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The advantages of Nutmeg (*Myristica fragrans houtt.*) for overall well-being and well-nourishment: A review

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Nutmeg which is ordinarily fully ingrained with *Myristica fragrans* is one of the most expensive spices, recognized since ancient times for its odoriferous, erotic, and healing features. Similar to other herbs and spices, the recognized advantages of nutmeg for overall wellbeing have been employed for healing everything from stomachaches to finding medicine to address epidemics, all the while that there is substantial proof of negation of nutmeg healing advantages. Multiples researches have exhibited that nutmeg can alleviate high blood pressure, treat stomachache, forestall diarrhea, cleanse the body on a small scale, and dynamize brain activities. From a nourishment standpoint, an abounding supply of energy, carbohydrates, proteins, and dietary fibers is found in nutmeg, and it is specifically an abundant source of vitamins A, C, and E. It is also comprised of electrolytes (Sodium and Potassium), minerals (calcium, copper, iron, magnesium, manganese, zinc, and Phosphorus), and phytochemicals such as carotene-B and β -Cryptoxanthin. It has been discovered that *Myristica fragrans* has multiple industrial usages in the production of alcoholic beverages, soaps, and beauty products.

Keywords: Nutmeg, Nourishment, Healing Advantages, Multiple Applications

INTRODUCTION

Aromatic nutmeg originally known as nutmeg, the spice made of the dried shell of nutmeg, alchemy, musedier, Nux Moschata, pyritic oil, muskabaum, is one of the most expensive spices, recognized since ancient times for its odoriferous, erotic, and healing features (Khayatnezhad and Gholamin, 2021a, Gholamin and Khayatnezhad, 2020d, Si et al. 2020). Nutmeg is an evergreen tree which has foliage all throughout the year and is originally cultivated in the tropical rainforests of Indonesia. It belongs to the Myristicaceae family of flowering plants (which is sometimes known as the "nutmeg family" also credited as "Myristica fragrance", while having less distinguished taste and fragrance (Karasakal et al. 2020a, Gholamin and Khayatnezhad, 2020c). It is commonly assumed that nutmeg can be employed to treat

heart diseases since it can stimulate blood flow and dynamize the circulatory system. Nutmeg health benefits also include improving digestion, relieving flatulence and stomach cramps, healing symptoms of sickness, diarrhea all the while improving appetite. Nutmeg can be employed to heal respiratory diseases like a cough from a normal cold as well, and it is usually included as the main ingredient in cough syrups. Nutmeg is believed to be effective in dealing with asthma (Esmaeilzadeh et al. 2020, Farhadi et al. 2020, Alelor, 2021). Apart from nutmeg's advantages for overall wellbeing, one must be careful not to use more than the minimum dose prescribed for it since it might introduce various harms to the body which might, in turn, lead to grave health issues (Zhu et al. 2021, Khayatnezhad and Gholamin, 2021a, Huang et al. 2021, Ren and Khayatnezhad, 2021). Do not ever devour more

than 30 grams (approximately 6 tablespoons) of it a day, while even consuming this much might be regarded as too much (Karasakal et al. 2020b, Gholamin and Khayatnezhad, 2021, Alayi et al. 2020, Arjaghi et al. 2021, Barth, 2021). Since the overall appeal of using modest natural solutions has increased for people while having this undeniable fact in mind that all human beings require help for the multiple diseases and illnesses they suffer from all the while believing that the cure comes from nature, from modest herbs that are grown in the countryside to some species which are made of dried plants that are less recognized these days, many of them are considered to be highly effective (Yin et al. 2021, Sun and Khayatnezhad, 2021, Khayatnezhad and Gholamin, 2021b, Gholamin and Khayatnezhad, 2021). Therefore, a requirement is sensed to recognize, study, apply, and specifically to appreciate them, and nutmeg and other essential spices are considered to fall within this line of interest.

MATERIAL AND METHODS

The Study of Nutmeg's Natural Features and its Development

Nutmeg is a dioecious plant which means it has the male and female reproductive organs on separate plants and does not have both of them on a single plant and tends to breeds either with the use of sexual organs or without them the latter being the most applied form of reproduction. Sexually procreative seedlings produce 50% made seedlings, which are infertile. Since there is no dependable technique in order to discover plants' sex before blossoming within the sixth to eight years sexual procreation Epicotyl grafting approach and chip budding have proved to be effective methods. Epicotyls grafting is one of the most employed, not specifically preferred, methods, due to its low (35 – 40%) fruition percentage (De Milto and Frey, 2005). The nutmeg tree is approximately seven meters high having a grayish-brown or black trunk and its branches are spread in a spiral pattern. The leaves have petioles, with a flat surface, have grown in an intermittent fashion, and are fragrant. The flowers are small with axillary racemes. The fruit is a drupe having soft skin with a juicy fruit wall and rugose skin all over the seed. The seed/kernel has a tough and chunky texture and is abundant in oil. The kernel is the nutmeg which is mostly applied for sale purposes and has healing features (Khayatnezhad and Nasehi,

2021, Huang et al. 2021, Hewitt, 2021).

The nutmeg tree is a huge plant with foliage all year-round that can grow splendidly in the tropical environment. A completely developed tree expands for more than 50-60 feet in height and is the source of nutmeg and mace, two highly appreciated spices. The nutmeg fruit is actually a drupe, approximately in the size of an apricot, which when it ripens splits open to disclose a single oval-shaped hard kernel which is positioned at the center of the fruit and are regarded as nutmeg spices. The seed is tightly wrapped by crimson-red colored frilly or fiber-like arilli which is regarded as mace. The two spices possess the same amiable, syrupy, and fragrant taste (Gholamin and Khayatnezhad, 2020b, Fataei, 2017, Ghomi Avili and Makaremi, 2020). Nutmeg is a universally consumed edible spice which has recently attracted much recognition as a substitute for drugs that cause hallucination (Fataei et al. 2018, Huma et al. 2021). Nutmeg and mace have been employed in Indian cuisine and traditional medicine (Khayatnezhad, 2012, Kabir et al. 2021). In traditional medicine, nutmeg has been employed to cure diseases that are caused by stomach gas, rheumatism, and also as a sleeping drug and a drug that increases sexual desires (Khayatnezhad and Gholamin, 2021b, Li et al. 2021, Radmanesh, 2021). In the 6th century, much attention was focused on the application of nutmeg as a drug that induces abortion and a drug that increases activities in the muscles (Khayatnezhad and Gholamin, 2012b, Ren and Khayatnezhad, 2021). Such features have been discredited to a large extent; however, these assumed properties continue to cause nutmeg poisoning in women (Khayatnezhad and Nasehi, 2021, Sun et al. 2021, Bi et al. 2021). Nutmeg and mace are two separate spices with distinct tastes, but both of them come from the fruit of the nutmeg tree, *Myristica fragrans*. This gradual growing evergreen tree develops more than 20 m in height and is mainly propagated in India, Ceylon, Malaysia, and Canada. The fruit, known as a drupe or a nutmeg apple, resembles the shape of a peach or an apricot. When the ripened fruit splits open, the nutmeg's stony endoeag or its seed which is wrapped by a red, somewhat chunky fiber or arillus is mace. The nut is taken out of the fruit and dehydrated to make nutmeg.

Nourishment Advantages of Nutmeg

From a nourishment standpoint, nutmeg is an abundant source of energy, carbohydrates, proteins, and dietary fiber. It is specifically

abundant in vitamins A, C, and E. It is also comprised of electrolytes (Sodium and Potassium), minerals (Calcium, Copper, Iron, Magnesium, Manganese, Zinc, and Phosphorus), and phytochemicals such as carotene-B and β -Cryptoxanthin. Furthermore, nutmeg is rich in moisture (14.3%), extract (36.4%), fiber (11.6%) essential oil (6-16%), amyllum (4.6-24.24.2%), polymers composed of pentose (2.25%), furfural (1.5%), and pectin (0.6%). Nutmeg owes its tasteful and healing features to its essential oil. The nutmeg oil is fluid, achromatic, and bright yellow elixir, possessing a distinctive fragrance and the main ingredients of it are D pinene and D camphene. The acerbic taste of the nutmeg which is produced from the tree makes it highly marketable and financially profitable and its highly fragrant flesh is pounded and cooked or steamed before being ground.

Table 1: Nutritional values

values of Nutmeg per 100 g Nutrient data base	Nutrient Value	Percentage of RDA
Energy	525 Kcal	26
Carbohydrates	49.29 g	38%
Protein	5.84 g	10%
Total Fat	36.31 g	180%
Cholesterol	0 mg	0%
Dietary Fiber	20.8 g	55%
Vitamins		
Folates	76 μ g	19%
Niacin	1.299 mg	8%
Pyridoxine	0.160 mg	12%
Riboflavin	0.057 mg	4%
Thiamin	0.346 mg	29%
Vitamin-A	102 IU	3.5%
Vitamin C	3 mg	5%
Electrolytes		
Sodium	16 mg	1%
Potassium	350 mg	7.5%
Minerals		
Calcium	184 mg	18%
Copper	1.027 mg	114%
Iron	3.04 mg	38%
Magnesium	183 mg	46%
Manganese	2.900 mg	126%
Phosphorus	213 mg	30%
Zinc	2.15 mg	20%
Phyto-nutrients		
Carotene- β	16 μ g	--
Crypto-xanthin- β	90 μ g	--
Lutein-zeaxanthin	0 μ g	--

The fruit is has a delicate flesh with a yellow or yellowish red color having the fragrance and the flavor of nutmeg (Khayatnezhad and Gholamin, 2012a, Sun et al. 2021, Rodriguez,

2021, Xu et al. 2021, Ma et al. 2021). The nourishment advantages of nutmeg are demonstrated in Table 1.

Nutmeg and mace are employed for their distinctive taste the yellowish color the food take after their application. Whole seeds are usually favored over the ground form because they have more essential oils and because of their shells that have an intense taste which adds vigor to the prepared dish. Conventionally, entirely dehydrated seeds are either ground down or powdered shortly before adding to the dish at the final stage of cooking. Nonetheless, eating large amounts of nutmeg might cause concentration deficit, perspiration, rapid heartbeat, physical pain, and in highly dangerous cases it might cause hallucination and acute confusional state (delirium) (Khayatnezhad and Gholamin, 2020a, Gholamin and Khayatnezhad, 2012, Huang et al. 2021). However, if nutmeg is consumed at a normal rate, it may be used safely during pregnancy and at the time of breastfeeding. With regards to the chemical components of nutmeg seeds, they contain 20% to 40% of carrier oil generally known as nutmeg butter. This oil is composed of myristic acid, myristin, and triglycerides of lauric, tridecanoic, stearic, and palmitic acids. Nutmeg also has a production rate of 8% to 15% of essential oil which is to some extent regarded as the reason for the negative impacts affiliated with nutmeg poisoning. The essential oils of nutmeg and mace have analogous chemical structure and fragrance while exhibiting notable differences in color (bright orange in contrast with pale yellow). The essential oils are also employed as edible spices. Nutmeg oil also accommodates in tiny proportions sabinene, p-Cymene, alpha-thulene, gamma-Terpinene, and monoterpene alcohols (Muhibbuddin, 2020). Phenolic composites observed within nutmeg have exhibited antioxidant features; other individual composites include the resorcinol smalbarieone B and C along with ligands and neolignans (Omrani and Fataei, 2018, Khayatnezhad and Gholamin, 2020b). The following points are valuable pieces of information relevant to the subject of our study:

Vitamin A in the form of beta-carotene improves the immune system.

Vitamin A in the form of beta-carotene reduces the risk of eye disorders.

Vitamin C is an antioxidant and improves the immune system.

Vitamin C can be employed in effective dealing with contagious diseases.

Vitamin C improves blood circulation.

Vitamin E is an antioxidant and improves the immune system.

Vitamin E can improve the functions of the nervous system.

Vitamin E can accelerate the recovering rate in physical injuries.

Iron improves blood circulation which accelerates the rate at which red blood cells transport oxygen to all organs of the body.

Iron deficiency can cause feebleness and fatigue.

Phytochemicals known as phytosterols reduce the risk of colon cancer by decelerating the cellular reproduction in the large intestine.

Phytosterols decrease the risk of swellings and irritations in the body.

The Advantages of Nutmeg for Overall Well-being

Nutmeg, with its sweet, bitter, and warm flavor, is a key ingredient in most Indian kitchens. Despite the fact that the culinary benefits of this marvelous spice are highly recognized, its medicinal and healing features remain highly unrecognized. While our ancestors employed nutmeg within multiple medicinal compounds, we have mostly disregarded this beneficial spice, and we should in fact store large amounts of it in our pantry.

Improving Brain Function

One of the most important features of nutmeg is improving the functions of the brain. It reduces stress and stimulates mental activities as well. It can also improve one's ability to concentrate and adjust to different conditions since it enhances blood flow to the brain. Nonetheless, one must take necessary precautions not to consume too much of this spice since it might lead to an acute confusional state (Jia et al. 2020).

Heart Medicine

Nutmeg is discovered to be an efficient medicine for the circulatory system. It enhances blood circulation and improves heart functions (Gholamin and Khayatnezhad, 2020a).

Kidney and Liver Cleansing Agent

Nutmeg oil is an effective liver medicine because of its cleansing properties. It is beneficial in the treatment of kidney failures and helps kidney stones dissolve as well (Zaeimdar et al. 2019).

Sleep Induction

It is reported that nutmeg can be effectively employed to treat insomnia. It increases the serotonin level, which helps the body to relax. You can add nutmeg to your tea, coffee, or herbal tea; you can even incorporate a few seeds of it within your dessert (Zaeimdar et al. 2019).

Remedy for Bad Breath

Nutmeg oil is beneficial in removing bad breath (Arjaghi et al. 2021). It has also antimicrobial properties which help treat toothaches as well as gum diseases. Due to this very feature nutmeg oil is even employed within various types of toothpaste. If you are battling tooth diseases, add nutmeg to your diet.

Increasing Sexual Desire

Nutmeg is a superb substance to increase sexual desires. Within the 18th century, it was employed to cure male sexual problems. A research that has been taken place recently also confirms the fact that this spice increases sexual desires.

Treatment of Digestive Disorders

Nutmeg can be employed in the treatment of stomach gas, diarrhea, and tends to increase appetite as well. Nonetheless, consult a doctor before employing it for the treatment of stomach disorders, since it is reported that consuming large amounts of nutmeg can lead to hallucination and in some cases, even death.

Pain Relieving Properties

Nutmeg oil's features can protect the body against swelling and irritation and it can also be employed for its pain-relieving properties. Once applied to the areas subjected to pain, nutmeg oil can cure joint and muscle pains. It can reduce inflammations in joints and can also be employed in the treatment of rheumatic fever.

Cold Medicine

Nutmeg is beneficial in clearing up the congestion which is caused by catching a cold and because of this feature it is extensively employed within cough syrups. It can also be employed in therapeutic treatments using odors.

Other Therapeutic Benefits

Since the earlier periods of human history, nutmeg and its oil were employed in Chinese and Indian traditional medicine for the treatment of diseases associated with the nervous and digestive systems. The composites within these

spices such as myristicin and elemicin exhibit calming properties all the while improving brain function.

Nutmeg oil contains eugenol, which has been employed within dental medicine for the treatment of toothaches.

The oil can also be applied topically on the skin in order to relieve muscular pain and rheumatic pain of joints.

Freshly prepared concentrated liquor from boiling nutmeg with honey has been used to relieve nausea, gastritis, and digestive disorders.

Nutmeg helps treat diarrhea and rheumatic pains; ground kernel or the concentrated liquor of the seeds are employed in the treatment of diarrhea, flatulence, and rheumatism.

The ground kernel is added in order to dissolve the disagreeable flavor or fragrance of multiple herbal concoctions.

Nutmeg is also employed as a pesticide.

The liquor concentration of the nutmeg is used in order to cure stomach gas, stomach sickness, and vomiting.

The nutmeg oil is applied topically over the stomach to reduce pain.

Roasted nutmeg paste is applied topically to treat leucorrhoea, a whitish discharge from the uterine cavity or vagina.

Carbonized nutmeg provides a beneficial cure for fevers and chills and its prescribed amount is normally half to one gram taken twice a day.

Ground nutmeg combined with Vaseline is topically applied to treat lumps.

In order to get rid of tiny swelling spots on the skin, mix equal amounts of ground nutmeg and black pepper.

The leaves and bark of nutmeg are abundant in essential oil which is employed within soaps, creams, perfumes, and candles. The oil is topically applied for the treatment of rheumatism.

Nutmeg essential oil is also used for its taste which can be incorporated within spices, alcoholic beverages, and beauty products.

The oil is employed for the treatment of Cystitis and urinary tract infection as well.

Nutmeg butter or fat is used as a soft topical tonic in creams, hair lotions, and pastes. It can be employed in the treatment of rheumatism, sprained body organs, and paralysis.

The essential oil, acquired from the nutmeg tree leaves exhibits contaminative effects on weeds; therefore, it can be used as a weedicide, and it can also be employed in the production of chewing gums and other food flavoring and essences.

CONCLUSION

Highly odorous nutmeg is one of the most expensive spices known since ancient times for its fragrant, sexually inducing, and healing features. Ever since the earlier periods of human civilization, nutmeg has been employed as a cure for multiple disorders or to improve the overall health. While the culinary benefits of this marvelous spice are highly recognized, its medicinal and healing benefits remain highly unrecognized. This article demonstrated that *Myristica fragrans* is abundant in nutritional and health benefits that can be enjoyed by the people who live in the countryside near the region of its cultivation, and it can also exhibit multiple industrial applications in the making of alcoholic beverages, soaps, and beauty products.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

Arda Karasakal conducted, planned, Analyzed the data, wrote manuscript and interpreted the results and involved in manuscript preparation. All authors read and approved the final version.

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