

Broad Spectrum Activities of Jaiphal (Nutmeg) in Unani system of medicine: A Review

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Abstract:

Jaiphal (*Myristica fragrans* Houtt) traditionally known as Jatiphal and Javitri in India and Asian countries, belongs to the family Myristicaceae is known for its flavor and therapeutic and pharmacological action since 18th century in alternative medicinal systems. It is a good body detoxifier, stimulates the brain. Ethanol extract shows antifungal, anti-pimple or anti-acne spasmolytic, carminative, hepatoprotective, antiviral, anti-carcinogenic or anti-neoplastic, antioxidant, anti-microbial properties. Nutritionally, nutmeg is rich in energy, carbohydrates, proteins and dietary fiber. Seed is a rich source of vitamins. It also contains electrolytes minerals and phytonutrients including carotene-B and crypo-xanthin. *Myristica fragrans* has a lot of industrial applications in liqueurs, soap production and cosmetics. This review article elucidates the information regarding the phyto-chemistry and pharmacological activity of the plant which provides the basis for further research. Mostly nutmeg contains terpenes and phenylpropenes. Chemical composition of these constituents varies due to different cultivation conditions. Nutmeg is considered as essential ingredient of numerous industrial applications ranging from food to cosmetics. Its pharmaceutical products are also important due to its antioxidant and antimicrobial properties. More uses and applications of nutmeg byproducts are continuously added. Nutmeg is used as a constituent in preparations of medicines such as for dysentery, flatulence, stomachache, nausea, vomiting, rheumatism, sciatica, malaria and early stages of leprosy. More research on maximizing yield, optimum preservation and oil extraction methods are needed.

Keywords: Unani system of medicine, *Myristica*, Myristicin, Detoxifier, Jatiphala, Nutmeg.

1. INTRODUCTION

The Greco Arabian system of medicine originated from Greece and the word Unani derives from 'Unan' which is a Greek Urdu transformation. It is best to refer to it as Greco-Arabic medicine as it is the outcome of unique Greek medicine produced during the Arab development. This system is constructed on the Hippocratic theory (Boqrat 460-377 BC) of humours viz. blood, phlegm, yellow bile, and black bile, and the four qualities of states of the human body like hot, cold, moist and dry. The Arabian physician put the Greek ideas as seven principles (Umoor-e-Tabbiya), including organs (Aaza), spirit (Arwah), faculties (Qowa) element (Arkan), temperament (Mizaj), humor (Akhlat), and functions (Afaal). In this system, these principles are believed to be accountable for the composition of the body and its health, as well as for diseased conditions. Herbal and natural products have been used for varying purposes for centuries. In recent decades, plants yielding essential oils and other extracts as sources of natural products have gained attention and scientific interest. *Myristica fragrans* Houtt. belongs to the family Myristicaceae and commonly known as Jaiphal and Javitri in India. It is the source of two spices, nutmeg, and mace. Nutmeg is the seed kernel inside the fruit and mace is the net-like covering (aril) over the kernel of fleshy red in color. It is an evergreen aromatic tree of a dioecious or monoecious type typically growing to 5 to 13 meters high, rarely 20 meters. These agents have been used since a pretty long time and there is enough evidence showing their use by the ancient Greek and Arab physicians e.g. Hippocrates (460 B.C), Dioscorides (70 A.D), Rhazes ((926 A.D, Muhammad ibn Zakariya al-Razi), Avicenna (Abu Ali al Husyan ibn Addillah ibn al Hasan Ibn Ali bin sina), Al-Zahrawi (Abu al-Qasim Khalaf ibn al-Abbas al-Zahrawi), and Ibn Nafis((1038 A.D) Ala-al-Din abu al-Hasan Ali ibn Abi-Hazm al-Qarshi al-Dimashqi,) etc.

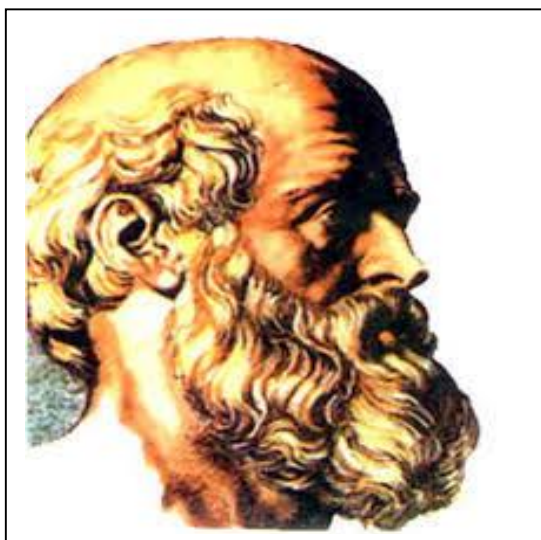


Fig. 1 Hippocrates (460-377 BC)

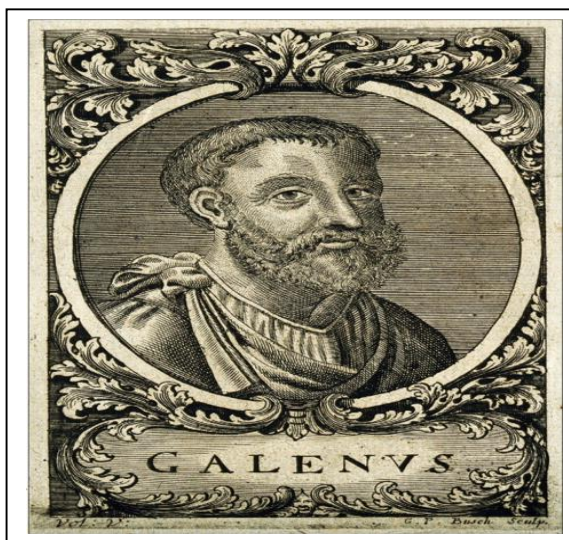


Fig. 2 Claudius Galenus (129 -210 AD)

The term *Myristica fragrans* was derived from the Latin word "Nux Muscat", used for musky or scented nut. The folklore claims that the musky aroma causes the paradise birds to land on the ground. This outlandish phenomenon is probably due to observing its narcotic property. But the pleasing aroma and taste make this spice very famous to be used in sweets, desserts, or any suitable savoury dishes. Scientists from various disciplines have studied the chemical constituents of *M fragrans* for

hypolipidemic and hypocholesterolemic effects, antimicrobials, antidepressants, aphrodisiacs, memory enhancing, antioxidants and hepatoprotective property. For centuries Nutmeg has been used all over the world as a valuable spice. Nutmeg has also been used in traditional remedies for stomach and kidney disorders along with its use in flavor enhancer of foods and beverages. The effects of nutmeg on the central nervous system and its antimicrobial and antioxidant effect were also reported in literature.

2. Botanical Description of Jaiphal.

Nutmeg originated in Indonesia, and was discovered by Portuguese (1512). The importance of the nutmeg seed was propagated by the Dutch. The name Nutmeg comes from Latin word *nux muscatus*, meaning “musky nut”. Nutmeg (*Myristica fragrans*) is an evergreen tree belonging to family *Myristicaceae*, a family of flowering plants indigenous to Asia, Africa, Pacific islands, and America and has been known by most taxonomists. It is occasionally called the nutmeg family, due to its well-known member, *Myristica fragrans*, the source of the spices nutmeg and



Fig. 3 Jaiphal Unripe Fruit



Fig. 4 Jaiphal Unripe Fruit Crude

mace. The genus *Myristica* consists of about 150 species spread in the western Pacific and Asia. Nutmeg cross pollinate because of inadequate flowers of both sexes on one tree. *Myristica fragrans* is known by different names in the world. In India specifically in Hindi, it called as Jaiphal, and in Indonesia, is called as Pala. It is known as Josat at-Tib in Arabic. In Urdu, it is called as jaifal. In French, it is called as muscade, and in Greek is known as moschokarido. In China, it is called as roudoukou.

The main profitable species of genus *Myristica* is *Myristica fragrans*. Besides *M. fragrans*, numerous other species of *Myristica* are grown all over the tropical regions including *M. malabarica* (Indian), *M. argentea*, and *M. fatua*. Although their appearance is similar to *M. fragrans*, however, they have less intense taste, aroma and fewer prices.

There are about 300 species belongs to the genus *Myristica*. Among these two species have been produced in India; *Myristica malabarica* and *Myristica canarica*. The most precious variety i.e., *Myristica fragrans* belongs to Indonesia. The plant is mainly of dioecious or rarely monoecious evergreen type, height is usually 10-20 m with dispersing branches carrying oblong-ovate shaped leaves; 5-15 cm long, 2-7 cm wide and acute at apex and base, dark green colored of feathery and lustrous in touch. The

inflorescence of *M. fragrans* is an axillary raceme. It is a simple cyme in the female plant but branched in the male plant. Flowers are fragrant, creamy yellow-colored, and of drooping structure. Flowering was observed throughout the year in male trees whereas for seven months continuously in female trees. Highest flowering period in both the cases was of July followed by October. The trees, male or female, do not give flowers until they are up to 9 years old; they continue to do so for another 75 years once they start flowering. The lemon-like yellowish fruit contains the seed wrapped in a reddish spongy net-like tissue known as the aril or arillus. In seed, the testa, tegmen, and aril have a massive vascular supply. The endosperm is starchy and sticky. The aril (mace) is more horny, fragile, and yellowish-brown when dried and bright scarlet when fresh.

3. Cultivation of Jaiphal.

It is cultivated in all parts of viz. Kerala, Karnataka, Tamil Nadu, Assam, Goa, Andaman, and the Nicobar Islands. India producing approximately 11,424 tonnes of spice in an area of 15, 131 ha. And imports 1325 tons of nutmeg, and 265 tons of mace. *Myristica fragrans* require a moist, warm, and rainy tropical climate with an average temperature of 25-30 ° C and with no real dry periods. The types of soil on which nutmeg is grown vary greatly. They vary from sands to loam soils. The best soils tend to be from volcanic origin. A nutmeg tree takes about 20 years to achieve its full potential but the first harvest can take place 7 to 9 years after planting. The trees bear two to three crops per year.

4. Description in Unani Literatures

It is made up of peel, flesh, seed, and mace. The kernel within the seed is called Jaiphal (Nutmeg) and mace is the net like skinny covering known as aril over a kernel of fleshy red color. This covering is removed from it after drying and commonly known as Javitri, or Bisbasa. Javitri's shelf life is 3 years, and the taste is astringent type. It is of green color when fresh but maybe reddish or yellow after drying.

5. Language names of Jaiphal.

Urdu: Javit, Hindi: Japatri, English: Arillus of the nut- meg, Arabic: Bisbaasa. Persian: Jouzbawwa, Bengali: Japatri, jotri, Gujarati: Jayapatri, Malayalam: Jadipalliol, Kannada: Jaapatri, Tamil: Japatri, Telgu: Jadipattiri.

6. Temperament of Jaiphal.

Mizaj (temperament) is one of the fundamental components of the Unani system of medicine. The Mizaj of drugs have been expressed in terms of four kaifiyat (qualities) viz. har (hot), barid (cold), yabis (dry) and ratab (moist).

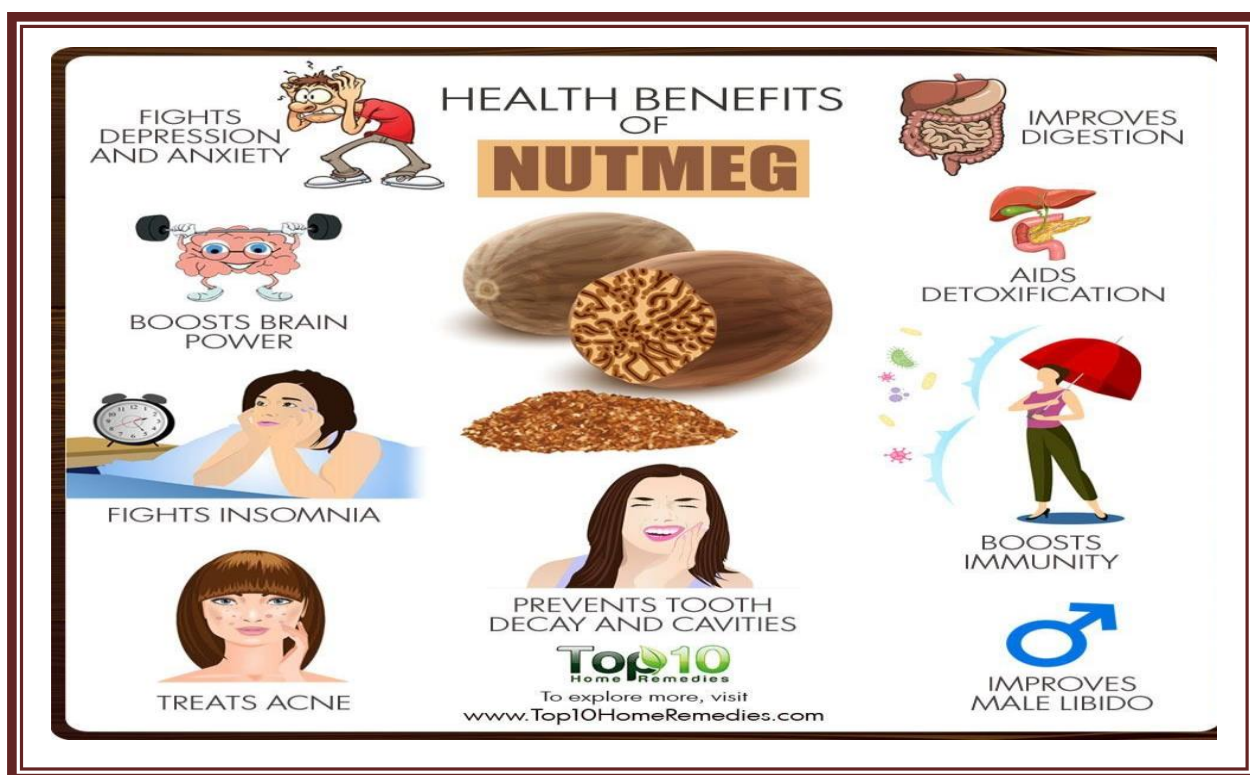
7. Pharmacological Action Jaiphal in Unani system of medicine.

Muqawwie meda, Muqawwie bah, Muhallile waram, Muqawwie jigar, Muteebe dahan, Muqawwie qalb wa dimagh, Mufarraah, Dafa'e ta'ffun, Muqaawwie aasab, Daafae sual,

8. Therapeutic Uses of Jaiphal in Unani system of medicine.

A. Anti-carcinogenic and Hepato protective activity

Nutmeg shows resistance against carcinogenic elements. Hussain and Rao, (1991) reported that, in Swiss albino mice uterine cervix, 3-methylcholanthrene -induced carcinogenesis could be prohibited by mace oral administration. Nutmeg also shows hepato-protective activity. This property observed in rats with damaged liver, by giving nutmeg in their diets. Kyriakis *et al* (1994) studied on the activities of hepatic carcinogen-metabolizing enzymes, like aryl hydrocarbon hydroxylase, cytochrome P-450, and acid soluble sulphhydryl and glutathione-S-transferase level in albino mice and checked the influence of essential oil from nutmeg. They found that the essential oil hinders the activities of the host enzymes related with detoxication and activation of xenobiotic components, as well as mutagens and chemical



carcinogens. Extracts of nutmeg suppressed the growth of human lymphoid leukaemic cells, Molt 4 B (Moteiki *et al.* 2002). Myristicin, present in the volatile oil of *M. fragrans* is a potential cancer chemo preventive agent (Zheng *et al.* 1992). The essential oil is reported to modulate the formation of DNA adducts by aflatoxin *in vitro* (Hashim *et al.* 1994). The dihydroguaiaretic acid from *M. fragrans* mace suppressed leukaemic cells, colon cancer and lung cancer cells *in vitro* (Park *et al.* 1998). The mace of *M. fragrans* protected from bone marrow genotoxicity in male Swiss albino mice (Kumari 1992). It also significantly protected from methylcholanthrene-induced carcinogenesis in uterine cervix of mice (Hussain & Rao 1991) and had chemo preventive effects on dimethylbenz anthracene (DMBA)-induced papillomagenesis in the skin of mouse (Jannu *et al.* 1991).

B. Antimicrobial

Extracts of nutmeg showed antimicrobial activity against gram positive (*Bacillus subtilis* and *S. aureus*) Orabi et al., 1991; De et al., 1999; Dorman & Deans, 2000, gram negative (*Pseudomonas putida* and *P. aeruginosa*) bacteria and pathogenic fungi (*Aspergillus fumigatus*, *A. niger* and *A. flavus*). Ethanol extract of fresh, seed and mace of *Myristica fragrans* is a classic remedy for the periodontal diseases that occurs by accumulation of *Actinomyces viscosus*, *Porphyromonas gingivalis*, *Streptococcus mutans* and *Streptococcus sanguis* in the form of an adherent plaque (Zaleha Shafiei et.al 2012) these properties are attributed by myristin and triglyceride Trimyristin

C. Antioxidant

Anti-oxidant properties has been determined by the ferric reducing antioxidant power and trolox equivalent antioxidant capacity (Tan KP et al 2013). Anti-oxidant property of nutmeg is contributed



Fig. 5 Jaiphal Health Benefits

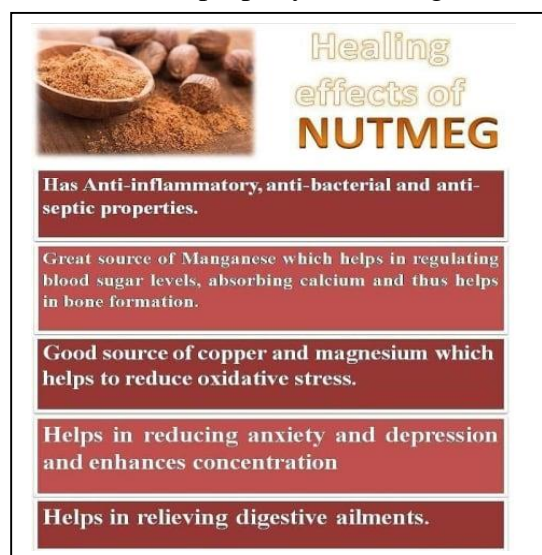


Fig. 6 Jaiphal Healing effect

by various phytochemicals, mainly vitamins, carotenoids, terpenoids, alkaloids, flavonoids, lignans, simple phenols and phenolic acids (Tan KP et al 2013), caffeic acid and catechin (Shan B2005)(Gowri Pendyalan et al.,2008)

D. Aphrodisiac

Since 18th century, the spice is being used to treat male sexual dysfunctions it is clinically proved by Orabi et al., 2000 (Tajuddin et al. 2005). Jaiphal used to increase the sexual wellbeing in male and female in ancient Unani system of medicine. It also used to control the impotency in male. Generally Jaiphal used orally in food increases the aphrodisiac effect.

E. Anti-inflammatory

Several authors reported anti-inflammatory activity of nutmeg as well as its oil. Similar to non-steroidal anti-inflammatory drugs, pharmacological activities also exhibited by nutmeg oil. But anti-inflammatory activity is shown only by petroleum ether extracts. The total extract of nutmeg activated an enzyme that is AMP-activated protein kinase enzyme (potential therapeutic target) for curing the metabolic syndrome including type-2 diabetes and obesity. Seven compounds like tetrahydrofuroguaiacin B, 2, 5-bis-aryl-3, 4-dimethyltetrahydrofuranlignans, fragransin C1, saucernetindiol, nectandrin B, verrucosin, galbacin and nectandrin A were isolated from this extract as active constituents. Some of the isolated compounds produced strong AMPK stimulation in differentiated C2C12 cells, at 5 μ M concentration. Nutmeg and its active components not only used to treat type-2 diabetes and obesity but also for the development of agents for other metabolic disorders.

Triglyceride Trimyristin of nutmeg oil shows anti-inflammatory properties and is used as a local anesthetic to reduce muscular pain and rheumatic pain of joints (Pamphona-Roger, 1999). It reduces joint swelling and treats rheumatic fever (Duke and Edward, 1985; Ernest, 2002).

F. Antidiabetic activity

Macelignan present in the seeds enhanced the insulin sensitivity and improved lipid metabolic disorders by activating peroxisome proliferator receptor and attenuating endoplasmic reticulum stress, suggesting that it is an antidiabetic agent for the treatment of type 2 diabetes (Han et al., 2008).

G. Dental Care

Eugenol of nutmeg relieves from toothache (Duke et al., 2002; Kokwaro 2009), prevents bad breath (Barceloux, 2009). This wonder spice prevents dental plaque by inhibiting the growth of bacteria in the mouth. Take a pinch of nutmeg powder and scrub over teeth. Rinse your mouth with water and brush your teeth. In this way, plaque built-up is inhibited, thereby whitening your teeth.

H. Memory enhancing activity

Parle et al. (2004) have investigated the effect of Jaiphal seeds on learning capabilities and memory level in mice. Administration of the n-hexane extract of *M. fragrans* at the lowest dose of 5 mg/kg body weight for 3 successive days significantly improved the learning and memory level of young and aged mice. The extract said to have reversed scopolamine and diazepam-induced impairment in learning and memory of young mice. The observed memory enhancing effect of *M. fragrans* may be attributed to a variety of properties (individually or in combination) such as antioxidant, anti-inflammatory, or procholinergic activity.

I. Digestive and carminative properties.

The decoction of the nutmeg is used for the treatment of flatulence, nausea and vomiting (Kurian, 2010). External application of the oil relieves the stomach pain. Freshly prepared decoction with honey has been used to relieve of nausea, gastritis and indigestion ailment (Doman et al., 2000). Nutmeg is said to have good carminative properties (Seenivasan et al., 2006).

J. Piles relieving

Piles are cured by applying nutmeg past mixed with Vaseline. In ancient Unani system of medicine Jaiphal used to control the piles in males and control the bleeding during plies.

K. Heart Functioning

Nutmeg proves to be an excellent tonic for the cardiovascular system. It increases the blood circulation and stimulates the heart functions (Balick and Paul, 2000). Small quantity of Nutmeg acts as vasodilator and maintains the blood pressure. A control Blood pressure would also not put excess strain on heart.

L. Antifungal

Essential oils of nut meg posses antifungal properties against Colletotrichum gloeosporoides, Colletotrichum musae, Fusarium oxysporum, Fusarium semitectum, Aspergillus niger and Aspergillus glaucus (V. Pooja et.al., 2012)

M. Spasmolytic

Nutmeg is helpful in clearing up the congestion resulting from cold and thus, is widely used in cough syrups. It's even helpful in aroma therapy (Gill, 1992; Iwu, 1993).

N. Hepatoprotective

Morita et al. (2003) have reported that myristicin from nutmeg possessed most potent hepatoprotective activity to rats with liver damage induced by lipopolysaccharide (LPS) plus D-galactosamine (D-GalN). It was reported that myristicin markedly suppressed LPS/D- GalN-induced enhancement of serum TNF- α concentrations and hepatic DNA fragmentation in mice. These findings suggest that the hepatoprotective activity of myristicin may be, at least in part, due to the inhibition of TNF- α release from macrophages. Sohn et al. (2008) observed that the hepatoprotective effects of macelignan, isolated from *M. fragrans* is related to activation of the mitogen activated protein kinase (MAPK) signaling pathway, especially JNK and c-Jun.

O. Insomnia

Nutmeg or *jaiphal* is an Indian spice sparingly used in many Indian dishes to enhance their taste and flavour. Apart from this, the spice also has certain medicinal properties that are of great value. One way nutmeg can help is by providing relief from your long standing insomnia or sleeplessness. According to studies documented in the *Journal of Ethnopharmacology*, nutmeg helps to induce and also increases the duration of sleep. Nutmeg seeds increase the levels of serotonin that brings the relaxation of the body. (Pandey, 2005)

P. Jaiphal for pimple and skin diseases.

A paste of nutmeg made with water or milk is applied externally to treat pimple and acne scar. Ground nutmeg powder made into a paste with Sandalwood, Kumkumadi taila, olive oil etc can be used for face. One of the most amazing benefits of nutmeg is that it has the ability to even out discolorations and pigmentation on your face. Dark spots, pigmentation and freckles appear due to excessive exposure to the ultra-violet rays of the sun, hormonal changes, progressing age, side-effect of medications or a certain skin condition.



Fig. 7 Skin and Haircare effect of Jaiphal

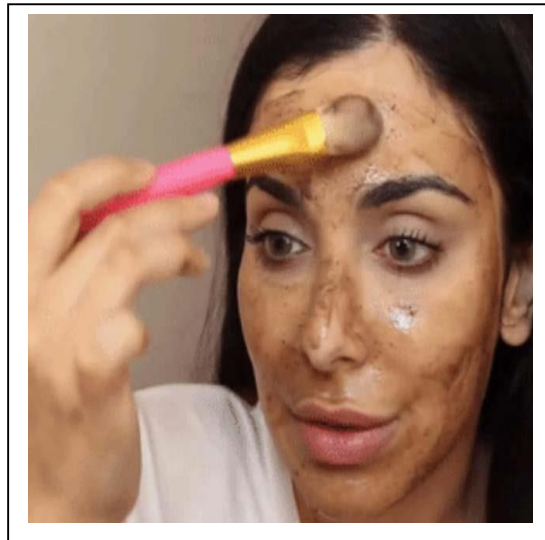


Fig. 8 Jaiphal used in skin cosmetics

Q. Weedicidal & Pesticidal Insecticidal properties

The essential oil, obtained from the leaves is toxic to weeds hence used as weedicides, could also be use in the preparation of chewing gums and other flavouring essences (Pandey, 2005). The aqueous decoction of seed is toxic to cockroaches (Krishnamurthy et al. 2001). Nematicidal activity of *M. Fragens* seed against *Meloidogyne incognita* has been reported (Gotke & Maheswari 1990). Jung et al. (2007) have reported the insecticidal properties of *M. fragrans* seed compounds against adult females of *Blattella germanica* (Dictyoptera: Blattellidae). Myristicin present in the kernel may be employed as an additive to pyrethrum to enhance the toxicity of the latter to houseflies, although myristicin itself is inactive (Anonymous, 1995). The aqueous decoctions of *M. fragrans* have been found to be toxic to cockroaches (Anonymous, 1995). Essential oil of *M. fragrans* has insecticidal activity against larvae of *Lycoriella ingenua* (Park et al., 2008) and *Callosobruchus chinensis* (Chaubey, 2008).

9. *Myristica fragrans* in Ayurvedic system of medicine:

Sanskrit name-Jaitiphala, Malatiphala Rasa : Katu, Tikta

Guna : Laghu, Tiktsna Virya : Usna

Vipaka : Katu

Karma:Dipana, Grahi,Vrsy,Mukhakledanasaka,Mukhadaurgandh yanasaka,Kaphavatapana

Important formulations – Jatiphaladi Curna, Dadimavaleha,Nasika Churna, Mrita Sanjivani Gulika

Therapeutic uses – Atisara , Svasa , Chardi , Kasa , Pinasa , Grahmi ,Mukharoga , Sukrameha. Dose - 0.5 - 1.0 g of the drug in powder form.

10. *Myristica fragrans* in Unani Medicine

Javetri or Bisbasa (Mace) in Unani therapeutic is used for cardiac diseases (Amraz-e-Qalb), indigestion (Sue Hazim) and sexual debility (Zofe Bah). Some formulations with Bisbasa

Jawarish Bisbasa - Buroodat Meda (coldness of gastric), Sue Hazm (Dyspepsia), Riyahi Dard (Gaseous Pain)

11. Myristica fragrans in Chinese Medicine

SuHeXiang Wan (SHXW), a polyherbal (15 herbs) Chinese traditional drug administered to treat central nervous depression, seizures, infantile convulsion, stroke. (Jeon S et al., 2011)

The Dosage of Nutmeg are as follows.

- Nutmeg powder (Jatiphala) is taken in a dose of 500 mg to 1 gram.
- Mace (Javitri) is taken in a dose of 250 mg to 1 gram.
- Children of age group 5-16 years are given half of the adult dose.
- Contraindications, Interactions, Side-effects, and Warnings (Nutmeg)
- It is safe in small recommended dosage.
- It is unsafe to use nutmeg in pregnancy. It must not be used in pregnancy.
- In high doses (one to three whole seeds or 5 to 15 g) it is very toxic, and has narcotic effect. It can cause euphoria, a sensation of floating, flushed skin, vomiting, circulatory collapse, and visual or auditory hallucinations, within one to six hours.
- In excessive dose body shows symptoms of delirium, epileptic convulsions, giddiness, weak pulse, and feeling of heaviness in chest.
- In clinical study the nutmeg oil has shown decreases fertility in rats.
- The seed extract causes anxiety.

12. CONCLUSION

In earlier days, *Myristica fragrans* or nutmeg was used for different medicinal purposes due to its curative, aromatic, and aphrodisiac properties. In general, it will improve the overall health, which is contributed by some important bioactive compounds (macelignan, carvacrol, myristicin, β -caryophyllene, β -pinene, α -pinene, p-cymene and eugenol) present in it. A potential therapeutic mode of applications was shown by the seed/mace extract of nutmegs such as antioxidant, antimicrobial, hepatoprotective, anticancer, antidepressant, anti-inflammatory, and cardioprotective activity. To better understand the broad spectrum of scientific applications of nutmeg, more efforts are required to validate its activity and the mechanism of action. *Myristica fragrans* have been used for the treatment of various ailments in the Unani System of Medicine for a long period. It has been used as a common ingredient in many Unani compound formulations.

REFERENCES

- 1) Anwar, A.K., Haneef, Z., Concept of Body Fat in Greco Arabian (Unani) medicine and its application in lifestyle disorders, 2019; 02: 1–3.
- 2) Anonymous. The Wealth of India. Raw materials. New Delhi: Publications and Information Directorate, CSIR 1995; 6(L-M):474-9.
- 3) Balick MJ, Paul AC. 2000. Plants that heal people: culture of science of ethno botany. Scientific American Library, New York.
- 4) Barceloux DG. 2009. Nutmeg *Myristica fragrans* Houtt. *Research Journal of Spices* 55 6: 373-379.
- 5) *Callosobruchus chinensis* (Coleoptera: Bruchidae). *Oleo Sci* 2008; 57:171-9.
- 6) Chaubey MK. Fumigant toxicity of essential oils from some common spices against pulse beetle,
- 7) Chemistry, antioxidant and antimicrobial potential of nutmeg (*Myristica fragrans* Houtt) Ashish Deep Gupta, Vipin Kumar Bansal, Vikash Babu , Nishi Maithil *Journal of Genetic Engineering and Biotechnology* (2013) 11, 25–31.
- 8) De M, Krishna De A, Banerjee AB. Antimicrobial screening of some Indian spices. *Phytother*
- 9) Demetriades, AK, Wallman PD, McGuinness A, Gavalas MC. Low Cost, High Risk: Accidental Nutmeg Intoxication. *Emergency Medicine Journal* 2005;22: 223–225.
- 10) Piaru, S.P., Mahmud, R., Abdul Majid, A.M.S., Ismail, S., Man, C.N., Chemical composition, antioxidant and cytotoxicity activities of the essential oils of *Myristica fragrans* and *Morinda citrifolia*. *J. Sci. Food Agric*, 2012; 92: 593–597. <https://doi.org/10.1002/jsfa.4613>.
- 11) Jaiswal, Preetee, Kumar, Pradeep, Singh, V.K., Singh, D.K., Jaiswal, P, Kumar, P, Vk, S., Dk, S., Effects, B., Biomed, R. ARBS Annual Review of Biomedical Sciences Biological Effects of *Myristica fragrans*. *ARBS Annu. Rev. Biomed. Sci.*, 2009; 21– 29. <https://doi.org/10.5016/1806-8774.2009v11p21>.
- 12) Thangaselvabai, T., Sudha, K.R. Nutmeg (*Myristica Fragrans* Houtt) – the Twin Spice – a Review. *Agric. Rev.*, 2011; 32: 284–2.
- 13) Tajuddin, A., Ahmad, S., Latif, A., Qasmi, I.A. Aphrodisiac activity of 50% ethanolic extracts of *Myristica fragrans* Houtt. (nutmeg) and *Syzygium aromaticum* (L) Merr. & Perry. (clove) in male mice: A comparative study. *BMC Complement. Altern. Med*, 2003; 3: 1–5. <https://doi.org/10.1186/1472-6882-3-6>.
- 14) Shafiei, Z., Shuhairi, N.N., Md Fazly Shah Yap, N., Harry Sibungkil, C.A., Latip, J. Antibacterial activity of *Myristica fragrans* against oral pathogens. *Evidence-based Complement. Altern. Med.* 2012. <https://doi.org/10.1155/2012/825362>, 2012.
- 15) Abbas, F.A., Al-massarany, S.M., Khan, S., Al- howiriny, T.A., Mossa, J.S., Abourashed, E.A. Phytochemical and biological studies on Saudi *Commiphora opobalsamum* L. *Nat. Prod. Res.* <https://doi.org/10.1080/14786410600942025>, 2007.
- 16) Simpson B, Orgorzaly M. *Economic Botany, Plants In Our World*. NewYork: McGraw Hill Book Company, 1986.
- 17) Mohammad R. *Kanjul advia Mufradah*. University publication Sarfaraz House, AMU, Aligarh, 1975; 130-

519.

- 18) Tariq MNA. Taj ul Mufradat. New Delhi: Idarah Kitab us Shifa, 2010; 52,154,420,597,264,653.
- 19) Nadkarni KM. Indian Materia Medica. Vol. 1st, 3rd ed. Mumbai: popular Prakashan Private Limited, 2009; 9, 153, 155, 280, 343, 587, 830, 943, 957, 1011, 1227.
- 20) Khare C.P. Indian medicinal plants-An Illustrated Dictionary. New York: Springer (India) Private Limited, 2007; 4,175,428,487,467,518,555,665.
- 21) Ahsan, M.T., Zafar, S., Temperament of drugs in Unani medicine: a critical analysis. Hamdard Medicus, 2012; 55: 73-78.
- 22) Kabiruddin M. Makhzanul Muradat, Kitabul Advia. New Delhi: Idara Kitab ul Shifa, 2007; 95, 102, 171, 250, 303, 369.
- 23) Anonymous. The Wealth of India. Vol. 10th, New Delhi: Council of scientific and Industrial Research, 2003; 274-277.
- 24) Rahman, S., Jahan, N., Ajij, S., Makbul, A., Ahmad, M. Scientific appraisal of Unani concept of islah-e- advia (rectification / purification of drugs) and its importance 258. <https://doi.org/10.1016/j.jep.2020.112880>, 2020.
- 25) Anonymous. Standardization of single drugs of Unani Medicine. Part-3. New delhi: CCRUM, Ministry of H & FW, Govt. of India, 1997; 145,151,153,229.
- 26) Rahman, N.A.A., Fazilah, A., Effarizah, M.E. Toxicity of nutmeg (Myristicin): A review. Int. J. Adv. Sci. Eng. Inf. Technol, 2015; 5: 212–215. <https://doi.org/10.18517/ijaseit.5.3.518>.
- 27) Ram A, Lauria P, Gupta R and Sharma VN. Hypolipidaemic effect of Myristica fragrans fruit extract in rabbits. Journal of Ethnopharmacology, 1996 December; 55(1): 49-53.