other one. They also have short of pits. Some of them having outgrowth toward their ends.

2. The different ones are larger in diameter however smaller in duration than with thick bordered pits on their walls. There is variety of fibres with pits with much less in variety than the fibres quick of pits. Stone cells are lignified and shorter in dimensions with thickened walls and possess vertical pits on their walls. The medullary rays converted to wider, and funnel-shaped as per they traverse the region of the secondary phloem. The wood is diffused, porous in nature and comprises of trachea, tracheids, fibers, and xylem parenchyma that are traversed by 2 to 3 celled extensive medullary rays. All the essentials of the xylem, excluding medullary rays, are powerfully lignified. The xylem vessels are of drum-shaped and having habitually bordered pits on their walls with discrete perforation rims and some of them possess sharp tail like ends. The tracheids having sharp ends and possess bordered pits on their walls. Xylem fibers are elongated, thickened with the perceptible lumen and sharp ends. Occasionally fibersare having outgrowth on their walls near its ends. The fiber tracheids are lengthened with having border pits on their walls and are thicker rather than xylem fibers. Xylem parenchyma is rectangular/polygonal in shape and includes simple pits on their walls.

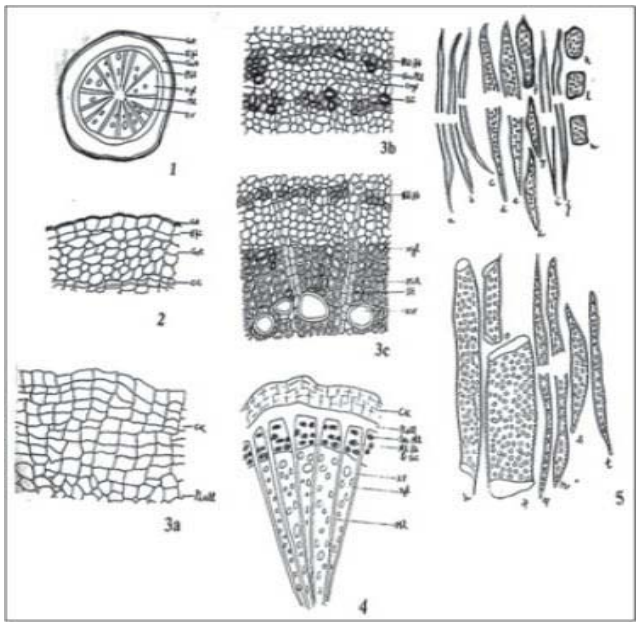

Fig. 2: (2.1) T. S. of young root (2.2) T. S. with cellular detail and cork cambium (2.3) T. S. of mature root showing cellular detail with phelloderm, phelloderm with secondary phloem, secondary phloem, and xylem (2.4) T. S. of mature root (2.5) Phloem fibers with pits, stone cells, xylem vessels, tracheidal fibers, tracheides, xylem fibers, xylem parenchyma [8]

Pharmacognostic investigation of stem

Descriptive characters

They are having 0.2-1.0 cm in diameter and cylindrical in shape with longitudinal fine wrinkles successively parallel to each other on the exterior surface. Scars are seen with some lenticles on external surface. T. S. Section shows smooth surface with yellowish bark and half of the size of the radius of the stem. A yellow wood contains a different central pith. Fracture is short and slightly fibrous with bitter taste.

Microscopic characters

T. S. Section of a young stem demonstrate a curvy outline. It comprises of a sole layer of epidermis which is made up of cubical to radial lengthened type of cells that is covered by a thick cuticle. Some of them are elongated to form short unicellular trichomes whose walls are very much thickened so as to leave a narrow lumen within them. They are non-lignified. This is followed by cortex, which is divided into three zones. The exterior part is a fine zone of three to four layers of parenchymatous cells with comparatively thick walls and having a lesser number of intercellular spaces between them. They seem to be tanniferous display deep coloration on their walls. The central zone comprises of four to six layers of sclerenchymatous fibers that are muscularly lignified. The fibers are extended with thick walls having a distinguishable lumen with mostly sharp ends. third zone of cortex is having only one to two layers wide and is contained thin wall parenchymatous cells. Endodermis and pericycle are unclear. The primary phloem is made up of sieve tubes, sieve plates and phloem parenchyma and having lackness of phloem fibers. Xylem are made up of vessels, tracheids, xylem fibers and xylem parenchyma. The section of xylem is traversed by separate medullary rays. The cells of the pith are hugespherical to isodiametric, thick-walled, slightly sclerosed and most of them having pits on their walls. when secondary growth occurred cork cambium gets up on the second layer of the parenchymatous cortex just surrounding the central stele. It gives rise to cork on the superficial side and phelloderm on the innermost side. The dermis with unicellular, uniseriate trichomes and the number one cortex comprising of tanniferous and sclerenchymatous cells receives peeled off. In mature stem, the cork is comprising of twelve to sixteen layers of thick-walled, extremely suberized cells that are tangentially elongated and radially arranged. Subsequent this is a small zone of phelloderm, which are only four to six layers wide with thin-walled parenchyma constituting it. This is followed by a wide zone of secondary phloem that is intersected in between by wide funnel-shaped medullary rays. Yet, the fibers are absent with inside the area of medullary rays. The phloem fibers are long, with lignified thick partitions and an extensive lumen and by and large pointed tapering ends. However, some fibers have blunted to forked ends additionally. Secondary phloem are additionally incorporate a few sclerides, which can be by and large square to squarish in form with thick lignified partitions, which at locations display pits on their partitions. The secondary xylem includes xylem vessels, tracheids, xylem fibers and xylem parenchyma. Vessels have by and large bordered pits with wonderful perforation rim, aleven thoughsome are visible having spiral kind of thickening. They range in form and length being by and large cylindrical and brief. The tracheids are brief with easy pits on their partitions. The fibers are very long, thick walled, lignified by and large with pointed tapering ends, even as some are located to be having blunt to forked ends. In transverse section, the xylem fibers look like they focused with inside the decrease part of vascular package deal with inside the shape of letter V and the xylem vessels are by and large focused with inside the Basal and peripheral a part of the package deal. Some tracheidal fibers with easy pits on their partitions also are visible. The xylem parenchyma is squarish to polygonal in form with thick partitions and having easy pits on their partitions. The pith cells are polygonal, round to isodiametric with thick, pitted partitions, which can be barely sclerosed; the range of medullary rays consistent with mm on the cambial area is 28-30; the wood-bark ratio is 2.5:1.

Pharmacognostic investigation of leaf

Descriptive characters

Leaf is generally obovate in shape and spinous-toothed. Leaf base is gradually narrowed with prominent reticulate veins. Glossy dark green appearance is on above side and glossy pale green appearance in inner side. Leaf is brittle in nature and having odor indistinct odour with bitter taste.

Microscopic characters

The midrib is having concavo to convex outline and possess more dorsal convexity as compared to the ventral concavity. It displays a sole layer of epidermis cells which are cubicle to tangentially in shape. The cells of the upper epidermis are bigger than then the lower epidermis. The epidermis is enclosed superficially by a thick cuticle

which appeared to be profoundly furrowed on both sides. The cuticular furrows found in the upper side are bigger than those of the lower side. Beneath the epidermis cell there is a widespread cortex. This cortex is formed by three to five layers. on the ventral side there is usually thick-walled parenchyma cells are present. However, on the dorsal side there is five to eight layers of thick-walled parenchyma cells. The Parenchyma cells are polyhedral to circular in shape with having slight inter-cellular spaces in between them. Neighbouring the vascular tissue there is all arounda discontinuous strand of four to six layers of pericyclic fibers with thick lignified walls consisting of a small lumen in between them. The fibers are extended and pointed with blunt ends. The vascular structure demonstrates an intermittent ectophloic-siphonostele encircling in the center central small pith that is consist of thin-walled polyhedral to is diametric parenchymatous cells. The medullary rays consist of one to two cells that are wide traverse through the xylem and phloem provinces. The phloem is comprising of sieve tubes, sieve plates and parenchyma but there is lackness of Phloem fibers. The xylem is consisting of trachae, tracheids, tracheidal fibers, xylem fibers and xylem parenchyma and these all are lignified. The trachea is extended with spiral, annular, scalar form and bordered pits. The later have distinct perforation rims. The tracheids are of 2 types.

1) The long tracheids are having smooth margin with thickening. It is either composed of scalariform or with bordered pits.

2) The short tracheids are having an irregular margin and scalariform type of thickening.

Fiber tracheids are copious in number along with pointed ends. The xylem fibers are very elongated and highly thickened with thin central lumen and typically tapering pointed ends. Xylem parenchyma cells is too thickened with simple pits on their walls.

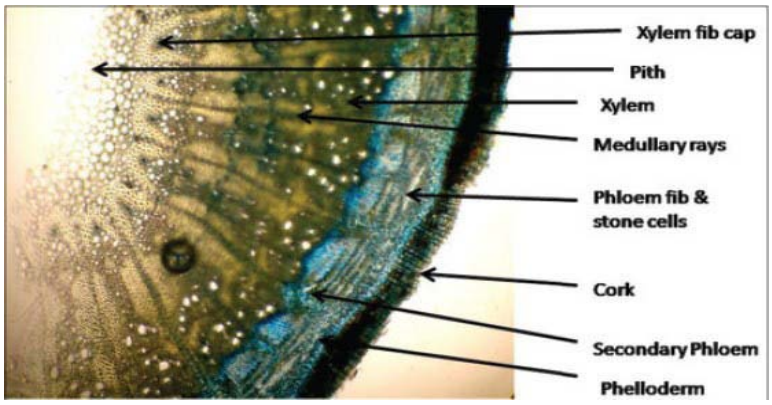

Fig. 3: T. S. of mature stem [8]

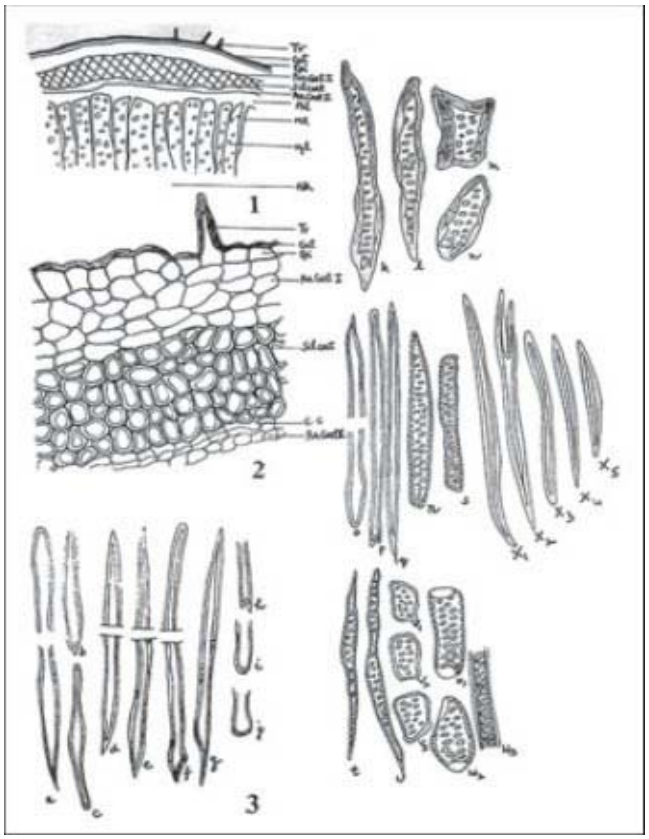

Fig. 4: (4.1) T. S. of the young stem (4.2) T. S. showing cellular details with cork cambium (4.3) Fibers from the young stem, secondary phloem fibers from mature stem, stone cells, xylem vessels, tracheidal fibers, tracheides, xylem fibers, xylem parenchyma [8]

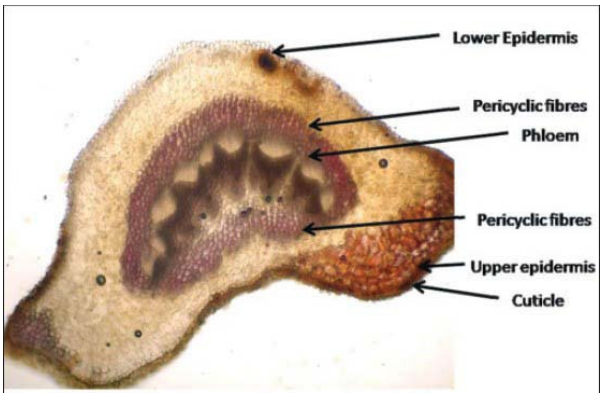

Fig. 5: T. S. of midrib of leaf of *Berberis aristata* [8]

Chemical constituents

It contains the number of alkaloids, ranging from 1.2-2 percent. Roots contain maximum alkaloids as compared to stem bark. Stem bark and root bark contain berberine, barbamine, oxyberberine, palmatine and taxilamine. Roots contain berberine, barbamine, Jatrorrhizine, columbamine and oxyberberine.

Pharmacological action

Antidiabetic activity

There is a systematic study performed on the roots of *Berberis aristata* and it reveals that the aqueous and methanolic root extract shows a hypoglycemic effect when administered to normal and alloxan-induced diabetic albino rabbit. Result of this study reveals that root extract is having potent and orally effective in diabetes. Antidiabetic activity is shows by triggering formation of insulin [9].

Antidiabetic activity is also observed in albino wistar rat diabetes induced by alloxan [10] and streptozotocin [11]. Ethanolic root extract shows a promising result. Methanolic [12] and ethanolic [13] extract of stem bark of *Berberis aristate* shows antihyperglycemic activity in diabetic rat.

Hepatoprotective activity

Hepatoprotective and antioxidant activity has been observed in dried aerial parts of *Berberis aristata.* Specially seen in aqueous and methanolic extract in CCl_4 induced liver injury and comparison is done by authenticated drug (*Silybum marianum*) [14]. Shoot and fruit extract also shows good result against paracetamol induced liver injury. Hepatoprotective activity of the extract is partially observed by inhibition of microsomal drug-metabolizing enzyme [15, 16] Butanolic extract of *Berberis aristata* reveals potent hepatoprotective action by selective inotropic activity [17].

Antimalarial activity

Antiplasmodial activity is observed in the root and bark extract *Berberis aristata* and it is found that the extract is having significant action in schizont maturation inhibition of P. berghei isolates *in vitro* testing [18].

Anticancer activity

Methanolic extract of stem of *Berberis aristata* was tested for anticancer activity and it was found to be very effective against human colon cancer cell line [19, 20]. Berberine is an active isolate of Berberis *aristata* and it has been found to significantly inhibit that the carcinogenesis is induced by 20-methylcholanthrene or N-nitrosodiethylamine, in a dose-dependent manner in small creatures [21].

Antioxidant activity

50% aqueous and ethanolic root extract of *Berberis aristata* was shown antioxidant potential by showing antioxidant enzymes of liver in rats (diabetes induced) with its protection parameters. The root extract has shown robust potential to decline oxidative stress [22]. Antioxidant activity of dried aerial part of this plant was successfully investigated in the aqueous and methanolic extract and in berberine also against CCl_4 induced liver injury. Significant result was obtained from this study [14].

Anti-inflammatory activity

Aqueous extracts of *Berberis aristata* by topical administration showed strong anti-inflammatory action against endotoxin-induced uveitis in rabbit [23]. Alcoholic and aqueous extracts of this plant showed promising activity against acute inflammatory condition and noteworthy activity was attained at 2 h after administration of Carrageen injection. Aqueous extract was also effective in the initial phase of acute inflammation and alcoholic extract in the advanced phase of acute inflammation. This alcoholic extract may be act by blocking the mediators released in the later phase (i.e., prostaglandin), while the aqueous extract may be acting by blocking the mediators released in the early phase (i.e., bradykinin, histamine, and serotonin), as well as by blocking the mediators released in the later phase (i.e., prostaglandin) [23].

The 50% alcoholic extracts were investigated for anti-inflammatory potential. And extract shows the promising result by one possible mechanism. For understanding this plant should be selected, trypsin and β.-glucuronidase inhibition assays were carried out. Plant extracts did not show β.-glucuronidase inhibitory potential butit show moderate antiproteolytic activity toward trypsin-induced hydrolysis of bovine serum albumin (BSA) [24].

Anti-microbial activity

Ethanolic extract of *Berberis aristata* is having antifungal activity [26]. Aqueous extract, alcoholic extract and powdered root in distilled water extract shows activity against various fungus species like *Candida* and *Aspergillus* [23].

Out of these three extracts, best result is observed in alcoholic extract. All these three extracts are having activity against different bacterial strains like gram-positive and gram-negative bacterias and works as an antibacterial agent. Main antibacterial activity is observed against *Vibrio cholerae* [23].

Wound healing activity

Aqueous and alcoholic extract of *Berberis aristata* was studied in the experimental animal (male adult goat). Alcoholic extract of this plant has anti-PAF (platelet-activating factor) activity; this experiment is performed in rabbits. This extract inhibits the PAF-encouraged collection of platelets in a dose-dependent manner in the microgram range [27-29]. It shows that *Berberis aristata* plant can be used in the treatment of allergic disorders [30].

Antidiarrheal activity

Dried leave extract (aqueous) is very effective against diarrhoea and dysentery [27].

Antidepression

"Berberine" is an alkaloid, specifically the isoquinoline category isolated from *Berberis aristata*. It possessed a wide range of

biological activity, including central nervous system activity as well. The involvement of the L-arginine-nitric oxide (NO)-cyclic guanosine monophosphate (cGMP) signaling pathway in the antidepressant action of berberine chloride was investigated successfully in the research work [28].

Indian barberry and Ayurveda

Daruharidra-*Berberis aristata* is used in Ayurveda to treat eye disorders, skin disorders with itching, diabetes, urinary tract diseases, etc. It is the main source for berberine, an alkaloid that is showing huge potential in treating diabetes and high cholesterol levels. This herb is found in Himalaya and Nepal region.

Action

Rasaut, Rasasranjana (extract)-bitter, cholagogue, antidiarrhoeal, stomachic, laxative, diaphoretic, antipyretic, antiseptic. Used externally in opthalmia, conjunctivitis, ulcers, sores, swollen gums. Root bark is anti-inflammatory, hypoglycaemichypotensive, antiamoebic, anti-coagulant, and antibacterial. Bark used in liver complaints, diarrhoea, dysentery, cholera, gastric disorders, enlargement of the spleen and for regulating metabolism. Berries antiscorbutic, laxative.

Dosage extract: 1-3 g, dried stem-5-10 ml decoction.

Part used: root, stem, fruit, water extract.

Its water extract is called as Rasanjana, used in eye disorders with infection and inflammation.

Dose: Decoction-15-60 ml in divided dose.

Daru Haridra side effects: Because it can lower sugar levels, people with diabetes should use this under medical supervision.

Therapeutic indication

- It can be used in children and during lactation.
- Seek medical advice for use during pregnancy.

Ayurveda important medicines

1) Maha Manjishtadi Kashayam-Used in the treatment of skin diseases.

2) Maha Yogaraja Guggul-used in joint diseases, skin diseases, piles, sprue, diabetes, etc.

3) Darvyadi Kwath-used in the treatment of heavy menstrual bleeding with pain, leucorrhoea etc.

4) Khadiradi Vati-used in Ayurveda treatment of bad breath, oral ulcers, diseases of teeth etc.

Table 2: Names of *Berberis aristata* in the different medication system

Names of *Berberis aristata* in the different medication system		
S. No.	**Medication system**	**Name**
1	Ayurveda	Daaruharidraa, Daaru, Daarvi, Daarunishaa, Daarura jani, Vrahitaphala, Valliphala, Sthirphala. Pushpaphala, Somakaa, Parjanyaa, Parjani, Kantkateri, Taarthya, Pachampachaa. Kaaliyaka
		Extract Rasaanjana
2	Unani	Daarhald
		Extract Rasaut
		Fruit Zarishk
3	Siddha	Marmanjal

Table 3: Daruharidra medicinal qualities

Daruharidra medicinal qualities		
1	Rasa (Taste)	Tikta, Kashaya-Bitter, Astringent
2	Guna (qualities)	Laghu (light to digest), Rooksha (Dryness)
3	Vipaka (Taste conversion after digestion)	Katu (pungent)
4	Veerya	Hot potency
5	Effect on Tridosha	Balances Kapha and Pitta Dosha

Table 4: *Berberis aristata* uses

***Berberis aristata* uses the qualities and usage of daru haridra is quite like benefits of turmeric**		
1	Vranajit	Quick wound healing
2	Mehajit	Useful in diabetes and urinary tract diseases
3	Karnanetramukharogas	Useful in the treatment of pain and itching related disorders related to eyes, ears and oral cavity
4	Shophahara	Anti-inflammatory
5	Kandu kushtahara	Relieves skin diseases with itching
6	Visarpahara	Useful in herpes
7	Vishahara	Antitoxic
8	Kapha, Abhishyandi hara	Has drying quality, relieves moisture, (as in wound healing). It is used in menorraghia and leucorrhea (white discharge) It helps to relieve spasmodic pain of abdomen.
9	External application	Its paste, made with water is applied externally to relieve pain and inflammation. Its filtered decoction (Kashaya) is used to wash eyes to relieve pain, swelling and inflammation. Its decoction is used for gargling to relieve and improve voice and throat infection. Its paste is applied over non-healing wounds, syphilis ulcers, fistula for quick healing.

Fig. 6: Daruharidra in Ayurveda

CONCLUSION

Berberis aristata is a very common plant with miraculous therapeutic activity. It is listed in "Ayurveda" for the treatment of various dysenteries. It is also used in different systems of medication like in Ayurveda, Siddha, and Yunani. It chiefly contains "berberine" as an active phytoconstituent that belongs to alkaloids. Other than berberine it also contains contain barbamine, oxyberberine, palmatine, and taxilamine. Roots of *Berberis aristata* contain berberine, barbamine, Jatrorrhizine, columbamine and oxyberberine. This plant is having various therapeutic activities like; antibacterial, antiperiodic, antidiarrheal, antipyretic, antidiabetic, and anticancer activities. Investigation shows that this plant is also having antimalarial, antioxidant, anti-inflammatory, hypoglycaemic, and hepatoprotective activites.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

Authors do not have any conflict of interests to declare.

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