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Review Article

MADANAPHALA (RANDIA DUMETORUM): A PHARMACOLOGICAL AND PHARMACOGNOSTICAL REVIEW

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ABSTRACT

Vamana (emetic therapy) is one among the panchakarma chikitsa (five eliminative therapies), where the morbid doshas are expelled through the oral cavity. Many vamaka yogas (emetics) have been mentioned in Bruhatrayees (treatises of Ayurveda) in various forms of preparations. Madana phala (emetic nut) is considered as best vamaka dravya (emetic drug). The multi-dimensional activities of Randia dumetorum have been revalidated in recent times on several experimental models and even in well designed clinical trials. Various parts of this medicinal thorny shrub reveals Antibacterial, Anti-Allergic, Anti-inflammatory, Analgesic, Immunomodulatory, therapeutic emetic and also used to check wound healing etc Shows us multiple precision of the plant This review is an attempt to explore various yogas for vamana karma where madanaphala is used as the main ingredient.

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INTRODUCTION

Ayurveda aims at Swastyasya swastya rakshana (maintenance of health in healthy) and Aturasya vikara prashamana (prevention of disease). Panchakarma, one of the major treatment modality of Ayurveda operates to fulfill these objectives. Vamana karma (therapeutic emesis) is the first and foremost among the Panchakarma therapeutic regimens, which eliminates the morbid Kapha dosha through the oral route.¹

Whole of the section known as Madanaphala kalpa in Kalpasthana of Charaka Samhita is denoted formulations to induce Vamana (therapeutic emesis) and Virechana (therapeutic purgation), where in out of 600 formulations mentioned in this section, 355 are meant, only for Vamana karma. This shows the importance of Vamana karma. Among the various drugs available for Vamana (therapeutic emesis), the drug Madanaphala (*Randia spinosa*) is considered best, mainly because of its Anapayikatwa guna (safe property).

In the vedic literature the thorns of madana are mentioned and in case of vegetable poison madanaphala is given to induce vomiting. Charaka emphasized its role as antidote to many poison. It is important to note that Madanaphala is enumerated

under vamana dravya's but not under vamanopaka group. However it's found in the asthapanapaka & anuvasanopaka group. Hence, it is the need of time to evaluate different formulations for their induction and adoption in day to day practice.²

Review of Madanaphala (*Randia dumetorum lam.*)

Latin Name: *Randia dumetorum*

Family Name: Rubiaceae

English Name: Emetic Nut

Synonyms: Madana, Chardana, Pindi, Visapuspaka, Salyak, Bastiasodhana, Dharaphala.

Gana: Vamana, Phalini (*Charak*), Urdhvabhagahara, Aragvadhadi, Muskadi (*Sushruta*)

Part Used: Madanaphala pippali, Phala, Tvak,

Botanical Description: A large deciduous thorny shrub which grows up to 5 metres of height. Leaves are simple, obovate, wrinkled, shiny and pubescent. Flowers are white, solitary and having honey like fragrance seen at the end of short branches. Fruits are globose, smooth berries with longitudinal ribs, yellow when ripe. Seeds many, compressed and embedded in the dark fetid pulp. Fruit 1.8 - 4.5cm long, globose or broadly

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wide, longitudinally ribbed or smooth yellowish brown, crowned with persistent calyx-limb, fruits contains numerous seeds 0.4 – 0.6 cm long, compressed, smooth, brown and very hard. These seeds are called as ‘madanphala pippali’.³

Pharmacodynamic Properties

Rasa	Madhura, Tikta (<i>Bhav Prakash</i>) Katu, Tikta (<i>Raj Nighantu</i>)
Guna	Laghu, Ruksha,
Veerya	Ushna
Vipaka	Katu
Prabhava	Vamana
Doshagnata	Kapha vata shamaka.

Doses: Therapeutic Dose: 1 - 2 gram & 3 - 6 gram for emesis

Chemical Composition

Bark

- Bark of *Randia dumetorum* contains mannitol, saponins, coumarin glycosides.
- Root bark of *Randia dumetorum* contains triterpene, -1-keto-3-hydroxyoleanane.

Leaf

- Leaves contain an iridoid-10-methylxoside. An iridoid glycoside from leaves of *Randia dumetorum*.

Fruit

- Ripe fruit contains glycosides, randioside A, mollisidial triterpenoid glycosides and randianin, six saponinsdumetoronins A to F.
- Saponins named as dumentoronin from fruit pulp of *Randia dumetorum* Dumetoronin A, B, C, D, E and F etc. A hemolytic triterpenoid saponins that is Randianin, from fruit of *R. dumetorum*.

Seed

(Madanaphala Pippali) Contains Fat= 1.5%, Protein= 14.2%, Resin, Mucilage & Organic acid (1-4 %) and minute quantity of unidentified alkaloids.⁴

Role of Madan phala in Vaman Karma (Emesis)

Madana phala irritates the stomach causes vomiting due to its *Tikta Katu Rasa*, *Ushna Veerya* and *vyavayi*, *vikasi*, *Laghu Guna*, Best. It is called as a **Best Vamaka** because it does not cause any side effect during emesis.

Mode of Action (According to Ayurveda)

Madanaphala possess five special properties viz. *Ushna*, *Laghu*, *Sukshma*, *Vyavayi* and *Vikasi*. Madanphala execute their action with the help of these five important properties.

Ushna Guna leads to Vishyandana i.e. help in liquefaction of morbid Doshas by virtue of its *Agneya* property. Hence, it facilitates movement of morbid Doshas towards Koshtha (central part of the bio-system) to be expelled out of body.

Laghu Guna is characteristic of drugs constituted of ‘*Vaayu* and *Agni mahabhuta*’. Drugs, possessing this property produce lightness in the body and promote the *Jatharaagni*. This actions help in reducing Kapha.

Sukshma Guna allows the drug to pass into micro-channels by virtue of its '*Anupravana bhava*' (special property to get enter

into the micro-channels) by dilating the channels. This property helps to remove the morbid matter from micro-channels and brings them to Koshtha for expulsion.

Vyavayi property allows the drugs to spread quickly throughout the body & starts their action before their digestion without any change in their form.

By virtue of *Vikasi* property *Madanaphala* leads to *Shaithilyata* (loosening) of morbid Doshas and thus help them to bring inside the Koshtha for their easy expulsion

Lekhan Guna allows the drug to clear the channels of the body. This property leads to '*Vichehhdan*' or *Sanghatbhedan* i. e. help to Scrap out the excessive mucous

Urdhva Bhag hara Prabhav: Having the dominance of ‘*Agni*’ and ‘*Vayu*’ *Mahabhuta* helps the medicine to move in upwards direction.⁵

According to Modern

The Mucosal layer of Stomach is most superficial which comes directly in contact with the administered Madanphala When the Stomach gets purified, it's layers get the nutrition and further absorption of micronutrients may be enhanced and these micronutrients may enter the circulation and finally reaches to the target organ.⁶

Importance of Emesis

All classical treaties in Ayurveda have advocated Bio-purification (*Shodhana*) treatment as first line of treatment in *Kaphaja Vyadhi*. Therefore, *Vaman* (induced emesis) becomes treatment of choice by virtue of its capacity to evacuate Kapha along with Pitta.

Bio-purification (*Shodhana*) treatments are capable of evacuating Dosha in larger amounts in short period of time; hence relief from symptoms is quicker and relatively long lasting. So *Vaman* is a rational treatment for Kapha dominant disease.

Vamana is done in spring season (*Vasantika Vaman*) approximately in the month of March and April for the elimination of vitiated Kapha Dosha which in turn helps to prevent the forth coming Kapha disorders and associated Pitta disorders or diseases originating or settled in the place of Kapha like bronchial asthma, allergic bronchitis, rhinitis, sinusitis, migraine, hyperacidity, indigestion, anorexia, obesity, overweight, dyslipidemia, diabetes mellitus, acne vulgaris, psoriasis, eczema, urticaria etc.⁷

Action & Uses

Bhavaprakasa: It is useful in Jirna Pratisyaya, Kustha, Anaha, Gulma and Vrana,

According to P.V. Sharma (1969)

Rogagnata: *Vatavyadhi*, *Amavata*, *Shotha-Vedanayukta Vikara*, *Vidradhi*, *Vrana*, *Udarashoola*, *Gulma*, *Shoola*, *Kaphapradhana Jwara*, *Shwasa*, *Kasa*, *Pratishyaya*, *Vibandha*, *Krimi*, *Pravahika*, *Raktavikara*, *Kastartava*, *Kastaprasava*, *Kustha*, *Jwara*, *Medoroga* & *Visavikara*.

Karma: *Shothahara*, *Vedanasthapana*, *Vranashodhana*, *Vamaka*, *Vatanulomana*, *Krimighna*, *Grahi*, *Raktashodhaka*, *Kaphanisharaka*, *Arttavajanana*, *Swedajanana*, *Kusthaghna*, *Jwaraghna*, *Lekhana*, *Visaghna*.

Fruit: It cures abscess, ulcers, inflammation, wounds, tumours, skin diseases and has anti bacterial activity. The pulp of fruit is believed by many practitioners to also have anthelmintic properties, and also used as an abortifacient as folklore remedy.

Bark: The bark is astringent and is given in cases of diarrhoea and dysentery (Chopra, *et al.*, 1956). It is administered internally and applied externally in the form of paste in rheumatism and to relieve pain of bruises and boneaches during fevers and to disperse abscesses. The aqueous extract of the root bark of the tree is used as an active insecticide.⁸

Scientific Interpretation of Vaman

According to modern sciences drugs act on

- Vomiting centre of medulla
- Chemo Receptor Trigger zone (CTZ)

The drug, which produces vomiting, is called Emetics. The process of vomiting is called emesis. Vomiting results from the coordinated interaction of central & peripheral neural, humoral, somatic muscular and gastro-intestinal myoelectrical muscular phenomena. Vomiting may initiated by stimuli acting on a variety of anatomical structures within the central nervous system & peripheral nervous system.⁹

Vamaka dravyas get quickly absorbed in blood and cross the blood brain barriers and stimulates the vomiting center. These impulses are transmitted to vomiting center through vagus and sympathetic afferent fibres.

When *Vaman dravyas* reaches to the stomach, they stimulated gastric mucosa, stimulated vagus and sympathetic nerve that carry signals to the vomiting centre and induced emesis. Emesis started when *Vamana Dravyas* reaches to the pyloric end of the stomach. Administration of Luke warm water, *Madanphala*, *yastimadhu kwatha* or saline water induces emesis by reflex stimulation of vomiting center of brain.¹⁰

Vomiting center lies bilaterally in medulla oblongata near the nucleus tractus solitaries. Motor impulses from the vomiting center are transmitted through V, VII, IX, XII cranial nerves to the upper part of GI tract and through spinal nerves to diaphragm and abdominal muscles.¹¹

Emesis may result from activation of peripheral structures outside of the central nervous system. Chemoreceptor trigger zone (CRTZ) located in the postrema and the nucleus tractus solitaries (NTS) are the most important relay areas for afferent impulse arising in the G.I.T., throat & other viscera. The chemoreceptor trigger zone (CRTZ) is also accessible to blood borne drugs, mediators, hormones, toxins etc. because it is unprotected by the blood brain barrier.¹²

Their Action is divided mainly in 2 types

1. Central emetics
2. Reflex emetics, local emetics, or gastric emetics.

Central emesis A central emetics drug induces vomiting by directly stimulation of the vomiting centre. These drugs also stimulate gastric muscles, diaphragm, and G.I.T. and also increase peristalsis. Their action is more prompt. Digitalis and Apomorphine are the example of Central emetics.¹²

Reflex Emetics

Peripheral afferent pathways involved in emesis may be activated by stimulation of receptors solution. Striated muscles structure of abdomen, thorax & pharynx are involved in process of emesis, during retching inspiratory, thoracic, diaphragmatic & abdominal wall muscles contract simultaneously with closed glottis. The resulting high positive intra abdominal pressure provides a driving force for reflux of gastric contents into the esophagus with associated herniation of the abdominal esophagus & gastric cardia into the thorax. However, the simultaneously high negative intra –thoracic pressure prevent expulsion of luminal contents into the mouth even through the upper esophageal sphincter may relax during retching

In contrast to retching, both the intra abdominal & intra-thoracic pressure is positive, in part due to a lack of diaphragmatic contraction, which permits transmission of the high positive abdominal pressure into the thorax.

Additional synchronous contraction of both the inspiratory & expiratory muscles contributes to this reversal of intra thoracic pressure during expulsion as with retching, the abdominal esophagus & the gastric cardia herniated across the diaphragm with transfer of gastric contents into the esophagus, with vomiting. However, the high positive intra-thoracic pressure provides a force for expulsion into mouth. Oral propulsion of the vomitus is further facilitated by movement of hyoid bone & larynx upward & forward.

- ✓ In Vamana there is anti-peristaltic movement begin to occur. The anti-peristaltic may begin as for down in the intestinal tract as the ileum and the antiperistaltic wave travels backward up to the intestine.
- ✓ During the vomiting strong intrinsic contractions occur in both the duodenum & lower esophageal sphincter. Thus following the vomitus to begin moving into the esophagus, from here a specific vomiting act involving the abdominal muscle expel the vomitus to exterior.
- ✓ In this vomitus, toxic/waste materials which are responsible for the alleviation of pathological process of various diseases through Vamana after snehana & swedana are excreted out.⁹

Other Pharmacological Activities of *Randia dumetorum*

Antibacterial activity: “The preliminary antibacterial activity of Methanolic extract of *Randia dumetorum*, Was done on some standard and wild pathogenic strains. The inhibition of the bacterial growth was more pronounced on E.coli as compared to the other tested organisms”. This shows the antibacterial action of *Randia dumetorum* Lam.¹³

Anti-Allergic activity: In Ayurveda, *Randia dumetorum* Lam. is used in treatment of Asthma (tamakshwasa), Rhinitis, cold, pain etc. “Extract and its fraction on milk induced leucocytosis and eosinophilia in mice, passive paw anaphylaxis and mast cell degranulation in rat models”.

Anti-inflammatory activity: “The crude methanol extract of fruit of *Randia dumetorum* effectively reduced the carrageenin induced oedema in hind paw of the rats, significant reduction in granular tissue formation was recorded. This activity seems to be significant at various acute phases of inflammation and on

formation of granular tissue". This proves the action of madanaphala on inflammation.¹⁴

Analgesic activity: Analgesic activity was tested in mice weighing between 20- 250 with six numbers of animals in each group by Acetic acid induced writhing response and Hot-plate response in mice. 500 mg/kg methanolic extract of fruit *Randia dumetorum* give analgesic activity in both models. This proves its shoolanashaka (pain killer) action.

Immunomodulatory activity :“*Randia dumetorum* has immunostimulant activity and chloroform fraction which strongly affected immune system seems to be bioactive fraction of this plant”.

Other: Cardiac Stimulant & Depressant, Hypotensive & CNS Depressant, Anthelmintic, Antidiarrhoeal, Antipyretic, Anti-ovulatory, Anticancer, Insecticidal, Antifungal, Antiviral, Antipyretic.¹⁵

CONCLUSION

The plant has been attributed with a number of activities in the classics. The multi-dimensional activities of *Randia dumetorum* have been revalidated in recent times on several experimental models and even in well designed clinical trials. Various parts of this medicinal thorny shrub reveals Antibacterial, Anti-Allergic, Antiinflammatory, Analgesic, Immunomodulatory, therapeutic emetic and also used to check wound healing etc Shows us multiple precision of the plant. It is known as good source of saponins, glycosides, d-mannitol, Scopoletin present in *Randia dumetorum* lam., might be either medicinally important or nutritionally sound. It possesses therapeutic potential in diseases like kushtha (skin diseases), jwara (febrile conditions), shotha (inflammation), vidradhi (abscess), Pratishtyaya (common cold), Gulma (abdominal tumours), Vrana (wound), Adhoga Raktapitta (Blood disorders) etc. Though there are certain properties which are still to be evaluated out.

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