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Daruharidra (*Berberis aristata* DC.): A Comprehensive Review Bridging Ancient Ayurvedic Wisdom with Modern Pharmacological Insights

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Abstract: ***Berberis aristata (Daruharidra), widely recognized in Ayurveda, has been used across ancient civilizations for treating liver, skin, and infectious diseases. This review brings together insights from classical Ayurvedic texts and recent pharmacological research to present a comprehensive understanding of the plant. Key aspects such as its Rasapanchaka profile, active phytoconstituents-particularly berberine and documented therapeutic effects are examined. Studies confirm its hepatoprotective, antimicrobial, and cardioprotective properties. The convergence of traditional knowledge with scientific validation suggests a strong potential for its application in integrative medicine and modern healthcare systems.***

Keywords: *Berberis aristata*, Daruharidra, Ayurvedic medicine, Berberine, Pharmacological review

1. Introduction

The plant kingdom has long served as a rich source of therapeutic agents, and the traditional knowledge systems of India, particularly Ayurveda, have meticulously documented the medicinal properties of countless herbs. Among these, Daruharidra, commonly known as Indian barberry or tree turmeric, holds a prominent position. In the Vedic literature, 'Kesava Paddhati' describes 'Daruharidra' along with Haridra in the management of Khalitya for the topical application. It is extensively used in the Ayurvedic therapeutics [1]. Historically, its use was widespread in ancient Egypt to combat plague, and in Europe to treat liver and gallbladder disorders [2]. The plant is used as a tonic, demulcent, diaphoretic, diuretic and alternative to treat diseases like wound healing, skin diseases, rheumatism, snakebite, menorrhagia, jaundice and eyes problem [3,4]. In Ayurveda, it is recognized for its multifaceted properties, earning it synonyms such as *Darvi* and *Peetdaru* which refer to its yellow-colored wood and potent nature. The root, stem bark, and fruit of *Berberis aristata* are the primary parts used for medicinal purposes. The study is significant as it bridges the classical Ayurvedic pharmacology of Daruharidra with its contemporary scientific evaluation, contributing to its potential integration into evidence-based herbal therapeutics.

Aim and objective: The review aims to systematically present and analyze classical Ayurvedic and modern pharmacological perspectives on Daruharidra (*Berberis aristata).*

2. Literature Review

1) **Botanical Name-** *Berberis aristata* DC [1]
2) **Family:** Berberidaceae

3. Classical Categorization

Caraka Samhita: Lekhaniya, Kandughna, Arshaghna, and Krimighna.
Susruta Samhita: Haridradi and Mustadi Vargas.
Astanga Hridaya: Haridradi and Mustadi Vargas.
Madanpala Nighantu: Avayadivarga
Kaiyadeva Nighantu: Ausadha Varga (or Ausaghu Varga)
Dhanvantari Nighantu: Guruchyadi Varga
Priya Nighantu: Satapuspadi Varga
Saligram Nighantu: Astavarga
Nighantu Adarsha: Daruharidradi Varga
Raj Nighantu: Pippalyadi Varga
Bhavaprakash Nighantu: Haritakyadi Varga

4. Synonyms of Daruharidra

Table 1: Synonyms of Daruharidra mentioned in different ayurvedic texts

S. No.	Synonyms	M.N.P	D.N	K.N	B.P.N	P.N	S.G.N	R.N	N.A
1.	Darvi	+	+	+	+	-	-	+	+
2.	Parjanya	-	+	+	+	-	-	+	-
3.	Katankateri	+	+	+	+	-	-	+	+
4.	Pita	-	+	+	+	-	-	+	-
5.	Pachampacha	-	+	+	+	-	-	+	+
6.	Pitadru	+	-	+	+	-	-	+	+
7.	Haridru	-	-	-	+	-	-	-	-
8.	Peetadaru	+	+	-	+	-	-	+	-
9.	Peetaka	-	-	-	+	-	-	-	-
10.	Peetachandana	-	+	+	-	-	-	-	-
11.	Kastharajani	-	+	-	-	-	-	-	-
12.	Kaleyaka	-	+	-	-	-	-	+	+
13.	Darunisha	-	+	+	-	-	-	+	+
14.	Peetahya	-	+	-	-	-	-	-	-
15.	Peetaka	-	+	-	-	-	-	-	-
16.	Hemavarnvati	-	+	-	-	-	-	-	-
17.	Hemakanthya	-	+	-	-	-	-	-	-
18.	Hemakanti	-	-	+	-	-	-	-	-
19.	Kusumvakka	-	+	-	-	-	-	-	-
20.	Nisha	-	-	+	-	-	-	-	-
21.	Katankati	+	-	+	-	-	-	-	-
22.	Swarnavarna	+	-	-	-	-	-	-	-
23.	Panchadha	+	-	-	-	-	-	-	-
24.	Sthiraraga	-	-	-	-	-	-	+	-
25.	Kambati	-	-	-	-	-	-	+	-
26.	Darupeeta	-	-	-	-	-	-	+	-
27.	Kamini	-	-	-	-	-	-	+	-
28.	Karkatakini	-	-	-	-	-	-	+	-

M.P.N- Madan pal Nighantu, D.N- Dhanwantari Nighantu, K.N- Kaiyadev Nighantu, B.P.N- BhavPrakash Nighantu, P.N- Priya Nighantu, S.G.N- Saligram Nighantu, R.N- Raj Nighantu, N.A- Nighantu Adarsha

5. Vernacular Names [2]:

Hindi: Daruhaldi, Daruharidra
Bengali: Daruhaldi
Marathi: Daruhald
Gujarati: Daruharidra
Punjabi: Daru Haldi
Tamil: Maramanjal
Telugu: Kasturi Puspu

6. Taxonomical classification [5]:

The taxonomical classification of Daruharidra is as follows:
Kingdom: Plantae
Division: Tracheophyta
Class: Magnoliopsida
Order: Ranunculales
Family: Berberidaceae
Genus: *Berberis*
Species: *B. aristata*

7. Botanical Description

Berberis aristata is a large, deciduous shrub native to the Himalayan region, found at altitudes between 2,000 and 3,500 meters. The plant is characterized by its prominent thorny branches and deep yellow-colored wood. Leaves: Leaves are arranged in clusters of 5-8 and are spinous, simple, lanceolate, leathery, toothed, sessile, verticillate that is 4.9cm in length and 1.8cm in breadth. Leaves are light green from the ventral surface and deep green from the dorsal surface with reticulate pinnate venation [6].

Flower: Flowers are yellow, complete, hermaphrodite, actinomorphic, racemose with 11 to 16 flowers per raceme, with an average diameter of the fully opened flower is 12.5mm. The calyx is polysepalous with three small and three large sepals that are 4 to 5mm long. Corolla is yellow, polypetalous with 6 petals. Polyandrous androecium contains 6 stamens that are 5-6mm long and a female reproductive structure which is 4-5mm long and is composed of broad stigma and short style. The flowering starts in mid-march and lasts throughout April month [7].

Fruit: The fruit is edible, acidic, succulent, ovoid to elliptical, bright red covered with flowers. The length of the fruit is approximately 7mm and 4mm in breadth while the weight is about 227mg [8]. Seed: 2 to 5 in number weighing 25mg and 29ml in volume [9].

Figure 1: Daruharidra (*Berberis aristate* DC)

8. Rasapanchaka

Table 2: Showing of Rasapanchaka according to different Ayurvedic texts

RASA											
Rasa	Cha	Su	DN	MN	KN	BP	RN	NR	SGN	NA	PVS
Katu	-	-	-	+	+	+	+	+	+	+	-
Tikta	+	-	-	-	+	+	+	+	+	+	+
GUNA											
Laghu	-	-	-	-	-	-	+	-	-	-	+
Ruksha	-	-	+	+	+	+	+	-	-	-	+
Tikshna	-	-	-	-	-	-	-	+	-	-	-
VEERYA											
Sheeta	-	-	-	-	-	-	+	-	-	-	+
Ushna	-	-	+	+	+	+	+	+	+	-	+
VIPAKA											
Katu	+	+	+	-	-	-	+	-	-	-	+

KARMA:

KARMA											
Karma	Cha	Su	DN	MN	KN	BP	RN	NR	SGN	NA	PVS
Vrana ropana	-	-	+	+	+	+	+	+	+	+	+
Meha	+	+	+	+	+	+	+	+	+	+	-
Kandu			+				+	+	+	+	+
Urdha jatru gata roga	+	+	+	+	+	+	+	+	+	+	+
Visarpa	-	-	-	-	-	-	+	+	+	-	-
Twak roga	-	-	+	+	+	+	+	+	+	+	+
Visa	-	-	-	-	+	-	+	-	+	-	-
Sotha	-	-	-	-	+	+	-	-	-	-	-
Pandu	-	-	-	+	+	+	-	-	-	-	-
Varnya	-	-	-	+	+	+	-	-	-	+	-
Daha	-	-	-	+	-	-	-	-	-	-	-
Rakta dusti	-	-	-	+	-	-	-	-	-	+	+
Sopha	-	-	-	+	-	-	-	-	-	-	+
Apachi	-	-	-	-	+	-	-	-	-	-	-

Cha- Caraka Samhita, Su- Susruta Samhita, DN- Dhanwantari Nighantu, MN-Madhava Nighantu, KN- Kaiyadev Nighantu, BP-Bhavprakash Nighantu, RN- Raj Nighantu, NR- Nighantu Ratnakara, SGN- Saligram Nighantu, NA- Nighantu Adarsa, PVS- P.V Sharma

It is evident from the above table that maximum numbers of authors have accepted raspanchak as below-
Rasa- Tikta, Katu
Guna- Laghu, Ruksha
Virya- Ushna
Vipaka- Katu

Karma of dosa- Kapha pitta shamaka

9. Parts Used: Root, Stem, Fruit, extract (Rasanjana) [10]

10. Doses: Decoction: 50-100ml, Fruit powder-5-10gm, extract-1-3g

11. Formulations And Preparations: [10]

Darvi ghrita, Darvyadi kvatha, Darvyadi taila, Darvyadi leha, Katankateryadi kvath.

12. Traditional uses of B. Aristata[11]

Traditional uses of Daruharidra, given in Indian Materia Medica are as follow-

1) Tincture of Daruharidra is effective in cases of enlargement of the liver and spleen.
   It is much recommended in fever accompanied by bilious symptoms and diarrhoea.
2) A crude extract of Daruharidra referred to as Rasanjana, prepared from its root-bark, is used as

a local application in affections of the eyelids and in chronic ophthalmia in which it is painted over the eyelids occasionally combined with opium (Papaver somniferum), sodium-chloride (NaCl) and alum (K2SO4.Al2(SO4)3.24H2O).

3) A decoction of root bark tried in the management of oriental sore.
   In bleeding piles, it administered in the doses of 5 to 15 grains with butter. Its solution (1 in 32 of water) is used as a wash in haemorrhoids.
4) Its ointment prepared with camphor and butter is applied to pimples and boils. A decoction of Daruharidra root bark, with honey is taken in jaundice.
5) With the addition of Emblic myrobalan (Amla), the decoction is beneficial in painful micturition from bilious or acrid urine.
6) Externally, a decoction of Indian barberry root bark is used as a wash for unhealthy ulcers to improve their appearance and promote cicatrisation.
7) Rasanjana mixed with honey is applied to aphthous sores, abrasions and ulcerations of the skin.
8) The ancient Egyptians used it to stop plagues. India's Ayurvedic healers used it for dysentery. During the early Middle Ages, European herbalists used it to manage liver and gallbladder ailments. Russian healers also used it for inflammations, high blood pressure, and for abnormal uterine bleeding. American Indians recognize barberry almost like Oregon grape. [12]

13. Phytochemical Profile

The therapeutic efficacy of *Berberis aristata* is largely attributed to its rich array of phytochemicals, particularly the yellow isoquinoline alkaloids [12]. The most important and well-researched constituent is berberine [13], which is found predominantly in the root and stem bark. Other significant alkaloids include palmatine, jatrorrhizine, oxyberberine, berbamine, and oxyacanthine. The plant also contains other compounds such as tannins, sugars, and starch. The high concentration of berberine has made Daruharidra a valuable source for the isolation and standardization of this compound in pharmaceutical preparations.

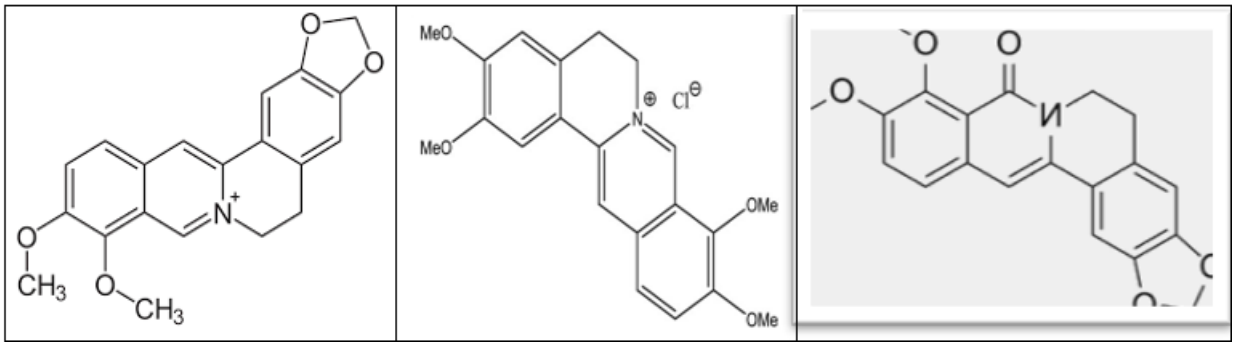

Figure 2: Berberin, Palmitin, Oxyberberin

14. Physiochemical studies [14]

Physiochemical study of water extract of Daruharidra shows-
Loss on drying: not more than 7.0%
Total ash: not more than 12.0 %
Acid-insoluble ash: not more than 2.0 %
pH: 6.0-8.0 Total soluble solids: not less than 90.0 %
Chromatography - Rf value of berberine at 0.5 of Daruharidra water extract was found.

15. Modern Pharmacological Activities

1) **Hepatoprotective activity:** An immunomodulation study was conducted in the golden hamster to evaluate the hepatoprotective activity of the plant. It was observed that the formulation containing B. aristata decreases the rate of infection in hepatic amoebiasis [15]. The aqueous methanolic extract of the plant possesses hepatoprotective action [16]. Other reported studies demonstrated that the berberine constituent of the plant showed hepatoprotective action when experimented in rats where cytochrome p-glycoprotein and P-450 regulates the hepatobiliary excretion and liver metabolism [17]. Berberine is found to be effective against liver fibrosis in the Chinese medicinal system [18].
2) **Anti-inflammatory:** Reported studies have revealed that the aqueous extract of roots of B. aristata possesses anti-inflammatory action when tested in rats at dosage 500-1000 mg/kg [19]. Similarly, the methanolic and aqueous extract of B. aristata and C. fenestratum showed anti-inflammatory action when tested in carrageenan-induced raw paw edema in a rat model [20].
3) **Antibacterial:** The alkaloid extract of the plant showed an antibacterial effect against trachoma [21].Reported studies also revealed that berberine extract of the plant showed significant anti- microbial activity against the number of microbes including virus, bacteria, fungi, protozoans, helminths and chlamydia [22,23,24].The herbal gel formulation contains B. aristata extract was found to be effective medicine against skin infections when tested in Staphylococcus aureus, Pseudomonas aeruginosa and Corynebacterium [25].It was also reported that the root extract and hexane extract of the plant showed anti-fungal activity against different fungal pathogens[26].
4) **Antidiarrheal:** The in vivo and in vitro studies were carried out to confirm the anti-diarrheal activity of B. aristata plant [27]. Reported studies revealed that berberine constituent extracted from roots and barks of B. aristata plant showed inhibition of the secretory response of enterotoxins of Vibrio cholera and E. coli in rabbit ligated intestinal loop model and infant mouse assay [28].

Also, crude dried formulation of B. aristata plant inhibits cholera toxin-induced diarrhea [29,30].

5) **Anti diabetic activity:** Various experimental studies revealed that the ethanolic extract of B. aristata showed anti-diabetic activity when experimented within alloxan-induced diabetic rats [31]. The alcoholic stem extract of B. aristata plant possesses anti-hyperglycaemic activity [32]. DPP-IV inhibiting property of the plant showed potential anti-diabetic agent [33].
6) **Anticancer:** The methanolic extract of B. aristata plant was studied against human colon cancer cell line to evaluate anti-cancerous activity. It was found that methanolic extract of B. aristata showed concentration-dependent inhibition of HT29 cells [34]. Also, Berberine constituent extracted from B. aristata plant was found to show significant inhibition against carcinogenesis induced by 20- methylcholanthrene or nitrosodiethylamine, in a dose-dependent manner in small animals [35,36].
7) **Anti-oxidant:** The aqueous ethanolic extract of B. aristata plant was studied to find the antioxidant activity of the plant. The study was conducted in diabetic rats with safety parameters. It was found that the root extract of the plant showed decrease oxidative stress [37]. Also, a significant result was found when aqueous and methanolic extract of the plant was tested against CCl4 induced liver injury [38].
8) **Anti-platelet:** Various scientific studies revealed that the alcoholic extract of B. aristata plant inhibits the PAF (platelet-activating factor) induced Aggregation of platelets and 3H- PAF binding when tested in rabbit platelets [39]. It was also reported that Berberine constituent of the plant inhibited the platelet aggregation by interfering with collagen-mediated adhesion process [40].
9) **Cardiotonic:** The fruit extract of B. aristata exhibits positive inotropic action [41]. The biochemical study was conducted in healthy rabbits to evaluate the cardiovascular property of the plant. The study revealed a significant decrease in serum cholesterol, triglycerides and low- density lipoprotein level and an increase in fibrinogen and thrombin levels [42].

16. Discussion

The comprehensive review of classical Ayurvedic texts, modern botanical descriptions, and contemporary pharmacological research underscores the significant and multifaceted therapeutic potential of *Berberis aristata* DC. (Daruharidra). This plant holds an esteemed place in Ayurveda, categorized in classical texts like the Charaka and Sushruta Samhitas for its actions on skin disorders, wounds, parasites, and metabolic imbalances. Its extensive list of synonyms across various Nighantus (lexicons) not only reflects its widespread historical use but also its valued properties, such as its yellow pigment (Pita, Peetadaru) and potent nature (Darvi, Katankateri).

The pharmacological efficacy of Daruharidra is primarily attributed to its rich profile of isoquinoline alkaloids, with berberine being the most prominent and extensively studied constituent. Modern scientific investigations have successfully validated many of its traditional uses, creating a robust bridge between ancient wisdom and evidence-based medicine. Its well-documented hepatoprotective, anti-inflammatory, and antimicrobial activities provide a scientific basis for its traditional application in treating liver disorders, skin diseases, wounds, and infectious conditions like diarrhoea and trachoma. Furthermore, research has expanded its potential into modern therapeutic areas, demonstrating promising antidiabetic (through DPP-IV inhibition and hypoglycemic effects), anticancer (inhibiting colon cancer cells), antioxidant (reducing oxidative stress), and cardioprotective (modulating lipids and platelet aggregation) properties.

The consistency in its Rasa Panchaka across multiple texts—primarily Tikta-Katu Rasa, Laghu-Ruksha Guna, Ushna Virya, and Katu Vipaka- explains its primary pharmacological actions. This combination makes it highly effective in pacifying Kapha and Pitta doshas, which aligns with its use in conditions like inflammation, skin diseases, and metabolic syndromes. The various formulations derived from its root, stem, and fruit—such as Darvyadi Kvatha, Darvi Ghrita, and the concentrated extract Rasanjana—demonstrate the sophisticated pharmaceutical ingenuity within Ayurveda, allowing for tailored applications for internal and external use. Daruharidra is a quintessential example of a traditional medicinal plant whose value has been magnified rather than diminished by modern scientific scrutiny. The convergence of detailed classical references with modern multi-target pharmacological findings positions it as a highly valuable natural resource. Future research should focus on standardizing extracts, conducting rigorous clinical trials to establish efficacy and dosage for specific conditions, and further exploring the synergistic effects of its alkaloidal compounds. This will ensure that this ancient herb can be effectively integrated into contemporary holistic and complementary healthcare practices.

17. Conclusion

In conclusion, *Berberis aristata (Daruharidra)* stands as a profoundly significant botanical agent, seamlessly bridging the ancient wisdom of Ayurveda and modern pharmacological science. Its esteemed status in classical texts, evidenced by its detailed categorization and numerous synonyms, is robustly validated by contemporary research that confirms its wide spectrum of therapeutic activities—including hepatoprotective, anti-inflammatory, antimicrobial, antidiabetic, and anticancer properties, primarily driven by its key alkaloid constituent, berberine. The consistent Rasapanchaka profile across texts provides a logical doshic framework for its use, particularly in managing Kapha and Pitta disorders. This convergence of traditional knowledge and empirical evidence solidifies Daruharidra's role not merely as a relic of historical medicine but as a highly relevant and promising candidate for future drug development and integrative healthcare approaches, advocating for further research into standardized extracts and clinical applications to fully assess its medicinal potential.

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