



Conceptual Recapture of Aamra [*Mangifera indica* Linn.]

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ABSTRACT

Aim- To collect and comprehensively review information available regarding the medicinal use of *Amra*.

Background- *Amra* [*Mangifera indica* Linn.] has been used in traditional medicine for the treatment of different disease. It contains tannins, pyrogallotannins, mangiferin and also contains vitamin A and C. It shows Anticancer, Anti-diabetic, Anti-inflammatory, laxative action. In various *nighantus* properties of *amra* and its different part have been explained. Though there are few review articles available on this plant but no review has comprehensively covered all aspects of *Amra*.

Materials And Methods- This review is in a narrative format and done from literature and publications relevant to *Amra* that were identified through a systematic search of major computerized medical databases.

Review Results- *Amra* [*Mangifera indica* Linn.], was reviewed from all *samhitas* and *Nighantu*'s and from more than 55 research articles for medicinal uses and other important aspects.

Conclusion- *Amra* is concluded to have more than 20 *Samhita* based indications *Rakta-rodhaka*, *Vran-aropaka*, *Stambhana*, *Garbhashay-ashothahara* (Bark); *Rakta-rodhaka*, *Vrana-ropaka*, *Chhardi-nigrahana* (Leaf); *Vrana-ropaka*, *Mootra-sangrahaniya*, *Stambhana* (Flower); *Rakta-rodhaka*, *Stambhana*, *Krimi-ghna*, *Vrana-ropaka* *Garbhashaya-shothahara* (Seed kernel); *Snehana*, *Anulomana*, *Saraka*, *Balya*, *Varnya*, *Brinhana*, *Vrishya*, *Hridya*, *Shonita-sthapana* (Ripe fruit); *Daha-prashamana* (Unripe fruit- Roasted); *Rochana*, *Deepana*, *Pachana*, *Raktapitta- prakopaka* (Unripe fruit Unroasted). *Amra* also possesses anti-cancer, anti-diabetic, anti-inflammatory properties, hepatoprotective, anti-hemorrhagic, anti-tetanus, analgesics and antipyretic, kidney damage, anti-ulcer, lipid profile, anti-bone-resorption, anti-diarrheal, anti-bacterial, anti-fungal, anti-viral, anti-amoebic, anthelmintic, anti-malarial, radio-protective, immunomodulation, cardio-protective, osteoporosis prevention, recognition of memory, broncho-dilatory and laxative effects.

Clinical Significance- *Samhita* based indications of *Amra* are compared with Article concluded effect and then areas of further research are identified in drug *Amra*.

KEYWORDS: Ayurveda, *Amra*, *Mangifera indica*.

INTRODUCTION

Mangifera indica, also referred to as mango or *amra*, has been a significant herb in indigenous and *Ayurvedic* medicine for more than 4,000 years. The genus *Mangifera*, which includes roughly 30 species of tropical fruiting trees in the *Anacardiaceae* family of flowering plants, is where mangoes are found.^[1]

Ayurveda attributes a variety of therapeutic qualities to the various sections of the mango tree. *Mangiferin* has potent antioxidant, anti-lipid peroxidation, immunomodulatory, cardiotoxic, hypotensive,

wound healing, antidegenerative, and antidiabetic properties since it is a polyphenolic antioxidant and a glucosyl xanthone.^[2]

In addition to treating diarrhoea, dysentery, anaemia, asthma, bronchitis, cough, hypertension, insomnia, rheumatism, toothache, leucorrhoea, haemorrhage, and piles, different portions of the plant are used as a antiseptic, astringent, diaphoretic, stomachic, vermifuge, tonic, laxative, and diuretic. Abscesses, broken horns, rabid dog or jackal bites, tumours, snakebite, stings, datura poisoning, heat stroke, miscarriage, anthrax, blisters, oral wounds, tympanitis, colic, diarrhoea, glossitis, indigestion, bloody dysentery, liver disorders, excessive urination, tetanus, and asthma are all treated with some of the parts.^[3]

Mango fruit that is ripe is said to be refreshing and energising. The juice is used to treat heat stroke and is a restorative tonic. The seeds are used as an astringent and to treat asthma. In order to alleviate hiccups and throat affections, fumes from the burning leaves are inhaled. The astringent bark is used to treat rheumatism and diphtheria and is thought to have a tonic effect on mucous membranes.^[4] Gum is utilised in scabies and cracked foot treatments. It is regarded as anti-syphilitic as well. After soaking in water and removing the astringent properties, the kernels are turned into flour. The bark contains tannins that are used for dyeing, while the majority of the tree's parts are used medicinally.^[5]

One of the active ingredients in many herbal and polyherbal compositions, *Mangifera indica* is a huge spreading evergreen tree that is utilised in *Ayurvedic* medicine to treat a variety of illnesses. While the bark and seed kernel are used to treat diarrhoea, bleeding, and other body discharges, the ripe fruit has laxative properties.^[6] To cure snake bites, the root, bark, stem, and leaf are administered in addition to other medications. One Similarly many more information are available in Ayurvedic classical text books related to *Amra*, aside from all of this, *Amra*'s nutritional worth gives it a special place in the globe.^[7]

MATERIALS AND METHODS

This literature review was compiled from ayurvedic text, relevant modern science books, research published articles both from print and electronic resources. Computerized medical databases E- Samhita, PubMed., Google Scholar, Medline, Embase, Mantis were searched using these keywords: *Amra*, *Mangifera indica* Linn etc. Results of these searches were reviewed with respect to medicinal uses of *amra* and other important aspects.

REVIEW RESULTS

Historical review

Jaimini brahamana (2/156) describes *Amra* as having *Badar*. *Amra* is also mentioned in the *Brihadaranyaka Upanisad*. (4/3/36) According to the *Shankhayana grihasutra* (1/11/2) it is *Phalottama*. *Pallava* and *Samitha* are described in different *Griha sutras*. *Amra* is regarded as *Shradadeya phala* together with *Draksha* and other deities in the *Shankhalikhita Dharma Sutra* (220). *Yagyavalkyashiksha* (33) describes it as *Dantadhavana*.^[8]

Classical categorization/Gana

Table No. 01: Classical categorization of *Aamra* as per various *Nighantu*

S.No.	Mentioned In	References
1.	<i>Dhanwantari Nighantu</i> ^[9]	<i>Aamradi Varga</i>
2.	<i>Shodhala Nighantu</i> ^[10]	<i>Aamradi Varga</i>
3.	<i>Madanpala Nighantu</i> ^[11]	<i>Phaladi Varga</i>
4.	<i>Kaiyadeva Nighantu</i> ^[12]	<i>Aushadhi Varga</i>

5.	<i>Bhavaprakasha Nighantu</i> ^[13]	<i>Aamradi Varga</i>
6.	<i>Raj Nighantu</i> ^[14]	<i>Aamradi Varga</i>
7.	<i>Priya Nighantu</i> ^[15]	-
8.	<i>Shaligrm Nighantu</i> ^[16]	<i>Phala Varga</i>
9.	<i>Astang Nighantu</i> ^[17]	<i>Nyagrodhadi Gana</i>

Synonyms of Amra

Table No. 02: Synonyms of Aamra as per various Nighantu

<i>Dhanvantari Nighantu</i> ^[9]	<i>Sahakara, Kamanga, Parpusta, Madodbhava, Rasala, Chuta, Kiresta, and Madirasakha</i>
<i>Kaiyadeva Nighantu</i> ^[12]	<i>Manmatha, Shyamatailaka, Shilishtha, Supathamoda, Pikaramahotasava, Manoratha, Maddhasaha, Maakanda, Shourdikipriya, Samanvitakaari, Pindiphala, Atisaurabha, Kokilabandhu, Shista, Amra, Rasala, Sahakara, Chaitravriksha, Vanapuspotsava, and Chuta</i>
<i>Raja Nighantu</i> ^[14]	<i>Kaamashara, Madhuli, Kaamavallabha, Bhringabhista, Sidhuras, Sumadana, Kokilotsava, Vasantaduta, Amlaphala, Madadhaya, Manmathalaya, Madhvavasa, Madhavadhroma, Pikara, Nipapriya, Priyambu, Kokilavasa, Amra</i>
<i>Saligram Nighantu</i> ^[16]	<i>Amra, Maakanda, Madhuduta, Pikavallabha, Kamanga, Sahakara, Rasala, and Atisaurabha</i>
<i>Madanpal Nighantu</i> ^[11]	<i>Amra, Maakanda, Atisaurabha, Rasala, Sahakara, and Chuta</i>
<i>Adarsa Nighantu</i> ^[18]	<i>Amra, Sahakara, Rasala, and Chuta</i>
<i>Priya Nighantu</i> ^[15]	<i>Sahakara Rasala</i>
<i>Saraswati Nighantu</i> ^[19]	<i>Amra, Manmatha, Maakanda, Pindiphala, Atisaurabha, Rasala, Sahakara, and Chuta</i>
<i>Sodhala Nighantu</i> ^[10]	<i>Kamanga, Sahakara, Parpusta, Madodbhava, Amra, Rasala, Kiresta, Madirasakha, and Chuta</i>

Vernacular names^[20]

English-*Mango, Spring tree, Cupid's favourite, Cuckoo's joy*

Arabic - *Ambaja*

Assamese - *Am, Ghariam*

Bengali-*Ama*

Gujarati -*Ambo*

Hindi-*Ama*

Kannada- *Mavinaphala (Elayamavinakavi)*

Malayalam - *Gomanne, Manna, Amram, Cutam, Nattumavu, Tenmavu.*

Marathi-*Amba, Aahba*

Oriya – *Amo, Ambo, Boulo, Chuto*

Punjabi -*Amba*

Pharsi – *Aamba, Amba, Amba, Naghzak*

Tamil - *Manga, Marama, Mamarama*

Telugu - Mamidi, Mavi Mavidi, Gujjumamidi, Amramu, Elamavi, Makandamu, Rasamamidi, Satamu

Sing – Etamba, Makandamu, Amba

Sind -Amb, Amu

Urdu - Amba

Taxonomy^[21]

Kingdom: *Plantae plants*

Subkingdom: *Viridaeplantae* – green plants

Division: *Angiospermae*

Subdivision: *Spermatophyta* (Seed plant)

Class: *Magnoliopsida*

Subclass: Rosidae

Order: Sapindales

Family: Anacardiaceae

Genus: *Mangifera*

Species: *M. Indica* L

English name: *Mango*

Botanical description^[22]

Tree- A large, evergreen tree, 10-45m high.

Leaf- Leaves are simple, linear, oblong or elliptic- lanceolate. 10-30 cm long.

Flower- Flowers are small, reddish white or yellowish green, in large panicles.

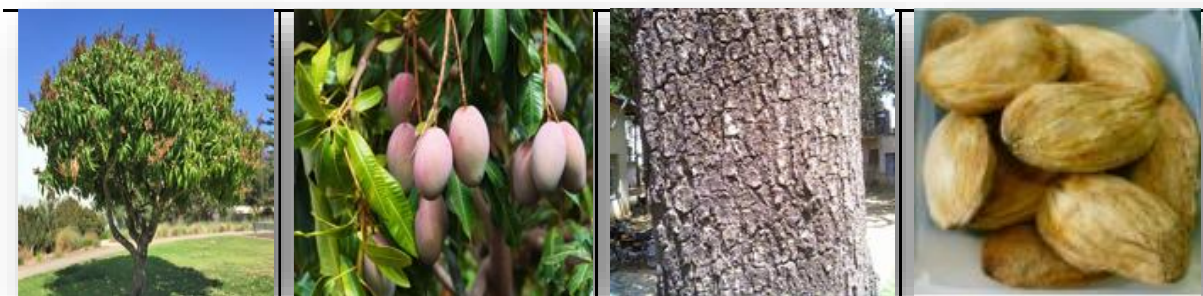
Fruit- fruit are variable in form and size, green, yellowish or red fleshy.

Seed- Seeds are solitary, ovoid- oblique, encased in a hard fibrous endocarp

Flowering- November to February

Fruiting time- Mango takes about five months from the time of flowering to mature and ripen.

Diagram-01- Botanical description of Amra



Origin and distribution^[23]

It occurs wild or semi- wild nearly throughout India in tropical and sub-tropical hilly forests, particularly near, nullahs and ravines. It is common in sub-tropical Himalayas, Nagpur, Bihar, Orissa, West Bengal, Assam, hill forests of Eastern and Western Ghats, Deccan and Andaman Island. Commonly it is cultivated throughout the country for its fruits.

Varieties

According to *Raja Nighantu*^[14]: 5 types

1. *Aamra* 2. *Koshaamra* 3. *Rajaaamra* 4. *Maharajaamra* 5. *Badaraamra*

According to *Shodala Nighantu*^[10]: 3 Types

1. *Aamra* 2. *Rajaamra* 3. *Koshaamra*

Useful parts^[21]

Root, Bark, Leaf, Flower, Fruit, Seed kernel.

Pharmacological characters**Table No. 03: Raspanchaka of Aamra**^[21]

	Seed	Bark	Unripe fruit	Ripe fruit
Rasa	<i>Kashaya, Madhura, Amla</i>	<i>Kashaya</i>	<i>Amla</i>	<i>Madhura</i>
Guna	<i>Laghu, Ruksha</i>	<i>Laghu, Ruksha</i>	<i>Laghu, Ruksha</i>	<i>Guru, Snigdha</i>
Veerya	<i>Sheeta</i>	<i>Sheeta</i>	<i>Sheeta</i>	<i>Sheeta</i>
Vipaka	<i>Katu</i>	<i>Katu</i>	<i>Amla</i>	<i>Madhura</i>

Table No. 04: Properties of Amra parts according to Bhavaprakashnighantu^[13]

S. No.	Useful Part	Rasa	Veer ya	Guna	Karma	Action on Tridosha
1.	Baal Amra-Phala (Young Raw fruit)	<i>Kashay, Amla</i>	-	-	<i>Ruchya (Ruchikar)</i>	<i>Vatapittakar</i>
2.	Tarun Amra-Phala (Grown Raw Fruit)	<i>AtiAmla</i>	-	<i>Ruksha</i>	-	<i>Tridosha-prakopak, Raktavicar janak</i>
3.	Pakva Amra-Phala (Ripe Fruit)	<i>Madhur-pradhan Kashaya-anurasa</i>	<i>Sheet</i>	<i>Snigdha, Guru</i>	<i>Vrushya, Hrudya Varnya</i>	<i>Vatanashak, Pittajanak, Kaphavardhak</i>
4.	Vruksha sampakva-Amra (Fruit ripened on tree)	<i>Madhur, Amla</i>	-	<i>Guru</i>	-	<i>Vatahar, Pittakar</i>
5.	Krutrima Pakva - Amra (Artificially ripened fruit)	<i>Madhur, Amla</i>	-	-	-	<i>Pittahar</i>
6.	Chushit Amra-rasa (its juice if consumed by sucking)	-	<i>Sheet</i>	<i>Laghu</i>	<i>Atyant Ruchikar, Balya, Veerya karak</i>	<i>Vata-Pittanashak, Kaphakar</i>

7.	<i>Galit Amra rasa</i> (Extracted juice of ripened fruit)	-	-	Guru, Sara	Balya, Sarak, Ahrudya, Attyantsantar pan, Bruhan, Tarpan	Vatahara, Kapha- vardhak
8.	<i>Amra Beeja</i>	Kashaya, Madhur	-	-	-	-
9.	<i>Amra Pallav</i>	-	-	-	Ruchikarak	Kaphapittas hamak
10.	<i>Amrakhand</i>	Madhur	Sheet	Guru	Ruchikarak, Balya, Bruhan, Chirpaki	Vatanashak
11.	<i>Dugdha Amra</i> (Ripe mango with milk)	-	Sheet	Guru	Ruchikar, Bruhan, Vrushya Varnya	Vatapittakar
12.	<i>Amavat (Type of Amravadi)</i>	-	-	Laghu, Sara	Ruchikar	Vatapittahara

Table No. 05: Properties of different parts of *Amra* according to various Nighantu's

	<i>Dhanvantari Nighantu</i> ^[9]	<i>Priya Nighantu</i> ^[15]	<i>Kaiyadev Nighantu</i> ^[12]	<i>Raj Nighantu</i> ^[11]
Apakwa bala phala	Rasa-Kashay, Katu, Amla Guna-Ruksha Rogaghnta-Vatakar & Rakta-pitta-kruta Karma- Dahanprashamana	Rasa- Kashaya, Katu, Amla Dosha- Vata-pittakar	Rasa-Kashay, Katu, Amla Guna-Ruksha Dosha- Vata-pittakar	Rasa-Kashay, Amla Dosha- Tridosha- vardhak Rogaghnta- Kantha-rognashak
Tarun phala	Rasa-Amla Dosha-Pitta-kapha prakopak Karma-Hrudya, Varnya, Rakta-mansa-balaprada Karma- Rochana, Deepana, Pachana, Raktapitta-Prakopa	Rasa-Amla Dosha-Kapha-pittakar	Dosha-Kapha-pittakar	-
Pakva phala	Rasa-Madhur Guna-Guru Dosha-Pitta-sha	Rasa-Madhur Dosha-Vata-shamak	Rasa-Madhur, Amla, Kashay Guna-Guru,	Rasa-Madhur Guna-Guru Karma-Tridosha

	<i>mak</i> <i>Karma- Snehana,</i> <i>Anulomana, Saraka,</i> <i>Balya, Varnya,</i> <i>Brinhna, Vrishya,</i> <i>Hridya,</i> <i>Shonitasthapana</i>	<i>Karma-Balya,</i> <i>Truptikar,</i> <i>Shrukal</i>	<i>Snigdha,</i> <i>Dosha-Vata-</i> <i>shamak, Pitta-</i> <i>kaphavardh</i> <i>ak</i> <i>Karma-</i> <i>Hrudya,</i> <i>Ruchikar, Balya</i>	<i>shamak,</i> <i>Tarpan,</i> <i>Kanti-vardhak</i>
Twak	<i>Rasa-Kashay</i> <i>Dosha-Kapha-</i> <i>pittakar</i> <i>Karma-Grahi</i> <i>Raktarodhaka,</i> <i>Vranaropna,</i> <i>Dahaprashmna,</i> <i>Stambhana,</i> <i>Garbhashayashotha</i> <i>hara</i>	<i>Rasa-Kashay</i> <i>Guna-Ruksha</i> <i>Dosha-Kapha-</i> <i>pittashamak</i> <i>Rogaghnta-</i> <i>Atisar,Prameha,</i> <i>Yonivyapad,</i> <i>Charmaroga</i>	<i>Karma-Grahi,</i> <i>Dahanashak</i>	<i>Rasa-Kashay</i> <i>Virya-Sheet</i> <i>Karma-Grahi,</i> <i>Ruchikar</i>
Pallav	<i>Rasa-Kashay</i> <i>Dosha-Kapha-</i> <i>pittakar</i> <i>Karma-Grahi</i> <i>Karma-Rakta-</i> <i>rodhaka,</i> <i>Vranaropna,</i> <i>Chhardinigrahana</i>	<i>Karma-Ruchikar</i> <i>Dosha-Kapha-</i> <i>pittashamak</i> <i>Rogaghnta-</i> <i>Chhardighna</i>	<i>Dosha-Kapha-</i> <i>pittanashak</i> <i>Karma-</i> <i>Ruchikar</i>	-
Beeja	<i>Karma-</i> <i>Raktarodhaka,</i> <i>Vranaropna,</i> <i>Stambhana,</i> <i>Krimighna,</i> <i>Mootrasangrahaniy</i> <i>a, Garbhashayashot</i> <i>hahara</i>	<i>Rasa-Madhur,</i> <i>Kashay</i> <i>Karma-</i> <i>Stambhan</i>	<i>Rasa-Madhur</i> <i>,Kashay</i> <i>Karma-Grahi</i>	-
Pushpa manjari	<i>Karma-</i> <i>Raktarodhaka,</i> <i>Vranaropna,</i> <i>Stambhana</i>	<i>Rasa-Kashay</i> <i>Virya-Sheet</i> <i>Dosha-Kapha-</i> <i>pittashamak</i> <i>Rogaghnta-</i> <i>Prameha,Atisar,</i> <i>Raktavikar</i>	<i>Virya-Sheeta</i> <i>Dosha-Kapha-</i> <i>pittanashak,</i> <i>Vatakar</i> <i>Karma-Grahi,</i> <i>Ruchikar</i> <i>Rogaghnta-</i> <i>Atisar,Prameha</i> <i>, Raktadosha</i>	<i>Karma-</i> <i>Ruchikar,</i> <i>Agnidipak</i>

<i>Aama rasa</i>	-	<i>Guna-Guru, Snigdha, Sara Dosha- Vatashamak, Kaphavardhak Karma-Balya, Tarpan, Bruhan, Hrudya, Shukral</i>	<i>Guna-Snigdha Karma- Hrudya, Ruchikar</i>	
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Nutrient and Phytochemicals

The apple mango has a somewhat higher energy value (79 kcal per 100g) than the apple mango, which has 250 kJ (60 kcal) per 100 g (3.5 oz). Numerous minerals^[24] and phytochemicals^[25] can be found in mangos. Mango peel and pulp contain other compounds, such as pigment carotenoids and polyphenols, and omega-3 and -6 polyunsaturated fatty acids^[26]. Carotenoids, such as the provitamin A compound, beta-carotene, lutein, and alpha-carotene^[27], polyphenols^[28-29], such as quercetin, kaempferol, gallic acid, caffeic acid, catechins, tannins, and the unique mango xanthonoid, mangiferin^[30], are among the pigments found in mango peels that have biological effects^[31-32]. They are also being studied for their potential to prevent various disease processes.

It seems that different mango cultivars have different levels of phytochemicals and nutrients^[33]. The yellow-orange colouring of the majority of mango cultivars is caused by beta-carotene, the densest of up to 25 carotenoids that have been extracted from mango pulp.

Protocatechuic acid, catechic acid are among its constituents. In addition, it contains phenolics, chromones, hydrocarbons, xanthenes, triterpenes, fatty acids, essential oil, and saponins. In addition, it has vitamin C1 and vitamin A.^[34]

Part wise-Common in various parts^[35]: Mangiferine, Amino acid, Gallotannin, Gallic acid, m-digallic acid, Ethylgallate, Isoquercetin, Quercetin and β – sitosterol

Fruit: m-trigallic acids, riboflavin, citric acid, ellagic acid, malic acid, epicatechin, β -carotene, α -xanthophyll, Vitamin The glucose

Flower: D-arabinose, glucose, and aliphatic and aromatic esters of gallic acids Galactose Isoamyl alcohol, α - and β -pinenes, myrcene, limonene, and fenchone are the constituents of pericarp oil.

Seed oil: Methyl alcohol, Propyl alcohol, Isopropyl alcohol, Butyl alcohol, Isoamyl alcohol.

Leaves: Citronellal, Diterpene, Gerananiol, Limonene, Mangiterol, Mangiferone, Nerol, Nerylacetate, α and β pinene, Tannin, Chinomin, Methylchinomin, Isochinomin, Hyperin, Friedelin, Lupeol, Taraxerol, Taraxerone, Leucine, Tyrosine, Valine

Stem bark: Butin, Fisetin

Root bark: α and β amyrins, Cycloartinol, Friedelan-3 β -ol, Mangiferonic acid

Resin: Mangiferolic acid, Hydroxymangiferonic acids, Erythrodiol, Oleanolic aldehyde

Amra-atiyoga-janya-dosha^[36]

Rakta-dushti-janya-vikar, Jatharagni-mandya, Vassama-jwar, Netra-vyadhi.

Treatment- 1. Use water to drink *Shunthi* (dry *Zinziber officinale*).

2. Consume *Sauvarchal lavan* together with *Jeerak* (Cumin seed).

Therapeutic uses

1. *Nasasrava* contains *Beejamajjachurnanasya* ^[17]
2. *Chhardi* is used to deliver *Amrabeejamajja kwatha virechana*. ^[17]
3. In *Atisara*, *Madhu* is offered with *Beejamajja swarasa*. ^[37]
4. *Amraasthi rasa* is used for *Krimiroga* and nasal bleeding. ^[18]
5. *Vrana* ^{[17] [38]}
6. *Sangrahani* ^{[16] [17] [38] [39]}
7. *Stambhana* ^{[18] [20]}
8. *Mutrasangrahaniya* ^{[20] [39]}
9. *Pustikar* ^[37]
10. *Rakta shodhaka* ^[20]
11. *Purishasanganraniya* ^[39]
12. *Hridya* ^{[42] [38] [39]}
13. *Bhagnasandhana* ^{[17] [38]}
14. *Medapiitaraktasrava* ^{[17] [38]}
15. *Trishna* ^[17]
16. *Daha* ^{[17] [38]}
17. *Yoni roganashaka* ^{[17] [38]}
18. *Chhardi* ^[17]
19. In *Mukhapaka*, the face should be covered with *Madhu*, *Lohachurna*, *Rasouta*, *Gairika*, and *Lepa* of *Amrabeejamajja*. ^[40]
20. In *Charmadala khustha*, *Kamsya patra* should be used to prepare the *Lepa* of *Amra-beeja-majja* and *Saindhava lavana*. ^[41]
21. *Madhu* and *Sita* are used with *Amra-beeja majja* and *Bilvaphala majja kashaya* in *Vamana* ^[43]

Formulations containing *Amra-beeja-majja*

Table No. 06: Showing formulations containing *Amra-beeja-majja*

Caraka samhita ^[44]	Pittajaatisaranashaka yoga, Mahanilataila, Sarvatisarnashakaghrita, Khaphajaatisaranashaka yoga, Pushyanuga churna, Jambavadi churna, Twaksavarnikaranalepa, Dhatakyaditaila
Susruta samhita ^[45]	Shaivaladitaila, Gutikanjana and Kubajkadyanjana
Astanga Hridya ^[46]	Dhatakyadi taila, Pushyanugachurna,
Sarangdhara ^[47]	Jatiphaladichurn, Palitalepa, Amrabeejadilepa and Vrihadagangadharachurna
Cakradatta ^[48]	Pushyanugachurna, Bilvamrasthikashaya Hritakyadyagan raga and Amrabeejamajjaswarasa, Savarnakarkaliyakadilepa, Dhatyamrajalepa Amrasthilajasinthutthaleha
Vangasena ^[49]	Nilabindutaila, Kaitakyadyataila, Mayurpittadyataila, Chandanadichurna, and Pushyanugachurna
Gada nigraha ^[50]	Gangadharachurna, Pushyanugachurna

DOSE ^[51]– Churna -1-5gram, Juice 10-20 ml, Decoction 50-100 ml

TRADE AND COMMERCE ^[52]

Ripe and unripe fruits are commonly traded in fruit and vegetable markets respectively. Best varieties like *Alphanso*, *Dashahari*, *Langra* are exported. Retail market price – kernel-Rs. 105/-kg

Toxicology^[53]

1. In albino rats, mangiferine's LD50 was 365 mg/kg intraperitoneally.
2. According to reports, mice given a 50% ethanolic extract of the entire plant (but not the root) had an LD 50 of over 1000 mg/kg intraperitoneally.

Article review/Pharmacological activity

a) **Anti-cancer:** Molt-4 leukaemia, A-549 lung, MDA-MB-231 breast, LnCap prostate, SW-480 colon cancer cells, and the non-cancer colon cell line CCD-18Co were among the cancer lines used by Noratto et al. (2010) to examine the anticancer effects of polyphenolic extracts from several mango types. ^[54]

When HL-60 cells were incubated with whole mango juice and mango juice fractions, Percival S. et al. (2010) observed that the cell cycle was inhibited in the G0/G1 phase, indicating that whole mango juice and juice extracts have anticancer activity. ^[31]

Additionally, studies suggest that mangiferin may have disrupted the ability of cells to adhere and connect by impairing or interfering with the assembly or function of microtubule filaments or components of the cellular matrix. ^[55]

Other potential methods of mangiferin included enhancing cellular apoptosis and inhibiting the gene and telomerase ^[56]Kim et al. (2012) also looked into the anti-proliferative properties of mango meat and peels. ^[57]

Timsina et al. (2015) and Ali et al. (2012) found that the bioactive fraction from the crude extract showed antiproliferative effects with an IC50 value of less than 10µg/ml, and that the ethanol extract had considerable cytotoxicity to HeLa cells. ^[58]

Mangos also exhibit notable cytotoxic properties against the colon cancer cell line (SW-620), renal cancer cell line (786-0) [27], breast cancer cell lines MCF 7, MDA-MB-435, and MDA-N, and K562 leukaemia cells. ^[59]

b) **Anti-diabetic:** In rats with Type-2 diabetes, Bhowmik et al. (2009) discovered that a single oral dose of 250 mg/kg body weight has a robust and powerful hypoglycemic impact. ^[60]

Two weeks following the administration of a high dose (1 g/kg/d) of powdered portion, aqueous extract, and alcoholic extract of *Mangifera indica* leaves, a substantial drop in the mean concentration of plasma glucose was seen. ^[61]

Aqueous extract from mango leaves demonstrated a pronounced hypoglycemic impact in diabetic rats, according to Miura T et al. (2001) and Mangola EN (1990) ^[62-63]

In rabbits, Wadood et al. (2000) discovered that alcoholic extract of *Mangifera indica* leaves had anti-diabetic effects at doses of 50, 100, 150, and 200 mg/kg body weight. ^[64]

c) **Anti-inflammatory:** According to Dhananjaya BL & Shivalingaiah S (2016), standard aqueous stem bark extract of *Mangifera indica* has anti-inflammatory properties and can inhibit Group IA sPLA2 enzyme activity up to 98% at a concentration of about 40 µg/ml. ^[65]

According to Beltrana AE et al. (2004), mangiferin's anti-inflammatory properties are linked to the suppression of cyclooxygenase-2 and iNOS production. ^[66]

The balance between proinflammatory mediators and anti-inflammatory cytokines, inhibition of inflammatory cellular activations, control of inflammatory gene expressions, and augmentation of cellular resistance against inflammatory injuries are some of the potential anti-inflammatory mechanisms of mangiferin.^[67]

d) **Hepato-protective:** According to Nithitanakool et al. (2009), mango seed kernels have hepatoprotective properties. Mango pulp extract's (MPE) chemopreventive qualities were assessed in Swiss albino mice's liver alterations. By altering cell-growth regulators, MPE was found to be useful in preventing oxidative stress-induced cellular damage to the mouse liver.^[68]

e) **Anti-hemorrhagic:** Leanpolchareanchai et al. (2009) and Pithayanukul et al. (2009) assessed the anti-hemorrhagic and anti-dermonecrotic properties of mango extract against snake venoms.^[69]

f) **Anti-tetanus:** Leaf extracts of *Mangifera indica* were found to be active against *Clostridium tetani*, a pathogen that kills a lot of people worldwide, according to Godfrey SB et al. (2007). With MICs of 6.25 and 12.5 mg/ml, respectively, ether and ethanolic leaf extracts demonstrated anti-clostridium tetani action.^[70]

g) **Analgesic and Anti-pyretic:** The antipyretic properties of MI's stem bark extract were assessed in mice. Additionally, the extract reduced yeast-induced hyperpyrexia.^[71]

h) **Kidney damage:** Amien AI et al. (2015) found that improving kidney function by lowering serum creatinine, urea, and uric acid had a substantial preventive impact against kidney damage. Rats treated with 500 and 1000 mg/kg MPS extract showed a considerable increase in reduced glutathione (GSH) and superoxide dismutase (SOD) activity, while glutathione-S-transferase (GST) and total malondialdehyde (MDA) were considerably decreased.^[72]

i) **Anti-ulcer:** Neelima N et al. (2012) assessed the antiulcer potential of petroleum ether and ethanol extracts of mango leaves against in vivo stomach ulcers caused by aspirin. The ulcer index was considerably lowered by the 250 mg/kg petroleum ether and 250 mg/kg ethanol extracts of mango tree leaves.^[73]

j) **Lipid profile:** Rats treated with an aqueous extract of *Mangifera indica* leaves showed a large rise in high density lipoproteins and a significant decrease in total serum cholesterol, triglycerides, low density lipoprotein, and very low-density lipoprotein. On the other hand, treatment with an aqueous extract of mango leaves (200 mg/kg body weight) resulted in a significant increase in high density lipoprotein (HDL-C) and a significant decrease in elevated total cholesterol (TC), triglycerides (TG), low density lipoprotein (LDL-C), and very low-density lipoprotein (VLDL).^[74]

k) **Anti-bone resorption:** In mice, mangiferin has been demonstrated to prevent bone resorption triggered by parathyroid hormones.^[75]

l) **Anti-diarrheal:** Sairam K et al. (2003) investigated the possible anti-diarrheal properties of methanolic and aqueous extracts of *M. indica* seeds.^[76]

Alkizim et al. (2012) investigated the anti-diarrheal properties of mango kernel aqueous extract at doses of 0.25 to 0.50 mg/ml.^[77]

m) **Anti-bacterial:** Mango leaves and stems have been found to have adequate antibacterial activity against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Streptococcus pneumoniae*, *Pseudomonas aeruginosa*, *Candida albicans*, and *Enterococcus faecalis* in both aqueous and ethanol extracts at 50 and 25 mg/mL.^[78]

Salmonella enterica, *Listeria monocytogenes*, and *Escherichia coli* were all found to be susceptible to the extract's antibacterial properties.^[79]

According to Sahrawat A et al. (2013), at a concentration of 100µl/ml, the antibacterial properties of *Mangifera indica* leaf extract on methanol, ethanol, and benzene were investigated against bacteria such as *Salmonella typhi*, *Proteus vulgaris*, *Pseudomonas fluorescens*, *Shigella flexneri*, and *Klebsiella pneumoniae*.^[80]

n) **Anti-fungal:** At a dosage of 6.25 mg/mL, the antifungal activity of methanol, ethanol, and aqueous extracts against *Alternaria alternata* was discovered.^[79]

o) **Anti-viral:** Mangiferin was thought to be an antiviral agent against the hepatitis B virus, HIV, and herpes simplex virus. Mangiferin's in vitro impact against Herpes simplex virus (HSV) type 2 was investigated by Zhu XM et al. in 1993; it suppresses the late event in HSV-2 replication rather than directly inactivating HSV-2. Additionally, mangiferin was able to counteract the cytopathic effects of HIV and prevent HSV-1 virus replication within cells in vitro.^[81-82]

p) **Anti-amoebic:** Tona L et al. (2000) also assessed the anti-amoebic properties of mango extract.^[83]

q) **Anthelmintic:** Mice experimentally infected with *Trichinella spiralis* nematodes were used to test the anthelmintic properties of mangiferin, a component of MI stem bark.^[84]

r) **Anti-malarial:** The antiplasmodial activity of MI's stem bark extract against *Plasmodium yoelii* nigeriensis was assessed. The extract showed repository activity and a schizontocidal effect in the early stages of infection. The chloroform:methanol (1:1) extract of MI was tested for its antimalarial properties in vitro. With a growth suppression of 50.4% at 20 µg/mL, the extract demonstrated good efficacy against *P. falciparum* in vitro.^[83]

s) **Radio protective:** At a dose of 2 mg/kg, mangiferin's radioprotective effects on radiation-induced immune cells have been verified without altering the vulnerability of cancerous cells.^[85]

t) **Immuno-regulation:** 2.1. Mangiferin has been contemplated as an immunoregulator candidate. As an immunostimulant, it prevented the immunological depression caused by cyclophosphamide, including atrophy of lymphoid organs, reduced cellular responsiveness, low IgM specific to antigens, increased lipid peroxidation, and decreased superoxide dismutase activities. Additionally, it significantly raised mice's serum haemolysis IgG and IgM levels.^[86]

The cellular skeleton of the activated macrophage led to cytoplasmic dissemination, lengthy extensions, and intercellular connections, and its immunological modulatory mechanisms may be associated with the prevention of activation-induced T-cell death.^[87]

u) **Cardio protective:** 2.1 Devi et al. (2006) looked into how mangiferin affected rats' myocardial infarction caused by isoproterenol. It was discovered that mangiferin decreased the production of lipid peroxide, maintained the cardiac marker enzyme activities at a level close to normal, and lessened the impact of isoproterenol-induced pathological alterations. The data above show that mangiferin has a cardioprotective effect.^[88]

v) **Osteoporosis prevention:** Crucially, mango enhanced bone mineral density as well as bone quality, as evidenced by improvements in strength and microarchitecture.^[89]

w) **Recognition of memory:** In vitro, in human U138-MG glioma cells, mangiferin promoted cell division and caused a notable rise in the supernatant levels of tumour necrosis factor (TNF)- α and nerve growth factor (NGF). According to the findings, mangiferin improves recognition memory via a process that may entail raising cytokine and neurotrophin levels.^[90]

x) **Broncho-dilatory:** The impact of *M. indica* stem bark aqueous extract (mangiferin) on rat trachea contracted by acetylcholine and histamine was investigated by Gbeassor et al. (2005). These tests revealed that the aqueous extract of *M. indica* (mangiferin) may inhibit the rat trachea's muscarinic and histaminic receptors, indicating that it might be used to treat asthma.^[91]

y) **Laxative:** At oral doses of 30 mg/kg and 100 mg/kg, mangiferin markedly increased the mobility of the gastrointestinal tract (GIT) by 89% and 93%, respectively.^[92]

DISCUSSION

Amra is concluded to have *Samhita* based indications *Rakta-rodhaka*, *Vran-aropaka*, *Stambhana*, *Garbhashay-ashothahara* (Bark); *Rakta-rodhaka*, *Vrana-ropaka*, *Chhardi-nigrahana* (Leaf); *Vrana-ropaka*, *Mootra-sangrahaniya*, *Stambhana* (Flower); *Rakta-rodhaka*, *Stambhana*, *Krimi-ghna*, *Vrana-ropaka* *Garbhashaya-shothahara* (Seed kernel); *Snehana*, *Anulomana*, *Saraka*, *Balya*, *Varnya*, *Brinhana*, *Vrishya*, *Hridya*, *Shonita-sthapana* (Ripe fruit); *Daha-prashamana* (Unripe fruit- Roasted); *Rochana*, *Deepana*, *Pachana*, *Raktapitta- prakopaka* (Unripe fruit Unroasted). *Amra* also possesses anti-cancer, anti-diabetic, anti-inflammatory properties, hepatoprotective, anti-hemorrhagic, anti-tetanus, analgesics and antipyretic, kidney damage, anti-ulcer, lipid profile, anti-bone-resorption, anti-diarrheal, anti-bacterial, anti-fungal, anti-viral, anti-amoebic, anthelmintic, anti-malarial, radio-protective, immunomodulation, cardio-protective, osteoporosis prevention, recognition of memory, broncho-dilatory and laxative effects.

Table No. 07: Comparison Between Ayurvedic Indications and Article Concluded Effects

AYURVERDIC INDICATION	ARTICLE CONCLUDED EFFECTS
<i>Rakta-rodhaka</i> , <i>Shonita-sthapana</i>	anti-hemorrhagic
<i>Stambhana</i> ,	anti-diarrheal,
<i>Vrana-ropaka</i> ,	anti-tetanus, anti-bacterial, anti-fungal, anti-viral, anti-amoebic, anthelmintic, anti-malarial, analgesics and antipyretic
<i>Garbhashaya-shoth-ahara</i>	anti-inflammatory properties, anti-tetanus, anti-bacterial, anti-fungal, anti-viral, anti-amoebic, anthelmintic, anti-malarial, analgesics and antipyretic
<i>Chhardi-nigrahana</i>	anti-ulcer, anti-bacterial, anti-fungal, anti-viral, anti-amoebic, anthelmintic, anti-malarial,
<i>Mootra-sangrahaniya</i> ,	kidney damage
<i>Krimighna</i> ,	anti-bacterial, anti-fungal, anti-viral, anti-amoebic, anthelmintic, anti-malarial, anti-cancer,
<i>Snehana</i> , <i>Anulomana</i> , <i>Saraka</i> , (ripe fruit)	laxative effects
<i>Balya</i> , <i>Brinhana</i> (ripe fruit)	anti-bone-resorption, , osteoporosis prevention,
<i>Hridya</i> (ripe fruit)	cardio-protective, anti-diabetic, lipid profile,
<i>Daha-prashamana</i> (unripe fruit roasted)	anti-ulcer,
<i>Rochana</i> , <i>Deepana</i> , <i>Pachana</i> (unripe fruit unroasted)	hepatoprotective, anti-ulcer,
<i>Raktapitta- prakopaka</i> (unripe fruit unroasted)	-
<i>Varnya</i> (ripe fruit)	-
<i>Vrishya</i> (ripe fruit)	-
-	radio-protective, immunomodulation, recognition of memory, broncho-dilatory

CONCLUSION

Amra is concluded to have more than 20 *Samhita* based indications and nearly 23 Article concluded effects. Among them *Raktapitta- prakopaka* (unripe fruit unroasted), *Varnya and Vrishya* (ripe fruit) are *Samhita* based indications on which there is none availability of appropriate study, which may act as area of further research.

CLINICAL SIGNIFICANCE

Areas of further research are identified in drug *Amra* by comparing *Samhita* based indications with Article concluded effects.

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