Review Article

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KARĪRA (*Capparis decidua* Edgew.) AS FOOD AND MEDICINE: A COMPREHENSIVE CHRONOLOGICAL REVIEW

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ABSTRACT

Ayurveda involves natural healing process and it is gaining importance now a days. Today more emphasis is given on medicinal plants in this globalized world. A number of medicinal plants are available and one amongst them is *karīra* or *Capparis decidua* Edgew., order Capparidaceae. It has been a source of food and medicine from ancient times. Present study aimed to find out the various nutritive and therapeutic applications of this important plant as per ancient *Ayurveda* scholars. The term *karīra* and its related synonyms were searched in various ancient Sanskrit and *Ayurveda* literatures, a review has been done in chronological order and then analysis and discussion has been done regarding its nutritive and therapeutic values. Study revealed out that its fruit have high nutritive value and has been mentioned in various diseased conditions. Though numbers of pharmacological studies have already been reported on this medicinal plant and it's used as a food in preparing pickles is very common but practically it's used as a medicine in treatment is still limited. So, there is plenty of scope of advance scientific research regarding its ancient therapeutic application.

Keywords: *karīra*, *Capparis decidua*, food, medicine, nutritive value

INTRODUCTION

Karīra commonly known as kair, tint is one of the easily available xerophytic medicinal plants, botanically identified as *Capparis decidua* Edgew. has great medicinal values. The plant usually grows in dry, exposed habitat often on foot hills, in wastelands, easily available in Rajasthan, Punjab and Sind, Southwards to Karnataka and Tamil Nadu, growing wild in Western Ghats, Rajasthan and Gujarat[1].

Capparis decidua Edgew. is a bushy shrub or a small tree in dense tufts, 4-5 m high, apparently leafless branches. Most of the branches and twigs are glossy dark green with small paired spines on the twigs at each node, but with age bark turns whitish-grey colour. Leaves are minute (2 mm long), with a very short life span on young shoots, so plant looks leafless most of the time. Flowers appear at the beginning of the dry season (March, May) in the axils of the spines; pink, red-veined in small. Fruit appears in April and June and are berry sized, cherry shaped, many-seeded, ovoid or sub-globulus, becoming blackish when dry. Caper buds are both wild-collected and cultivated; plants grown in cultivation tend to be spineless. It is cultivated in well drained, sandy soil in sun. It is propagated by seed sown in autumn or spring; by ripe woodcutting in summer at 19-24º C (66-75 ºF)[2].

Pharmacological study reveals antimicrobial activity of root bark[3] and seeds[4], hypercholesterolemic and dose dependent depressant activity[5], anti-inflammatory activity[6], anti diabetic activity[7], anti helmintic and purgative activity[8], hypolipidaemic activity[9], anti atherosclerotic activity[10], anti hypertensive activity[11], hepato protective activity[12]. Study also shows high nutritional value of *karira*.

Aerial parts mainly leaves, flowers, fruits of *Capparis decidua* are nutrient rich. Plant contains many important dietary constituents such as vitamins, minerals, fibers and proteins[13]. These possess very high nutritional value and are used as supplement. These properties are efficacious in the prevention and treatment of various diseases. Present study was aimed to find out the ancient nutritive and therapeutic uses of the plant *karīra* in various *Ayurveda* literatures.

Historical Review of *Karīra*

Vedika Kāla

Veda is considered as repositories of knowledge since antiquity. In this period various references regarding *karīra* have been mentioned. *Karīra* is mentioned in *vedika saṁhitā*, *brāhmaṇa grantha*, *kalpasūtra*, *bṛhata saṁhitā*, *kādambarī*, *atharvapariśiṣṭa*[14] and in *karṇaparva* of *Mahābhārata*[15] along with other species like *śamī*, *pīlū* and *karīra.* Its root and stem are indicated in *krimiroga*[16]. *Śāyaṇa* interprets *karīra* as sweet fruits growing in *uttarāpatha* by which he means the region northern to his abode (he belonged to South India). *Maitrāyaṇī saṁhitā* described it as *saumya.* It is abundantly seen during rainy season and mountain areas. In religious sacrifices *saktu* of the fruits (powder of the dry and parched fruits) has been used[17]. It is said that *karīra* attracts clouds and helpful in bringing rains (*karīraiṣṭiyajña*). That's why it is found plenty in arid zone.

SaṀhitākāla

Caraka saṁhitā [1200 BC to 5000 BC approx.]

Caraka Saṁhitā is the main treatise of this era. The author has mentioned *karīra* by only two synonyms like *karīra* and *ṭiṇṭikera*.

It has been mentioned in *phalavarga* (Group of fruits)[18], *tiktaskandha* (bitter group of drugs)[19]. It is mentioned in shapes of *arsha- ṭiṇṭikerasadrishya* (hemorrhoids are *karira* shaped)[20]. *Caraka* has said that washing with decoction of *Karīra*, *dhava*, *nimba*, *arka*, *veṇuka*, *kośāmbra*, *jambu*, root of *jhingini* and *vāsā* mixed with *sīdhu* of grapes and *sukta* removes discharge from vagina[21]. It has been mentioned in the treatment of *hṛdyaprāptabasti* (one of the complications of enema). In this condition enema made of *kāśa, kuśa, itkaṭa* and drugs of *amla* (A class of plants with acid leaves or fruit), *lavaṇaskandha*, fruits of *karīra* and *badarī* are useful[22]. *Basti dravya* for asses and camels includes *pīlu, karīra, khadira*, leaves of the plant of *śampāka* and *bilvādigaṇa*.

***Suśruta saṁhitā* [2500 BC approx.]**

It has been described in *anuśastra*[23]. It has been described as *viṣatulya* with the combination of *dugdha*[24]. It has been mentioned in *tiktavarga*[25]and *phalavarga* having *madhura, tikta, kaṭu, uṣṇa, kaphavātahara* properties[26]. *Karīra* flower has *kaṭuvipāka,vātahara* and *srṣṭamūtrapurīṣakara* properties[27]. It is mentioned in shape of *kaphajaarśa* (hemorrhoids) as *karīraphalasadṛśa*[28]. It is mentioned in probing in wounds which have straight sinuses, foreign bodies, curved sinuses and which are bulging up slowly the surgeon should *doaiṣaṇa* (probing) by using shoots of *karīra*, hair, finger or metal probe[29]. Sinuses of the eyelids, those near the anus and which are not having an opening and those filled with blood, should be probed using smooth sprouts of cuccu, *upodikā* and *karīra* etc[30]. The vegetables of *karīra, paṭola, karkoṭaka, kāravellaka, vārtāka, śigru* and *ārtagala* cooked in *ghī* (ghee) are beneficial for eyes[31]. It has been mentioned in *Pānavibhramacikitsā* as one of the ingredient[32]. It is mentioned as content of *Arucināśakaleha*[33].

***Aṣṭāṁga Hṛdaya* (7th century AD)**

It is mentioned in *śākavarga* (Class of vegetables), 28 vegetables have been numerated, all are having *tiktarasa* (bitter taste), *śītavīrya* (cool in potency), *kaṭuvipāka*. As they are having *grāhiguṇa*, stops the elimination of fluid from the body. It increase *vāta* and mitigate *kaphapitta*[34]. It is having *kaṣāya, madhura, tiktarasa* and produces abdominal distension[35] and is also described in *māṁsa kalpanā*[36].

***Bhela Saṁhitā* (7th century AD)**

Karīra has been described as bitter in taste along with *kośātakī* and *śatāvarī*[37] i.e mentioned with the plants used as medicine. It is also mentioned in etiology of *udāvarta* disease[38].

***Cakradatta Saṁhitā* (11th century AD)**

It is described as *apathya* during the use of *agnimukhalauha* and *lauharasāyana*[39]. It is said that items beginning with *'ka' karīra, kāṁjika* etc. should be avoided otherwise *lauha* with its product is not assimilated and is excreted out[40],

***Vaṁgasena Saṁhitā* (12th century AD)**

Karīra is mentioned in shape of *kaphaja arśa*[41]. It is mentioned as *apathya* during the use of *cavyādi lauha*[42] and *lauha rasāyana*[43]. *Karīra* cooked in *ghī* are beneficial for eyes[44]. It has been mentioned with *Śarkarā*, goat's milk, *śraṁṅgāṭaka, karīra, triphalā svarasa*, *āmrātaka svarasa* mixed together used as vehicle to alleviate *śukrameha*[45]. It has been mentioned in *tiktavarga*[46].

***Gadanigrah* (12th century AD)**

It indication is given in dry piles. *Karīra* fruits, Salt, *arka* mixed with wine and sours should be burnt in closed heating. This alkali taken with tepid water, wine or sour juice destroys dry piles[47].

***Bhaiṣajyaratnāvalī* (18thcentury AD)**

It should be avoided during the use of *agnimukhalauha*[48]and *lauharasāyana*[49]. It has been mentioned as *apathya* in *arśa roga*[50], *vātavyādhi*[51], *udāvarta*[52], *mūtrakṛccha*[53], *mūtrāghāta*[54],

***Siddha bheṣaja maṇimālā* (*śrī kṛṣṇa rāma bhaṭṭa*, 20th century AD)**

Its description is given in *arśa cikitsā*. Steamed Tender fruit of *Karīra* dried in the sun should be taken with curd in morning pacifies bleeding piles.[55] Fruit powder is taken to destroy oedema[56]. *Kārīra taila* is indicated in *kapholvaṇavātapīḍā* in *vātavyādhi* chapter and its application on affected part alleviates tingling sensation disorder caused by impure blood[57]. *Kārīra* fruit is a content of *Maruśākhicurṇam* which act as laxative, used in *vāta- udāvarta* and *pādapraharṣa*[58]

Nighanṭu kāla

Nighanṭu period has provided the evidence of systematic & scientific understanding of the drug and it is explained with their synonyms, *rasa paṁcaka* and their utility in different disease. *Abhidhāna Maṁjarī* and *Madanapāla nighaṇṭu* described *Karīra* in *śākavarga Mādhava Dravya guṇa* mentioned it under *phala varga* and *śākavarga.* It indicates that it is used as *ahara dravya*. Similarly, the descriptions regarding indications of *karīra* as food, medicine have been explicated by its synonyms, pharmacological activities. Thus they reviewed from various *nighanṭu* and given in Table 1 (synonyms), Table 2 (*Rasapaṁcaka*), Table 3 (*Sāmānya Karma*).

Doṣaghnatā* of *Karīra

Caraka and *vāgbhaṭṭa* has described *Karīra* as *Pittakapha śāmaka*, while *Suśruta* mentioned it as *Kaphavātahara* and *vāgbhaṭṭa* put it as *Vātakara* also. Most of the *nighanṭu* described it as having *Kaphavātahara* properties.

DISCUSSION

Karīra is a well-known drug from *vedika kāla*. A lot of references are available in *vedika saṁhitā*. Two direct references are available in ancient literatures regarding *krimighna* action in *kauśika sutra* of *atharva veda* and *kaiyadeva nighaṇṭu*. Other references supporting the *krimighna* action may include *vraṇaghna* and *śophaghna* properties. Various indirect references are found regarding its antimicrobial activity in *veda* like *saktu* of the fruits (powder of the dry and parched fruits) of *karīra* has been described in religious sacrifices; thus indicating its environmental purification activity.

In *saṁhitā kāla*, it is described in *phalavarga*[59] showing its fruits are used at that time in food and therapeutics also. Various texts of *āyurveda* after 7th century, described *karīra* as *apathya* in different *lauha* (iron) formulations. *Cakradatta* said that during the use of *lauha* formulations, items beginning with 'ka' *karīra, kāṁjika* etc. should be avoided otherwise *lauha* with its product is not assimilated and is excreted out[60]. A 2009 report published in the Journal of Horticulture and Forestry provides the following nutritional values for 100 g of *karīra* shows 41.6 kcal, 8.6 g Protein, 1.8 g Carbohydrates, 12.3 g Fiber, 7.81 mg Vitamin C,

55 mg Calcium, 57 mg Phosphorous and negligible Iron[61]. It shows that calcium and phosphorous contents are in rich amount. The general consensus is that calcium can interfere with iron absorption on a short term basis[62] as calcium makes it harder for body to absorb either supplemental iron or iron from food, according to the National Institutes of Health[63]. There is some evidence to support the impact of calcium on iron absorption, albeit from short-term studies focused on this interaction with single meals[64]. On the other hand, long-term studies have found that calcium and milk products don't have any adverse effect on iron absorption[65].

Also recent researches shows addition of calcium and phosphorus in semi synthetic meal significantly reduced the absorption of non heme iron by forming a calcium-phosphate-iron complex[66]. It can be assumed that *karīra* intake may hamper iron absorption due to presence of calcium and phosphorous, this may be the reason it has been prohibited during the intake of various *lauha* formulations.

It has been described as *apathya* in various *vata* predominant disorders. This may be the reason that *ācārya* has described its used after cooking with *ghī*[67].

In *nighanṭu* period the drug is explained with their synonyms, *rasapaṁcaka* and their utility in different disease. Various synonyms are indicative of its habitat (*marujanmā, marubhūruha*); morphology (*granthila, karīra, krakara, mṛuduphala, cakraka, gūḍhapatra*, *apatra, tīkṣnakaṇṭaka*) and Pharmacological character (*tīkṣṇasāra, śākapuṣpa*). Few synonyms explained above are indicative of its used as food; for instance *śākapuṣpa* means its flowers are used for preparing vegetables and as medicinal like *Karīra* which means it has mala, viṣa and *kaphahara* properties.[68]

Almost all parts of the plant *karīra* possess medicinal properties. It contains several chemical constituents[69] which are reported to possess several biological activities. It contains steroids, Isocodoncarpine, Quercitin, stachydrine, Vitamin C and lutin, Rutin, tocopherols, alkaloids, fatty acids, protein, sterols, fiber, Oils, minerals, sugar, protein, Isothiocyanates, Isoginkgetin, Ginkgetin, Daucosterol, Uracil, stachydrine, Capparisinine, Capparisesterpenolide, Cappaprenol-12, Cappaprenol-13 and Pro-vitamin which shows wide range of pharmacological activities like hepatoprotective, Anti-inflammatory, Anticancer, wound healing, diuretic effects, Antiviral, Nutraceutical properties, anti-oxidant, Anti-arthritic activity, Anti-microbial property.

In traditional[70] system of medicine, the plant has been used as a carminative, tonic, emmenagogue, aphrodisiac, alexipharmic, improves appetite, good for rheumatism, lumbago, hiccough, cough, diabetes and asthma. Leaves and top shoots used in boils, eruptions, swellings, toothache, pyorrhoea and as an antidote to poison. The fruits are astringent, are useful in cardiac troubles, facial paralysis and phthisis, scurvy and enlarged spleen, kills intestinal worms. Root powder is used in liver problems, hemorrhoids.

Capparis decidua has *kaṭu* (pungent), *tikta* (bitter) *rasa*, *laghu* (light) *guna* (properties), *rukṣa* (~roughness) *guṇa*, *kaṭuvipāka* and *uṣṇa vīrya*[8]. It mainly acts on *kapha* and *vata* (basic humor of the body). The other actions on the general health are *rucya, swedya, Ādhmānakara, Balakara, Varṇakara, Agnivridhikara, Yakṛtajita, Plīhajita, vraṇanāśaka, Śophaghna, Arśoghna, Viṣaghna, Bhedana, Krimighna, Svedya, Śvāśaghna, Sarvashulaghna, Chardighna, Āmadoṣaghna*.

Table 1: Synonyms of *Karīra* According To Different Nighaṇṭu

Synonyms	*Am.*	*NS*	*AR*	*MN*	*RN*	*KN*	*BP*	*LN*	*AM*
Krakara	+	+	-	-	+	-	+	-	-
Granthila	+	+	+	-	+	+	+	-	-
Karīra	+	+	+	+	+	+	+	-	+
tīkṣṇasāra	-	+	+	-	-	+	-	-	-
śākapuṣpa	-	+	+	-	-	+	-	+	-
mṛuduphala	-	+	-	-	-	+	-	-	+
Marujanmā	-	+	-	-	-	-	-	-	-
Gūḍhapatra	-	+	-	+	+	+	-	-	-
kaṭuphala	-	+	+	-	-	-	-	-	-
Siddhapatra	-	-	+	-	-	-	-	-	-
Karīraka	-	-	+	+	-	+	-	+	-
Barbura	-	-	+	-	-	-	-	-	-
tīkṣnakaṇṭaka	-	-	+	+	+	+	-	-	+
Krakaca	-	-	-	-	-	+	-	-	+
niṣpatraka	-	-	-	-	+	-	-	-	-
Karaka	-	-	-	-	+	-	-	-	-
Hutāśana	-	-	-	-	-	+	-	-	-
Suphala	-	-	-	-	-	+	-	-	-
Apatra	-	-	-	-	-	-	+	-	-
Marubhūruha	-	-	-	-	-	-	+	-	-
gūḍhadala	-	-	-	-	-	-	-	+	-
Tiktaphala	-	-	-	-	-	-	-	+	-
Mālu	-	-	-	-	-	-	-	+	-
tīkṣṇaśāka	-	-	-	-	-	-	-	-	+
Śukapatra	-	-	-	-	-	-	-	-	+
śālapuṣpa	-	-	-	-	-	-	-	-	+
Grandhika	-	-	-	-	-	-	-	-	+

Table 2: *Rasapaṁcaka* of *Karīra* according to different *Nighaṇṭu*

S. No.	*Rasapaṁcaka*		*DN*	*So.N.*	*MD*	*MN*	*KN*	*RN*	*BP*	*PN*	*Dg.V.*
1.	*Rasa*	*Madhura*	+	-	+	+	-	-	-	-	-
		Tikta	+	-	-	-	+	-	+	+	+
		kaṭu	-	+	-	+	+	+	+	+	+
		kaṣāya	-	-	+	+	-	+	-	-	-
2.	*Guṇa*	*Guru*	-	-	+	-	-	-	-	-	-
		Picchila	-	-	+	-	-	-	-	-	-
		Tīkṣṇa	-	-	-	+	-	-	-	-	-
		Laghu	-	-	-	-	+	-	-	-	+
		Rukṣa	-	-	-	-	-	-	-	-	+
3.	*Vīrya*	*Śīta*	-	-	+	-	-	-	-	-	-
		Uṣṇa	+	+	-	+	+	+	+	+	+
4.	*Vipāka*	*Katu*	+	+	-	-	+	-	-	-	+

Table 3 Sāmānya karma of Karīra according to various Nighanṭu

Karma	*DN*	*So.N.*	*MN*	*KN*	*BP*	*R.N*	*PN*
Hṛdya (Cardiotonic)	+	-	-	-	-	-	+
Rucya (enhances interest in food)	+	+	-	-	-	+	-
Ādhmānakara (Causes distension)	+	-	-	-	-	+	-
Balakara (health tonic)	+	-	-	-	-	-	-
Varṇakara (enhances complexion)	+	-	-	-	-	-	-
Agnivridhikara (Increases digestive fire)	+	+	-	-	-	-	-
Yakṛtajita (Used in Liver disorders)	-	+	-	-	-	-	-
Plīhajita (Used in spleen disorders)	-	+	-	-	-	-	-
vraṇanāśaka(Wound healer)	-	+	+	+	+	+	+
Śophaghna (Anti- inflammatory)	-	+	+	+	+	-	-
Arśoghna (used in piles)	-	+	-	+	+	-	+
Viṣaghna (eliminates toxins)	-	-	+	+	-	-	+
Bhedana (Purgative)	-	-	+	+	+	-	+
Grāhī (fruit)	-	-	+	-	-	-	-
Krimighna (Anti- microbial)	-	-	-	+	-	-	-
Svedya (promotes sweating)	-	-	-	-	+	-	+
Śvāśaghna (Anti- asthmatic)	-	-	-	-	-	+	-
Sarvashulaghna (Used in all types of pain)	-	-	-	-	-	+	-
Chardighna (Anti- emetic)	-	-	-	-	-	+	-
Āmadoṣaghna (used in Indigestion)	-	-	-	-	-	-	+

Abbreviations

Am.- *Amarakōśa*; NS- *Nighaṇṭuśēṣa*; AR- *Abhidhānaratnamāla*; MN-*Madanapālanighaṇṭu*; RN-*Rājanighaṇṭu*; KN- *Kaiyadēvanighaṇṭu*; BP- *Bhāvaprakāśanighaṇṭu*; LN - *Laghunighaṇṭu*; AM - *Abhidhāna Maṁjarī*; DN - *Dhanvantari nighaṇṭu*; So.N. - *Sōḍhalanighaṇṭu*; MD- *Mādhava Dravyaguṇa*; PN - *Priya nighaṇṭu*; Dg.V. - *Dravyaguṇa vijñāna*

CONCLUSION

Karira is an essential plant in folklores and in Indian system of medicine both as food and medicine. A number of therapeutic uses have been mentioned in ancient *Ayurveda* texts. Its fruit and root both are used in medicine while its fruits have also been used for making pickles and vegetables indicating of its nutritive value. So it can be used as a food supplement also. It's been widely used for various diseased conditions like rheumatism, lumbago, hiccough, cough, diabetes and asthma, cardiac troubles, facial paralysis, phthisis, scurvy, enlarged spleen, kills intestinal worms etc. Although a number of pharmacological activities have been done on this plant but there is a huge scope for further clinical research on various therapeutic aspect of this important medicinal plants.

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