



Review Article

A COMPREHENSIVE REVIEW ON THE NUTRITIONAL AND MEDICINAL SIGNIFICANCE OF
KUSHMANDA OR ASH GOURD AS PER AYURVEDA

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ABSTRACT

Ayurveda stresses on the use of herbs as both food and medicine based on their nutritional and medicinal values respectively. While the *Rasa* (taste) of the medicinal plant determines its dietary value, the *Veerya* (potency) bestows its therapeutic actions. *Kushmanda* or Ash gourd (*Benincasa hispidia* (Thunb.) Cogn.) is such a fruit appraised in Ayurveda for both its medicinal and nutritive values. It is of utmost importance to showcase the properties and actions of this indigenous herb as it is easily available, safe and affordable to the common people. *Kushmanda* is used in managing ulcers, epilepsy, urinary disorders and in treating poisoning. The seeds and fruit juice of *Kushmanda* is claimed to be nootropic (*Medhya*) and is recommended in Ayurveda for enhancing memory and other cognitive functions. Experimental studies prove that *Kushmanda* possesses multitude of actions including anti-diabetic, anti-inflammatory, antioxidant, hypolipidemics, hypoglycaemic etc. A thorough review shows that the presence of phenols, triterpenes, sterols, and glycosides of ash gourd makes it useful for treatment of ulcers, inflammation, epilepsy and other nervous disorders. Further elaborate clinical studies need to be undertaken to explore and strengthen the claims on efficacy of *Benincasa hispidia* (Thunb.) Cogn. in nervous disorders, ulcers and diabetes.

INTRODUCTION

The fruit of *Benincasa hispidia* (Thunb.) Cogn. of Cucurbitaceae family commonly known as Ash gourd and "*Kushmanda*" in Ayurveda is relevant as nutritive source as well as a medicine. Its use in psycho-somatic disorders, ulcer, urinary disorders and digestive disorders has been well explored in Ayurveda. Ash gourd is cultivated throughout India and has high market demand owing to its nutritional value and health benefits. It is an important warm-season cucurbit vegetable, grown for its succulent hairy fruits, used as a vegetable, in confectionery and Ayurvedic medicinal preparations. The current generation relates to Ash gourd as the miracle fruit that helps detoxify the body and helps weight loss. The social media has been popularizing the use of the fruit juice as part of dieting techniques.

The sweet delicacy that is known to the world as "Agra petha", is also prepared from ash gourd. Commonly known as winter melon, wax gourd, white pumpkin, and Chinese watermelon, *Kushmanda* is native to parts of Southern Asia.

Ayurveda classical textbooks and *Nighantus* describe in length about the properties, actions, therapeutic uses and synonyms of the herb. Brhat Trayi have described *Kushmanda* under "*Saka varga*"^[1]. Acharya Vagbhata accepts *Kushmanda* as the best among *Valli phala* (creepers)^[2]. Classical textbooks also advocate the use *Kushmanda* for various ailments including *Mutrakriccha*, *Apasmara*, *Unmada*, *Visha*, *Amlapitta* etc^[3] which will be dealt in detail further in this article. *Keraleeya visha granthas* like *Prayogasamucchaya* and *Visha Vaidya jyosnika* have mentioned its utilities in poisoning in both *Sthavara* (vegetable poisons) and *Jangama vishas* (animal poisons)^[4]. *Bhava Misra* has included *Kushmanda* as a potent *Medhya Rasayana*^[5]. *Kushmanda rasayana*, *Kushmanda Ghrita*, *Kusmanda avaleha*, *Dhatryyadi ghrita* and *Vastiamayantaka ghrita* are some of the important formulations of the drug as per Ayurveda.

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Plant Description^[6]

Benincasa hispida (Thunb.) Cogn. is a large trailing gourd climbing by means of tendrils; stem is stout, angular and hispid. The leaves have a reniform-orbicular shape with 5-7 lobes and are 4-6 inches length. The hairy lobes are ovate-triangular in shape. Flowers are yellow, unisexual, male peduncle 7.5-10cm long, female peduncle shorter. The fruits are broadly cylindrical, 30-45cm long, hairy throughout, ultimately covered with a waxy bloom. This waxy bloom disappeared when the fruit is fully mature.

Flowering & Fruiting: June-October. Harvesting of the mature fruits starts in 90-100 days after sowing and may continue up to 150 days after sowing.

Parts used^[1]: Fruit, Seeds, seed oil, leaves.

Synonyms^[1]: *Kushmanda*, *Pushpaphala*, *Pitaphushpa*, *Karkaru*, *Aaru*

Vernacular Names^[7]

Hindi - Kumhra, Pani kumhra, Petha

Kannada - Bood kumbala kayi

Malayalam - Elavan, Kumbalam, Neyakumbalam

Marathi - Kohla

Punjab - Petha

Sanskrit - *Kushmanda*

Tamil - Kalyana poosni, Pushanikai

Telugu - Budida-gummadi

Properties and Action

Charakacharya describes *Pakva Kushmanda* (mature fruit) to be having *Madhura rasa*, alkaline nature and light to digest (*Laghu*), having diuretic and laxative action and *Tridosahara* property.

Susruta acharya details the properties of *Balam* (immature fruit) and *Pakwa kushmanda* (mature fruit) and also delineates the properties of *Kusmanda beeja tailam*^[8]. Susruta Samhita describes the immature fruit to be alleviating *Pitta dosa* and possessing nootropic and *Kapha* increasing properties. The mature fruits are said to increase digestive fire (*Deepanam*), diuretic (*Vasti shodanam*), appetiser (*Hrdyam*), alleviating *Tridosha* and useful in psychiatric disorders (*Chetoroga haram*)^[8]. It is also described to be a wholesome food or *Pathya ahara* which is of utmost benefit to health. According to Acharya Susrutha the seed oil of *Kushmanda* is sweet in taste (*Madhura rasa*) and after taste (*Madhura vipaka*) and has a cold potency (*Seetha veerya*). The seed oil pacifies *Vata* and *Pitta dosas* and acts as laxative-diuretic (*Srit vit-mutra*), it may cause blockage of *Srotas* (*Abhishyandi*), and diminishment of digestive fire (*Agni Saada*).

Detailed accounts of the properties and action of *Kushmanda* are available in the *Nighantus* of Ayurveda. While generally describing the fruit to be *Guru*, *Brimhana* (nourishing), *Vrisya* (aphrodisiac), and alleviating *Pitta-rakta*; *Bhava prakasa Nighantu* details

the difference in action of *Kushmanda* based on stage of ripening as follows^[5]:

Unripe fruit or *Bala Kushmanda*: Alleviates *Pitta* and is cold in potency

Half ripened fruit (*Madhyama*): Aggravates *Kapham*

Mature fruit (*Vridham*): It is not too cold in potency and has *Swadu-kshara rasa* and *Laghu* property. It is also said to be *Deepana* (digestive), *Vasti suddhikara* (diuretic), *Chetorogaharam* (useful in psychiatric disorders) and *Tridosaharam*.

The same properties and actions have been accepted in *Dhanwantari Nighantu*, *Raja Nighantu* and *Priya Nighantu*.

Prayoga**Action of *Kushmanda* as *Medhya Rasayana***

The fruit of *Benincasa hispida* is acclaimed to be *Medya* or possessing nootropic action. *Kushmanda* is the main ingredient of "*Kusmanda lehyam*" and *Kushmanda ghrita* popular Ayurvedic medicines, widely used, in psychiatric and nervous disorders. Numerous studies have been conducted to explore the action of *Kushmanda Grhita* and *Kushmanda lehya* in psychiatric and nervous disorders. *Kushmanda ghrita*-a medicated ghee processed using paste of root of *Yastimadhu* (*Glycyrrhiza glabra*) in fruit juice of *Kushmanda* is indicated in epilepsy (*Apasmara*) and is described to promote clarity in voice (*Swara*), intellect (*Dhee*), and speech (*Vaak*). (A.H.Ut.8/28) Studies prove that *Kusmanda Ghrita* has anti depressant action and has shown to improve the depressive illness in patients^[9]. In another study *Kushmandadi Ghrita* showed significant results in the management *Chittodvega* (anxiety disorders)^[10]. The action has been attributed to the *Medhya prabhava* as described in Ayurveda. On the same note, *Bhaisajya ratnavalai* advocates the administration of seed paste of ash gourd along with honey for 3 consecutive days for the management of *Unmada*. (B.R *Unmada Chikitsa* 24/8). There are studies that prove that fruit of *Benincasa hispida* has a tissue protective preventive effect as proven on colchicine induced Alzheimer's disease model via direct and indirect antioxidant activity^[11].

Kushmanda* as *Balya* and *Dhatu pushtikara

Ayurveda practitioners recommend including *Kushmanda* fruit regularly in food for promoting weight gain, promoting strength and for its nourishing property. In traditional practice the mature fruit is administered among malnourished children to help gain weight and establish health. The fruit is cut into pieces and boiled, after draining off the water, the pulp is mixed with ghee and jaggery and administered. A Clinical trial successfully proves the efficacy of *Kushmanda* (*Benincasa hispida*) for weight gain in malnourished children^[12].

Action on *Mutravaha Srotas*

Kushmanda (*Benincasa hispida* [Thunb.] Cong.) is said to be *Basti shuddikara* and the *Srishta mutrakaraka*^[1] and Mannitol content of *Kushmanda* has been attributed to these functions. Thereby it acts by causing increased urinary output and excretion hence being utilized in the management of *Mutrakrichra*, *Mutraghata* etc. According to *Bhaisajya ratnavali*, the fruit juice of Ash gourd (*Kushmanda Swarasa*) given along with *Yava kshara* and *Sarkara* is useful in dealing *Mutrakriccha* (urine retention) and *Asmari* (urinary calculi). (B.R *Mutrakrichha*, 34/10). Experimental study of diuretic effect of seed extracts of *Benincasa hispida* by Lipschitz method exhibited significant diuretic activity^[13]. The petroleum ether, ethanolic and aqueous seed extract proves to be antilithiatic and nephroprotective.^[13]

Anti-ulcer activity of *Kushmanda*

Study shows that the extract of *Kushmanda* may be a natural drug with antiulcer activity. *Kushmanda Avaleha* provides strength and reduces aggravated *Pitta* symptoms including burning sensation, acid reflux and hyperacidity. Sharangdhar Samhita details the preparation of *Kushmanda avaleha* as follows: The outer skin of *Kushmanda* fruit is peeled and the fruit is cut into small pieces and cooked by boiling with 4 parts water. Then well-boiled pulp is strained through a clean dry cloth and pulp paste is separated. The pulp is fried with ghee till it becomes brown in color. It is then added to mixture of sugar and separated liquid. The mild heating is continued till desired appearance of *Paka siddhi lakshana*. (Appearance of thread like consistency when the *Avaleha* is kept in between thumb and index finger). Lastly powder of dry ginger, coriander seeds, cumin seeds, Malabar leaf, cardamom, pepper and cinnamon is mixed in lukewarm stage. Once *Avaleha* achieves room temperature, honey was added and then mixed uniformly. The administration of the medicine has been found to soothe the stomach linings, modulate the gastric secretion, and gives relief from peptic ulcer symptoms.

An experimental study has evaluated anti-ulcerogenic activity of different extracts of *Benincasa hispida* (fresh juice, supernatant and residue fraction of centrifuged juice, alcoholic and petroleum ether extract) in various experimental models including aspirin plus restraint, swimming stress, indomethacin plus histamine and serotonin-induced ulcers in rats and mice^[14]. The oral feeding of different doses of the extract significantly reduced the ulcer index produced by various ulcerogens. The anti-ulcerogenic effect was dose-dependent in stress induced model of ulcer and not in other models. The study concludes that *B. hispida* probably has a CNS component in prevention of stress induced ulceration^[14].

Action Against Respiratory Illness

In the management of *Hikka- Swasa*, *Kushmanda* is indicated with lukewarm water (*Koshna Jala*). (B.R. *Hikka- Swasa Chikitsa* 16/19). Two triterpenes, namely alonusenol and multiflorenol, extracted from the methanolic extract of the *Benincasa hispida* fruit displayed a “mast cell stabilizing effect” and were found to have inhibitory effect on the histamine release induced by the antigen antibody reaction^[15]. The methanolic extract of *Benincasa hispida* showed protective action against histamine-induced bronchospasm probably through an antihistamine activity^[16]. Similarly *Kushmandaka Rasayana* is a medicine that is commonly used in respiratory diseases owing to its *Rasayana* effect. *Kushmandaka Rasayana* is mentioned to be indicated in *Kasa* (cough), *Hidhma* (hiccough), *Raktapitta* (bleeding disorders), *Kshata* (injury to *Pranavaha Srotas*), *Urakshata* (injury to chest), and *Jwara* (fever). A study results point out that *Kushmandaka Rasayana* is effective in the management of chronic bronchitis when given in a dose of 10 g twice daily with water as *Anupana* for a period of 12 weeks^[17]. The research signifies that the formulation is safe for consumption as safety parameters including LFT and RFT remained within normal limits during the entire period and no Adverse Drug reactions were observed in any of the patients during the trial. The effectiveness of the medicine on the symptoms of the disease was persistent on the follow-up without intervention at the end of 14 weeks. Therefore, the study concludes that *Kushmandaka Rasayana* can be taken for longer duration for the purpose of rejuvenation of the respiratory tract and for the prevention of progression of the disease^[17].

Other medicinal uses of *Kushmanda*

- Acharya Sarangdhara mentions the use of *Kushmanda Swarasa* with *Laksha Kalka* in *Raktakshaya*, *Uroghata* and *Kshaya Roga* in *Sarangdhara Samhita Madhyama khanda*. (Sa.M.Kh.5/21).
- *Rasa ratna sammuchhya* indicates the usage of fruit juice of ash gourd (*Kushmanda Swarasa*) along with *Vidanga* and *Sarkara* in *Prameha*. (R.R.S. 17/140)
- *Raktasrava* in *Mandali visha-* kalka (paste) of ash gourd seeds along with garlic (*Lashuna*) is administered along with *Tandulodaka*. (*Kriya Koumudi*)
- Urine retention in *Mandali visha-* the *Kasaya* made of stem of *Kushmanda* along with *Ela churna* or *Trikatu churna* respectively is mentioned in *Prayoga sammuchaya* and *Kriya koumudi* for managing urine retention in *Mandali visha*.
- Ayurveda classic *Bhaisajya ratnavali*, also describes the use of ash gourd juice (*Kushmanda Swarasa*)

along with jaggery (*Guda*) in the management of *Madatyaya*. (B.R. *Madatyaya Chikitsa*, 22/11)

Other Research Updates

Antidiabetic activity^[18]: Majumdar et al. (2010) Clinical evaluation of Ash gourd fruit juice in Type 2 Diabetes patients for 21 consecutive days showed that the blood glucose levels reduced by approximately 42%.

Hypoglycaemic and hypolipidemic^[18]: Use of ash gourd extract produced a 60% reduction in blood glucose, plasma TGs and free fatty acids in rats (Lim,2007). The alcoholic extract of ash gourd at 200 mg/kg–1body weight for 45 days reduced the blood glucose levels from 195 to 118 mg/dL–1) in alloxan-induced diabetic rats than in normal rats (Battuet al., 2007).

Antioxidant property^[18]: In vitro and in vivo studies indicated ash gourd fruit juice and extract have antioxidant activity, especially in the human liver and brain (Huang et al., 2004; Rao et al., 2007). Studies also prove that the fruit of Ash gourd have a tendency to decrease renal injury after ischemia or reperfusion injury of the kidney in albino rat models (Bhalodia et al.,2009).

Anti-inflammatory activity^[18]: Free radical scavenging activity of ash gourd seed might have been responsible for reduction of inflammation in carrageenan- induced paw oedema in rats (Grover and Rathi, 1994).

Study proves that petroleum ether extract and *Benincasa hispida* seed oil inhibited testosterone-induced hyperplasia of the prostate in experimental rats model^[19]. The anti-angiogenic property of the seed extract of *Benincasa hispida* is proven as it inhibits the proliferation of endothelial cells induced by bFGF^[20].

Nutritive Value of Ash Gourd^[18,21]

Ash gourd encompasses of high-water content approximately 96% and is a rich source of dietary fibres. Dietary fibres from ash gourd have excellent prebiotic activity (Sreenivas and Lele, 2013). Though Ash gourd consumption contributes to negligible number of calories, carbohydrates, proteins and fats, it's a good source of Vitamin C, flavonoids and carotenes. The efficacy of ash gourd fruit in preventing cell damage and preventing type 2 Diabetes and heart disease may be attributed to the antioxidant property of its constituents. The functionally important bioactive and therapeutic compounds phenolics, sterols, and glycosides of ash gourd can be used for treatment of epilepsy, ulcers and other nervous disorders. The antacid action of ash gourd helps maintain body pH and counteracts acidity caused by some foods. Also, the unique dietary constituents promise to aid digestive function and helps attain weight loss. The fruit is also source of Magnesium,

Potassium, calcium, iron and phosphorous. Cucurbitin B found in ash gourd has cytotoxic and anti-inflammatory activity. The triterpenes- alnusenol and multiflorenol from ash gourd are active histamine release inhibitors (Grubben and Denton,2004).

CONCLUSION

Ayurveda promotes using *Kushmanda* by calling it best among "*Valli phala*" or creepers. It is said to be brain tonic, digestant, diuretic, rejuvenative etc in classical textbooks. While going through the present research studies of the herb, it can be said without doubt that the fruit of *Benincasa hispida* can be utilized for its nutritive value and medicinally for preventing chronic disorders like Type 2 Diabetes and therapeutically for managing urinary disorders, psychosomatic disorders, ulcer and reproductive disorders. The anti-inflammatory, anti-oxidant, diuretic, anti-lithiathic, anti-ulcer, hypoglycemic and hypolipidemic activities of the fruit can be attributed to its chemical constituents triterpenes, sterols, glycosides, flavonoids and minerals.

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