

Review Article

A CRITICAL REVIEW ON BADARA (*ZIZYPHUS JUJUBA* LINN.)

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KEYWORDS: *Badara, Gana, Varga, Karma, Yoga.*

ABSTRACT

Badara is a native fruit of India, found wild and cultivated. From top to root, *Badara* is useful as food, fodder, nutrient and medicine purpose. *Zizyphus jujuba* Linn. is a small subdeciduous tree with dense spreading crown, commonly 0.6 meters high. Bark blackish to grey or brown, rough, regularly and deeply furrowed, Leaves 3-6. 3 by 2.5-5 cm., oblong or ovate, usually minutely serrulate or apex distinctly dotted, obtuse, base oblique and 3-nerved; Flowers 3.8-5 mm. diam., greenish, in dense axillary tomentose cymes, Drupe 1.2-2.5 cm. diam., globose, first yellow then orange and finally reddish brown, containing a single stone surrounded by fleshy pulp. Its flowering and fruiting season is November – December months. *Badara* having tremendous medicinal properties and having metabolites such as alkaloids, flavanoids, saponin etc. *Badara* fruit is a good source of vit- C and sugars and contain appreciable amount of mineral constitutes such as calcium, phosphorus, iron, thiamine, carotene etc. *Badara* root, seeds, fruit, bark, leaves, flowers, all are having medicinal properties. In spite of having medicinal properties, it is not considered as an important medicinal plant for use in main stream therapeutics. This article provides review of plant – *Badara* as a whole.

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INTRODUCTION

Badara is a very well known and common fruit, among this it is having medicinal properties being mentioned in so many Ayurveda literature. Different Acharyas mentioned *Badara* in different *Gana / Vargas*, differently they mentioned its vernacular Names and *Ganas and Vargas* according to classics

Paryayas, different *Guna, Karma* and *Prayogas*. It is a very commonly available plant, its fruit are edible and sweet in taste, leaves and bark is also used in so many diseases. It is summarized as.

Table 1: Showing *Ganas* and *Vargas* of *Badara* according to classics

| <i>Samhita/ Nighantu</i> | <i>Ganas/ Vargas</i> |
|------------------------------|---|
| <i>Charaka samhita</i> | <i>Hikkanigrahana, Shramahara</i> ^[1] , <i>Hridaya</i> ^[2] , <i>Udardaprashaman</i> ^[3] , <i>Virechanopaga, Swedopaga, Sheetaveerya</i> ^[4] , <i>Kashaya</i> ^[5] and <i>Amlaskandha</i> ^[6] |
| <i>Sushruta Samhita</i> | <i>Vatasamshamana, Nyogradhadi, Amlaskandh</i> ^[7] |
| <i>Astang Hridaya</i> | <i>Nyogradhivarga</i> ^[8] |
| <i>Bhavaprakash Nighantu</i> | <i>Amradiphalavarga</i> ^[9] |
| <i>Raja Nighantu</i> | <i>Amradivarga</i> ^[10] , <i>Shalmalyadivarga</i> |
| <i>Kaideva Nighantu</i> | <i>Oushadhi Varga</i> ^[11] |
| <i>Dhanwantri Nighantu</i> | <i>Amradivarga</i> ^[12] |
| <i>Madanpal Nighantu</i> | <i>Phaladivarga</i> ^[13] |
| <i>Nighantu Adarsha</i> | <i>Badaradi Varga</i> ^[14] |

Table 2: Showing the *Paryayas* of *Badara* according to different classics

| <i>Paryayas</i> | BN ^[15] | KN ^[16] | DN ^[17] | RN ^[18] | MN ^[19] |
|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <i>Kuvala</i> | + | + | - | - | - |
| <i>Karkandhu</i> | - | + | + | - | - |
| <i>Vishamobhayakantaka</i> | + | - | - | - | - |
| <i>Bahukantaka</i> | - | - | - | + | - |
| <i>Gokantaki</i> | - | + | - | - | + |
| <i>Yugmakantaka</i> | - | + | - | + | + |
| <i>Sukshmapatra</i> | - | - | - | + | - |

| | | | | | |
|---------------------|---|---|---|---|---|
| <i>Sukshmaphala</i> | - | - | - | - | - |
| <i>Kroshaphala</i> | - | + | - | - | + |
| <i>Laghubadara</i> | - | - | - | + | - |
| <i>Hrasvabadara</i> | - | + | - | - | - |
| <i>Ghonta</i> | + | + | - | + | - |
| <i>Ghunta</i> | - | - | - | + | - |
| <i>Gopaghanta</i> | - | - | - | - | - |
| <i>Gudaphala</i> | - | - | + | - | - |
| <i>Dusparsha</i> | - | - | - | + | - |
| <i>Kola</i> | + | + | + | - | - |
| <i>Koli</i> | + | - | - | - | - |
| <i>Kolaka</i> | - | - | + | - | - |
| <i>Badari</i> | + | + | - | + | + |
| <i>Phenila</i> | + | + | + | - | - |
| <i>Ajapriya</i> | - | - | - | + | - |
| <i>Shikhipriya</i> | - | - | - | + | - |
| <i>Shambarahara</i> | - | - | - | - | - |

Vernacular namesSanskrit – *Kola, Badara, Badari*Latin – *Zizyphus jujube* Lam.

English name – Chinese data, Indian jujube, Indian plum

Kannada – Bore

Hindi – baer, Ber, Beri

Marathi – Bori, bor, Raybor

Telugu – Regu, Regabanda

Malayalam – Ialanth, Elanthapayam, badaram, Kolam

Bengali – Kul, Kulaphal, Borgi

Gujarati – ber, Boradi, Unnaba

Tamil – Elandi, Reyanti

Punjabi – Kunar, Beri, Unnaba

Varieties of *Badara* according to classics**Table 3: showing the varieties of *Badara* according to different classics**

| References | Number | Varieties |
|---|--------|--|
| <i>Bhavprakash nighantu</i> ^[20] | 3 | <i>Sauveera, Kola, Karkandhu</i> |
| <i>Dhanwantri nighantu</i> ^[21] | 3 | <i>Sauveera, Kola, Karkandhu</i> |
| <i>Raja nighantu</i> ^[22] | 4 | <i>Badara, Rajabadara, Bhubadara, Laghubadara</i> |
| <i>Kaiyadeva nighantu</i> ^[23] | 5 | <i>Badara, Kola, Karkandhu, Sauveera, Sinchitaka</i> |
| <i>Madanapala nighantu</i> ^[24] | 3 | <i>Sauveera, Kola, Karkandhu</i> |

External Morphology of *Badara*

- *Zizyphus jujuba* Linn. is a small subdeciduous tree with dense spreading crown, commonly 0.6 meters high.
- Bark blackish to grey or brown, rough, regularly and deeply furrowed; the furrows about 1.2 cm. apart. Blaze 9-13 mm., short fibre, pink with or without paler streaks; the juice turning purplish black on the blade of a knife. Branches usually armed with spines, mostly in pairs, one straight the other curved. Young shoots more or less densely pubescent.
- Leaves 3-6. 3 by 2.5-5 cm., oblong or ovate, usually minutely serrulate or apex distinctly doted, obtuse, base oblique and 3-nerved; nerves depressed on the glabrous shining upper surface; densely clothed beneath with white or half tomentum. Petiole 2.5-10 mm long.
- Flowers 3.8-5 mm. diam., greenish, in dense axillary tomentose cymes or facicles 1.2-1'9 cm. long.
- Drupe L.2-2.5 cm. diam., globose, first yellow then orange and finally reddish brown, containing a single stone surrounded by fleshy pulp; green, mostly yellow-yellowish (or other shade) when ripe, edible.
- Seeds flat and ovoid, creamish yellow in color

Microscopy^[25]

- The epidermal cells of pericarp are sub-square, filled with brownish-red contents, and covered with thick cuticle; cells under the epidermis are yellow or yellowish-brown, sub-polygonal with thick walls; prisms of calcium oxalate are small and exist in parenchymatous cells of mesocarp. The sclereids of endocarp are pale yellowish-brown, sub-polygonal, striation well-defined, pit-canal minute, and contain yellowish-brown contents
- **Flowering and fruiting time**
- November-December.

PHYTOCHEMISTRY^[26, 27]

- **Fruits and pulp**
- **Flavonoids:** Puerarin, rhamnoside-4'-O-a-L-rhamnoside
- **Polyphenols:** Betulinic acid
- **Triterpenes and phytosterols:** colubrinic acid, aliphatic acid, oleanolic acid, betulonic acid, oleanonic acid, zizyberenic acid.
- **Plant**
Jujuboside D, Jujuboside A, Jujuboside E, Inosine.

- **Leaves**
Flavanoids, ziziphin, saponin, glucose etc.
- **Stem bark**
Leucocyanidin, ursolics, mauritinen- A, ziziphine- A.
- **Seeds**
Jujuboside A & B, Fatty Acids, Mixtures of linolenic Acids, Oleic acid, Betulinic Acid, jujubesides.
- **Pharmacological actions**^[26, 27]

Experimental pharmacology

• Antiallergenic activity

Intraperitoneal injection of 100.0 mg/kg body weight (bw) of a 100% ethanol extract of the *Fructus Zizyphi* or the active constituent of the ethanol extract, ethyl-d-fructofuranoside, daily for 5 days, inhibited haemagglutination- induced anaphylaxis in rats. A saline extract (0.85% sodium chloride) of the fruits (concentration not specified) prevented hypotonic and heat stress-induced haemolysis of erythrocyte membranes in vitro.

Three triterpene oligoglycosides, jujubosides A1 and C, and acetyljujuboside B, in varying concentrations inhibited histamine release from rat peritoneal exudate cells induced by antigen-antibody reaction.

• Anti-inflammatory activity

A methanol extract of the fruits, 0.1 mg/ml, did not suppress interleukin- 8 induction in lipopolysaccharide-activated rat macrophages in vitro. A polysaccharide isolated from an aqueous extract of the fruits, Ziziphusarabinan, 500.0 µg/ml, had anti-complementary activity in human serum in vitro. Both the *n*-butanol and diethyl ether extracts of the seeds exhibited anti-inflammatory activity in vitro as assessed by the albumin stabilizing assay.

Intragastric administration of 500.0 mg/kg bw of a 95% ethanol extract of the fruits to rats daily for 4 days, produced a significant inhibition of carrageenan-induced footpad oedema (50.0% reduction, $P < 0.05$), and cotton pellet-induced granulomas (25.0% reduction, $P < 0.05$)

• Analgesic activity

A hot aqueous extract of the fruits did not inhibit conduction in the frog sciatic nerve when added to the bath medium at a concentration of 2.0%. Intragastric administration of 500.0 mg/kg bw of a 95% ethanol extract of the fruits to mice reduced the responsiveness of mice in the hotplate and tail-flick tests, thereby demonstrating analgesic effects.

• Ant hyperglycaemic activity

Intragastric administration of a single dose of 1.0 g/kg bw of a 95% ethanol extract of the dried seeds suspended in water lowered the mean blood glucose concentrations in rabbits with alloxan-induced diabetes.

• CNS depressant activity and toxicity

Chronic administration of 100.0 mg/kg bw of a 95% ethanol extract of the fruits to mice in drinking-water daily for 3 months had no effects on mortality,

haematology, organ weight or sperm production. Intragastric administration of an aqueous extract of the fruits, three doses of 0.5 mg/kg bw, 1.0 mg/kg bw or 3.0 mg/kg bw over 24 hours, to mice had no acute toxic effects. Intragastric administration of a 95% ethanol extract of the fruits, three doses of 1.0 g/kg bw over 24 hours, had no acute toxic effects. However, sedation was noted in animals treated with three doses of 3.0 g/kg bw. Subcutaneous administration of 500.0 mg/kg bw of an aqueous extract of the seeds daily to mice depressed central nervous system activity, as measured by the potentiation of hexobarbital-induced sleeping time and antagonism of caffeine-induced hyperactivity. However, intraperitoneal administration of 500.0 mg/kg bw of a 75% methanol extract of the seeds to mice failed to have any effect on barbiturate-induced sleeping time. A saponin fraction of a defatted seed extract potentiated barbiturate-induced sleeping time when administered by intraperitoneal injection, 50.0 mg/kg bw. Intraperitoneal and intragastric administration of up to 1.0 g/kg of a butanol, methanol or alkaloid-enriched fraction of a methanol extract of the fruits had tranquillizing effects in mice. Intraperitoneal administration of 500.0 mg/kg bw of the flavonoids spinosin and swertisin, isolated from a petroleum ether extract of the dried seeds, had mild CNS-depressant effects in mice and potentiated hexobarbital-induced sleeping time by 50%. An aqueous extract of the fruits, 100.0 mg/kg bw per day, administered to mice in the drinking-water for 3 months reduced average weight gain when compared with the controls (no extract). Two mice developed alopecia of the snout, one was anaemic and one was suffering from protrusion of the penis. The mortality rate compared to control animals was not significantly different, and there were no significant haematological changes ($P > 0.05$). Intragastric administration of 50.0 g/kg bw of a decoction of the fruits to mice had no toxic effects. No deaths occurred in mice given an aqueous extract of the fruits (15 g). The intraperitoneal median lethal dose (LD50) of the decoction was 14.3 g/kg bw in rats. Subcutaneous administration of 10–15.0 g/kg bw of a 50% ethanol extract of the seeds to mice killed all animals within 30–60 minutes.

• Immune stimulation

A purified polysaccharide, 0.5 mg/ml, isolated from an aqueous extract of the fruits, had anti-complement activity in human serum in vitro. Intragastric administration of 1.0 g/kg bw of a polysaccharide-enriched fraction from an aqueous extract of the fruits to mice enhanced the activity of natural killer cells.

• Platelet aggregation inhibition

A hexane and 90% methanol extract of the dried seeds, 5.0 mg/ml, inhibited collagen-induced platelet aggregation in vitro.

• Clinical pharmacology

Zizyphus fruit is often a constituent in multi component prescriptions used in Kampo and traditional Chinese medicine. Numerous clinical trials have assessed the effects of the fruits in combination with other medicinal plants for anticonvulsant effects, memory-enhancing effects and anti-inflammatory effects. However, a review of these trials is beyond the

scope of this monograph, and is therefore not included. In one uncontrolled study, oral administration of the dried seeds to human subjects produced CNS depressant effects, and was reported to be effective for the treatment of insomnia at a dose of 0.8 g/day. No further details of this study are available.

Rasapanchak of Badara

Table 4: Showing Rasapanchak of Badara according to different authors

| Author | Rasa | Guna | Veerya | Vipaka |
|--------|-----------------------|---------------|--------|----------|
| DN | Amla | Snigdha | - | - |
| MN | - | Guru | Ushna | - |
| KN | Kasaya | Guru, Snigdha | Ushna | - |
| RN | Madhura, Kasaya, Amla | - | Ushna | - |
| BN | Madhura | Guru | Ushna | - |
| NA | Madhura | Snigdha | Sheeta | Maadhura |

Commonly all the authors have opined the properties of *Badara* as follows.

Rasa – Madhura, Amla

Guna – Guru, Snigdha

Veerya – Ushna

Vipaka – Madhura

a. Dosha karma of Badara

Table 5: Showing karma of Badara according to different authors

| Authors | Vatahara | Pittahara | Kaphahara |
|--------------------|----------|-----------|-----------|
| DN ^[28] | + | + | - |
| MP ^[29] | - | + | + |
| KN ^[30] | - | + | + |
| RN ^[31] | + | + | - |
| BN ^[32] | + | + | - |
| NA ^[33] | - | + | + |

b. Anya karma of Badara

Table 6: Showing karma of Badara according to different authors

| Karma | DN | MN | KN | RN | BN | NA |
|------------|----|----|----|----|----|----|
| Bhedana | - | - | + | - | + | + |
| Shukral | - | + | - | - | + | - |
| Brimhan | - | + | + | | + | + |
| Dahashaman | - | + | + | + | + | + |
| Vrishya | - | + | - | + | - | + |
| Shramhara | - | - | - | + | - | + |
| Deepana | + | - | - | + | - | - |
| Pachana | - | - | - | + | - | - |
| Vranaghna | - | - | - | + | - | - |
| Kandughna | - | - | - | + | - | - |
| Sangrahi | - | + | + | - | - | - |
| Rochana | - | - | + | - | - | - |
| Vishtambha | - | + | - | - | - | - |
| Ruchya | - | - | + | - | - | - |
| Balya | - | + | - | - | - | - |
| Hridya | - | - | - | - | - | + |
| Swedya | - | - | - | - | - | + |
| Virechya | - | - | - | - | - | + |
| Vajikaran | - | - | - | - | - | + |

Rogagnata

Table 7: Showing karma of Badara according to different authors

| Roga | DN | MN | KN | RN | BN | NA |
|------------|----|----|----|----|----|----|
| Kshaya | - | + | + | + | + | + |
| Trishna | + | + | + | - | + | + |
| Klama | - | + | - | - | - | - |
| Jwar | - | - | - | + | - | - |
| Visphota | - | - | - | + | - | - |
| Atisar | + | - | - | + | - | - |
| Shosha | - | - | - | + | - | + |
| Arati | - | - | - | + | - | - |
| Kustha | - | - | + | + | - | - |
| Kshawathu | - | + | + | + | - | - |
| Vibandha | - | - | + | - | - | - |
| Vishtambha | - | + | + | - | - | - |
| Shwasa | - | - | + | - | - | - |
| Kasa | - | + | + | - | - | + |
| Chhardi | - | - | + | - | - | + |
| Hikka | - | - | - | - | - | + |
| Udarda | - | - | - | - | - | + |

Upyukt anga (Part used)^[34] :

Fruit, Bark, Seeds, Leaves, Flowers and Roots.

Matra (Dose)^[35]

Bark decoction: 50-100 gms.

Fruits: 5-7 (in number)

Seed powder: 3-6 gms

Ripe fruit edible.



Ekmooolika prayoga of Badara

Table 8: Showing Ekmooolika Prayoga of Badara

| Bheshaj swroop | Indication | Reference |
|-------------------|-----------------|-----------------|
| Badaripatrankalka | Pravahika | B.N. |
| Badaripatrankalka | Swarbheda, Kasa | Ch. Chi. 18/180 |
| Badaripatrankalka | Shirashula | G. Ni. |

Vishishta yoga

Table 9: Showing Vishishta yogas of Badara

| Yogas | Indications | References |
|----------------------|---------------|------------------|
| Amritprasha ghrita | Kshatsheena | Ch. Chi. 11/37 |
| Badariphaladi ghrita | Kasa | Gad. Ni. 9 |
| Bala ghrita | Mutraghat | Su. U 58/58 |
| Changeri ghrita | Arsha | Bh. Sa 6/40 |
| Chittrakadi ghrita | Gulma udarda | Su. U. 42/98 |
| Dwipanchmula ghrita | Kasa swasa | Ch. Chi. 8/157 |
| Narayan churna | Udarda, Gulma | Ch. Chi. 13//129 |
| Panchmuladi ghrita | Grahani | Ch. Chi 15/88 |
| Rasna ghrita | Kasa | Ch. Chi 18/43 |
| Rohitak ghrita | Udarda, Gulma | Ch. Chi. 13/60 |
| Shatyadi Churna | Gulma | Ch. Chi. 5/88 |
| Yavadi Ghrita | Udarda, Gulma | Ch. Chi. 13/124 |

DISCUSSION

In *Ayurveda* *Badara* is used in Headache, root decoction in fever as powder applied to old wounds and ulcers. Bark and leaves are used in diarrhea. It is also considered as antipyretic and anti-obesity. Fruit is mucilaginous, it purifies blood and helps in digestion.

External morphology of *Zizyphus mauritiana*- it is a spiny, evergreen shrub or small tree upto 15 m high, with trunk 40 cm or more in diameter, spreading crown, stipular spines and many drooping branches. Bark dark grey or dull black, irregularly fissured. Leaves –alternate in 2 rows, oblong elliptic, finely wavy –toothed on edges.

Inflorescence- axillary cymose.

Fruit-drupe, globose to ovoid.

Distribution- *Badara* is found wild and cultivated in Punjab, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, Tamilnadu and Maharashtra etc.

CONCLUSION

- *Badara* is an easily growing plant and it is commonly available.
- It posses wide variety of nutrients.
- It can be used as an immunomodulator.
- It is having antimicrobial action, Anti diarrhoeal, Antioxidant and hepato protective action.

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