



Review Article

A CRITICAL REVIEW ON *MADANPHALA (RANDIA DUMETORUM (RETZ) POIR.)*

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KEYWORDS: *Madanphala, Randia Dumetorum, Shodhana, Vamana, Randia Dumetorum.*

ABSTRACT

Ayurveda science follows the principle that when there is accumulation of morbid *Dosha* it needs to be expelled out from the nearest route which is also known as *Shodhana* therapy. *Vamana* (therapeutic emesis) is a therapeutic procedure in which *Apakva* (unripen stage) *Pitta* or *Kapha Doshas* are expelled out through oral route. *Madanphala* known as *Randia Dumetorum* (Reitz) Poir belongs to *Rubiacea* family is most commonly used drug for *Vamana* and is considered as best one because of its *Anapayitva* qualities means having very less complications and is safer to use. It is considered as *Agrya Dravya* (best drug) for *Vamana, Asthapana* and *Anuvasana*. It possesses qualities like *Madhura Tikata* or *Katu Tikta Rasa* (taste), *Laghu Rukhsa* qualities, *Katu Vipaka* (post digestive effect) and *Ushna Virya* (potency). It performs various actions like *Vamana, Lekhana, Jvaraghana, Shothaghana, Jvaraghana, Shothaghana*. It has been indicated in *Pratishyaya, Shleshama Jvara, Vidhradhi, Gulma, Shosha, Shotha, Anaha, Vrana, Kushtha, Kaphaj Hridroga, Pakvashaya shodhana* and *Kapha Vata* diseases. Through various sources synonyms, qualities, actions, indications, posology, toxicities and its treatment has been collected. This information will help for further research to validate the classical uses of *Madanphala*.

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INTRODUCTION

In the era of contemporary science management of diseases confined to the usage of medicines which comprises of higher doses results into adverse effects on health along with drug resistant to the disease with their long term use. Ayurveda science follows the principle that when there is accumulation of morbid *Dosha* it needs to be expelled out from the nearest route which is also known as *Shodhana* (detoxification) therapy.^[1] *Shodhana* mainly comprises of five therapies namely *Vamana, Virechan* (therapeutic purgation), *Basti* (therapeutic enema), *Nasya* (nasal insufflation) and *Raktamokshana* (bloodletting).^[2] Among these five *Vamana* (therapeutic emesis) is a therapeutic procedure in which *Apakva* (unripe stage) *Pitta* or *Kapha Dosha* are expelled out through oral route.^[3] Ayurveda is full with treasure of herbal medicinal plants which are used to cure various illnesses. For *Vamana Karma* Charaka has described six drugs (*Madanphala, Jeemutka,*

Ikshavaku, Dhamargva, Kutaja, Kritvedhana) with detail in *Kalpasthana*.^[4] In that context *Charaka* has mentioned 355 formulations to cure various illness.^[5] While *Sushruta* has mentioned 31 formulations for *Madanphala*.^[6] For *Vamana* purpose qualities of emetic drugs are *Ushna* (hot), *Tikshana* (penetrating), *Sukhsma* (subtle), *Vyavayi* (quickly absorb,) *Vikasi* (depressant) and having predominance of *Vayu* (air) and *Agni* (fire) *Mahabhuta* (great elements).^[7] *Madanphala* known as *Randia Dumetorum* belongs to *Rubiacea* family is most commonly used drug for *Vamana* and is considered best one because of its *Anapayitva* qualities means having very less complications and is safer to use.^[8] It is considered as *Agrya Dravya* (best drug) for *Vamana, Asthapana* and *Anuvasan*.^[9] *Sushruta* and *Vagbhatta* do not mention it separately as *Charak* but *Sushruta* in *Sutrasthana* and *Vagbhatta* in *Kalpasthana* mentioned it. In classical literature abandoned description are

available on *Madanphala*. In this article an attempt has been made to collect detail information like synonyms, properties and actions, indications, mode of use, doses, parts used, side effects and its management given in classics, *Nighantu* and online available material with latest research for the better informative understanding and its implementation.

Materials and method

This study includes *Brihatrayee*, *Laghutrayee*, Ayurvedic classics, and material available in *Nighantu*. Also, various data has been collected available on pub med, Medline, Google scholar, Ayush Research Portal and various online available journals.

Etymology

Randia- In memory of Issac Rand, Botanist of Chelsea, London; *duematorum*- of thorny bushes, of hedges- *Madanphala* has many thorns.^[10]

Synonyms	Explanation ^[11]
<i>Shalayak, Karahata</i>	Thorny tree
<i>Maruvaka, Svasana</i>	Growing in dry region
<i>Vishapushpak</i>	Flowers are toxic
<i>Golaphala, Pinditaka</i>	Fruits round
<i>Ghantala</i>	Fruit hang like bell
<i>Phala, Ratha</i>	Fruit is common useful part, Applied in many disease
<i>Vaamana</i>	Mainly use for <i>Vamana</i>
<i>Madana</i>	Produce horripilation and malaise
<i>Gala, Galava, Kaphavardhan</i>	Eliminates <i>Kapha</i>
<i>Bastirodhana</i>	Used in different enema formulations
<i>Svasna</i>	Used in respiratory disorders
<i>Matsyantak phala</i>	Used in fish poison

Synonyms

Various synonyms like- *Madan, Karahata, Ratha, Pinditaka Phala, Shvasana*^[12], *Madan, Shalayaka, Ratha, Pindi, Pinditaka Phala, Galava, Karahata, Chardan, Vishapushpska*^[13], *Gaala, Sasyaka, Svasana, Maruvaka, Matula, Beeja Pushpak*^[14], *Tagar*^[15], *Nata*^[16], *Snehapinditaka*^[17], *Pinditaka, Dharaphala, Tarata, Rahu, Kantala, Vishmushti, Ghantala, Maadan, Harsha, Ghantalaya, Basti Rodhana, Gomatiphala, Golaphala*^[18], *Dridhakantaka*^[19] are mentioned in various classical text and *Nighantus* of Ayurveda. Acharya Sushruta

and *Vagbhata* have not mentioned synonyms separately but they used terms like *Madan, Ratha* and *Pinditaka* for *Madanphala*.

R.spinosa Poir. *R.brandisii* Gamble; *R. longispinosa* Wight & Arn.; *R. tomentosa* Wight & Arn., non Blume; *Xeromphis spinosa* Keay are the synonyms of *R.dumetorum* Poir.^[20]

Vernacular names ^[21]

Arabic- Jauzulki, Juzulkosul; Assam- Gurol; Bengal- Madan, Menphal; Bhil- Gali; Bombay- Ghela, Gehela, Gelaphala, Gelaphala; Burma- Hasaythanpaya, Sethanbaya, Thaminsa; Canarse- Aremadalu, Aremapala, Kare, Karigida, Karikakaremullu, Katmangari, Mangase, Mangari, Minakare; ecaan- Gehela, Piaralu; English- Common emetic nut; Gond- Katul, Kuay; Gujrati- Medhola, Mindhal, Mindhala; Hindi- Arar, Karahar, Madan, Main, Maindal, Mianhuri, mainphal, Manneal; Indochina- Gang gang trau, Gang tu hu; Kolami- Pato Portoho; Konkani- Gaddi; Kumaon- Karhar, Mainphala, Manyul; Kurku- Bhita;; Lambadi- Mendlero; Lepcha- Panji; Malayalam- Kara, Karalikkaya, Kattunaranna; Marathi- Galay, Gel, Gelaphala, Gera, Ghela, Madan, Mundhal, Monigeli, Peralu; Merwara- Ghetu; Michi- Gundrow; Mundari- Johara; Nepal- Amuki, Maidal, Maidaphul; Nirthwestern provinces- Karahar, Mian, Maini, Mainphal, Manyul; Persian- Juzulkueh; Punjab- Arara, Mndkolla, Mindhal, mindla; Rajbanshi- Gurol; Ronga- Cherole; Sanskrit- Bastishodhana, Chhharddana, Dharaphala, Galla, Ghantala, Granthiphala, Kaitarya, Kantaki, Kantha, Karahata, Karahataka, Madana, Marubaka, Maruvaka, Muchukunda, pichuka, Pindinata, Pinditaka, Ramachhardanaka, Ratha, Shalya, Shalayaka, Tagara, Vishpushpaka; Santal- Boibindi, Loto; Sind- Juzulmaindal; Sinhalese- Kukurman, Valikukurman; Tagalog- Sinampaga; Tamil- Kadudam, Kalagam, Karai, Karadam, Karudam, Madukkari, Marukkalam, Marukkarai, Pungrai, Sirattagalagam; Telugu- Madanamamu, Manda, Manga, Mangara, Mangu, Mranga, Sinnamanga; Tulu- Aremapala; Urdu- Mainphal; Uriya- Potua.

Classical categorization:

Charak Samhita:^[22-24] *Asthapanopaga, Anuvasanopaga, Phalini, Vamana Dravya, Sushruta*^[25-27]- *Argavadhigana, Mushakadi Gana, Urdhavabhaghara Gana,*

Ashtanga Sangraha:^[28-30] *Argavadhadi Gana, Tikta Skanda, Mridu Dhoompna Dravya,*

Ashtanga Hridya:^[31-34] *Argavadhadi Gana, Vamana Dravya, Niruhaghana Gana, Mridu Dhoompna Dravya, Dhanvantari Nighantu- Guduchyadi Varga, Kaiydev Nighantu- Aushadhi Varga, Madanpala Nighantu- Abhyadi Varga,*

Bhavprakash– Haritakyadi Varga,
Raj Nighantu- Shalmalyadi Varga,
Nighantu Adarsha- Manjishthadi Varga

Taxonomy^[35]

Kingdom- Plantae,
 Subkingdom- Trachebionata,
 Super division- Spermatophyta,
 Division- Magnoliophyta,
 Class- Magnoliopsida,
 Subclass- Asteridae,
 Order- Rubiales,
 Family- Rubiaceae,
 Genus- *Randia*,
 Species- *dumetorum*

Morphology^[36-38]

A large shrub or small tree armed with strong straight nearly opposite decussate spines, 1.3-3.2 cm long, coming off from above the branchlets, branches horizontal, rigid. Leaves usually fascicled on the suppressed branches, 3.2-5.7cm by 2.2-3.2cm, obovate, obtuse, wrinkled, shining above, more or less pubescent above and on the nerves beneath (especially when young), base cuneate, main nerves 6-10 pairs, petioles 3.1mm long, densely pubescent, stipules ovate, acuminate. Flowers at the end of the short leaf, bearing branchlets, fragrant, solitary or 2 (rarely 3 together), peduncles short. Calyx 1.3 cm long, densely hairy; tube broadly campanulate, teeth 5, foliaceous, 5mm, long ovate- oblong, subacute, often with small intermediate teeth between. Corolla 2cm long, at first white, afterwards becoming yellow; tube 5-6mm, long, densely hairy outside, lobes 1.3cm, long and nearly as broad as long, obovate- like a small crab- apple yellowish, globose or broadly ovoid, smooth or obscurely longitudinally ribbed, crowned with the large calyx limb 2- celled, glabrous; pericarp thick, Seeds many, flat, imbedded in pulp.

Flowering and fruiting season^[39]- April and July respectively.

Distribution:^[40] It is found throughout India, Ceylon- Java, Sumatra, Southern China, European tropical Africa.

- a) *R. dumetorum sensu stricto*- Eastern coastal districts of Andhra Pradesh and Madras and parts of Deccan.
- b) *R. longispina* Wight & Arn- North India from Kumaun to Assam, extending southwards into hills of Vishakhapatnam.
- c) *R. brandisii* Gamble- Deccan Peninsula, especially in the western parts.

Microscopic^[41]

Fruit: Transverse section shows epicarp consisting of single layered epidermis, sometimes obliterated in surface view; epidermal cells thin walled and polygonal; mesocarp, broad zone consisting of thin walled parenchymatous cells, some cells contain reddish-brown content; a number of vascular bundles found embedded in this zone; endocarp stony consisting of light yellow polygonal, sclerenchymatous cells of variable shape and size.

Seed: Transverse sections shows a seed coat, consisting of single layered, rounded to oval epidermal cells; a few layers of yellowish- brown pigmented cells; endosperm forms bulk of seed consisting of large oval and irregular shaped parenchymatous cells; albumen horny, translucent, cells of outermost layer small in size.

Powder: Reddish-brown; under microscopic shows numerous, large- irregular, reddish brown cells sclereids of variable shape and size; pieces of Xylem vessels with reticulate thickenings, thin walled, crushed parenchymatous cells and yellow orange pieces of seed coat.

Identity purity and strength^[41]

Foreign matter- not more than 2%, Total ash- not more than 6%, Acid- insoluble ash- not more than 0.25%, Alcohol- soluble extractive- not more than 19%, Water- soluble extractive- not more than 16%.

Chemical Constituents^[42]

Crude saponin fraction showed hemolytic, molluscicidal and immune stimulating activities (planta, ed 1990,56,451). Two new triterpene saponins isolated from fruits and characterized as 3-O- $[\beta$ -D- glucosyl (1-4)- β - D-glucosyl (1-3) - β -D- glucuronosyl] oleanolic acid and 3-O- $[\beta$ -D- glucosyl (1-6)- β -D- glucosyl (1-3)- β -D- glucosyl (1-3)- β -D- glucuronosyl] oleanolic acid (planta Med. 1990,56,451); a new aliphatic diol- randiol- isolated from bark and its structure established as tetratriconta- 12, 21- diol.

Collection and method of preservation^[43]

Fruits should be collected in middle of spring and summer in a *Maitra Muhurta* (auspicious day) when moon is in the constellation of *Pushya*, *Ashavini* or *Mrigashirsha*. The fruits collected should be fully matured, not perforated, it should not be green. It should be *Panduvarna* (pale yellow) in color, not rotten, not infested with parasites and not in small size. These fruits should be cleaned and tied up inside a bundle of *Kusha* grass. These bundles should be kept inside a heap either of barley husk, *Masha*, *Shali* type of paddy, *Kulattha* or *Mudga* for eight nights. Afterwards they become soft and are endowed with desirable smell like that

of honey; these fruits should be taken out of the bundle and dried up. When these are well dried up their seeds should be taken out. These seeds should be rubbed with ghee, curd, honey and oil, take and dried again. These seeds should be then kept in new jar cleaned of sand and dust particles and filled up to brim. This jar should be properly covered with a lid and after that performance of rituals should be placed in as swing.

Varieties

Sushruta:^[44] It is of three types based on colour of flowers.

Nighantu:^[18] According to *Raj Nighantu* it is of two types.

- Varahapinditaka*
- Snigdhapinditaka*

Wealth of India:^[40] Three types: a) *R. duematorum* sensu stricto b) *R. longispina* Wight & Arn. c) *R. brandisii* Gamble.

Rasa panchak (Ayurvedic properties)^[45]

Guna – *Laghu*, *Ruksha*

Rasa- *Madhura tikta rasa* (*Kaiydev* and *Bhavprakash*), *Katu tikta rasa* (*Dhantvantari* and *Raja Nighantu*), *Tikta* (*Madanpala Nighantu*).

Virya- *Ushna*

Vipaka- *Katu*

Karma (Action)

Vamana, *Lekhana*, *Jvaraghana*, *Shothaghana*, *Kushtaghan* are the main actions.

Indication

Nighantu^[46]

It is indicated in *Pratishyaya*, *Shleshma* *Jvara*, *Vidhradhi*, *Gulma*, *Shosha*, *shotha*, *Anaha*, *Vrana*, *Kushtha* *Kaphaj* *Hridroga*, *pakvashaya* *Shodhana*, *Kapha Vata Roga*.

Brihatrayee

Charak

In *Kalpa Sthan Madanphala* can be taken with decoction milk, nasal spray, *Avaleha*, *Varti*, *Utkarika*, *Apupa*, *Shashkuli*, *Badar Shadava* etc.^[47] In *Jvara* it can be used in *Yapana Basti*, also used in *Brihana Basti*, *Balyabasti*.^[48] For *Krimi Roga* (worm infestation) it is indicated for purification purpose.^[49]

Sushruta

Sushruta mentioned it in various conditions like for *Vimlapana* (liquefaction) *Dravya*^[50], in *Vridधिupdanshashlepada* for *Paniyakhshara*^[51], for gargling in *Chaladantaroga* (tooth disease).^[52] In various *Niruhabasti* like- *Gududchyaniruha*,^[53] *Bhadraniruha*,^[55] *Vrishashmadiniruha*,^[55] *Rasna-argavadhdainiruha*^[56] *Mustadiniruha*.^[56] For the

treatment of *Murcha* (syncope), *Chhardi* (vomiting) and *Atisara* (diarrhea) used as emetic^[57] also it can be used in bite of *Chkkirana* rat (one of the variety of rat poison)^[58] and all type of rat bite poison^[59], as suppositories in *Udarvatachikitsa* (flatus).^[60] For *Niruha* in 8th month of *Garbhini Paricharya*^[61], in *Anaha Roga* (abdominal distension).^[62] In *Vamana*, *Virechana* complication mentioned for *Vamana* treatment of *Ayoga*^[63], in *Nadivrana* used as *Varti*.^[64]

Ashtanga Hridaya

Vagbhatta mentioned in *Jvara* for *Basti*.^[65] In *Pittajakasa* associated with *Kapha* for *Vamana*^[66], in *Arsha* (piles) used as *Anuvasanabasti*,^[67] in *Kushtha Chikitsa* for bath (*Sidharthaka Snana*).^[68]

Chakradatta

Chakrapani mentioned it in *Jvara* for emesis^[69], for *Vranashamakdhoopa* (wound fumigation)^[70], *Pradeha* (local application) in *Kushtachikitsa*^[71], for emesis in *Visarpa* (erysepliasis)^[72], in *Artavajananyoga* (ovum formation)^[73], for emesis in *Kaphasanshrithakoshta*^[74]. *Madan Kusum Majja* (pulp) used in treatment of *masurika*(smallpox).^[75] He mentioned treatment for *Madanphala* intoxication.^[76]

Bhaishajyaratnavali

Treatment for intoxication due to *Madanphala* has been given with *Kushmanda* juice mixed with jiggery.^[77]

Ethanopharmacology ^[78, 79]

Bark is sedative and nervine calmative. Fruit has a bitter bad taste; emetic, purgative, carminative. Used for pain in the muscles, paralysis, inflammations, leprosy, boils, eruptions; clears the brain; used in disease of brain, asthma, bronchitis, leucoderma (Yunai). It acts as anodyne in rheumatism when applied externally. Its pulp of fruit possess anthelmintic properties and sometimes used as abortifacient. It can be used in fever and incidental ailments which children are subjected to (Murray). Infusion of bark is used as nauseating medicine. It can be applied to bruises. In colic fruit is rubbed with rice water and paste is made which is applied to navel region. In Ceylon the root decoction is taken for diarrhea and biliousness. Modern sheriff has found it as good a substitute for *Ipecuanha* in dysentery. The fruit is one the ingredients used in preparation of *Tanjore pill*, a famous snake remedy. It roots are grounded with human or ox urine and applied to eyes in stupor and comma. In *Panchakashaya* used as emetic and *Madandivamana* is effective expectorant. It is beneficial in acute bronchitis and asthma.

Important formulations

Pippalyadi Taila^[80], *Vardhmana Madanphala Kalpa*^[81], *Tilvaka Ghrita*^[82], *Bilvadi Taila*^[83], *Bala Taila*^[84], *Vikantakadi Lepa*^[85], *Jatayadi Kwath*^[86], *Mritasanjeevani Agada*^[87].

Posology: ^[80] 0.5- 1.0g of drug in powder form for decoction. 3- 6gm for induction of vomiting.

Toxicity Researches ^[88]

There was a study which showed that during acute toxicity, drug did not show any signs of toxicity and mortality upon single exposure to the test drug. Transient increase in SGOT and SGPT levels were observed but normalized at the end of 14 days. Hematological study revealed significant decrease in hemoglobin levels and relative decrease in packed cell volume and total red cells count. Biochemical studies revealed increase in the levels of SGOT, SGPT and decrease in creatinine levels as compared to the control. No major morphological changes in the vital organs on histopathological examination.

1. Crude extract of *Randia Spinosa* exhibit significant antimicrobial activity for *Staphylococcus aureus*, *Streptococcus mutans*; *Aspergillus niger* and *Candida albicans*. Action may be due to presence of saponins which occur to the extent of 2-3% in fresh fruits and about 10% in dried whole fruit.^[89]
2. *Randia Dumetorum* extracts exhibits a potential protective immune modulatory effect by humoral as well as cell mediated immune mechanisms. Analgesic effect of *Randia Dumetorum* was observed and also exerted strong anti-inflammatory effects.^[90]
3. It possess inhibitory properties against ESBL (extended spectrum β - lactamase) producing uropathogenic *E. coli* and have great potential as an alternative antibacterial agent to combat the invasion by such organisms.^[91]
4. Oral administration of methanolic fruit extract of *R. Dumetorum* produces significant hepato protective effect in chronic alcohol treated rats due to a counteraction of free radicals by its antioxidants i.e. flavonoids.^[92]
5. *R. dumetorum* exhibits antioxidant effect due to inhibiting the formation of radicals or scavenge the formed radical and it may be due to the presence of the phenolics compounds.^[93]
6. Crude organic and aqueous extracts of stems and leaves of have been screened for some pharmacological activities and found to possess anti-tumor, free radical scavenging, anti-inflammatory and analgesic potential.^[94]

7. One study was carried out on collection and processing of *Madanphala* in which three samples (self-collected, processed and market samples were analyzed through pharmacognostic, physico-chemical, qualitative and quantitative phyto-chemical study and found that that saponins on contact produce a generalized irritation of the mucous membranes producing sneezing, vomiting and irritation. So, after proper *Sanskara* (transformation) there is reduction in the saponin content resulted in the controlled initiation and completion of *Vamana* without complications.^[95]

DISCUSSION

In Ayurveda the most common and widely used drug for *Vamana* is *Madanphala* due to its *Anapayitva* quality (safer to use without complications). It has been mentioned in all the classics. *Bhaishjya Ratnavali* and *Chakradatta* mentioned the treatment of its intoxication. It is distributed throughout India, Ceylon Sumatra java etc. Its collection and preservation mentioned elaborately because improper administration can lead to *Pratilomapravritti*. Mostly *Acharya* mentioned it as *Katu-Tikta rasa* but in *Kaiydev* and *Bhavprakash* it is accepted as *Madhura* and *Tikta*. It possesses *Laghu*, *Rukhsha* qualities, *Ushnavirya* and *Katuvipaka*. It has *Vamak*, *Lekhana*, *Jvarghana* Action. It has been indicated in *Pratishyaya*, *Shleshama Jvara*, *Vidhradhi*, *Gulma*, *Shosha*, *Shotha*, *Anaha*, *Vrana*, *Kushtha*, *Kaphaj Hridroga*, *Pakvashaya Shodhana*, *Kapha Vata Roga*. Based on research evidences it is anti-microbial, immune modulatory, free radical scavenging, anti-inflammatory, analgesic, antioxidant and hepatoprotective.

CONCLUSION

Madanphala in traditional system of medicine is one of the best and commonly used drugs for *Vamana* and *Basti*. From this article it can be concluded that this drug is useful in various disorders depending on its rationale use. Future scope is to use it in different form and in various diseases wherever indicated and authenticate the data to create further valid evidences. Moreover researches on its mode of action should be carried out to assess its efficacy.

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