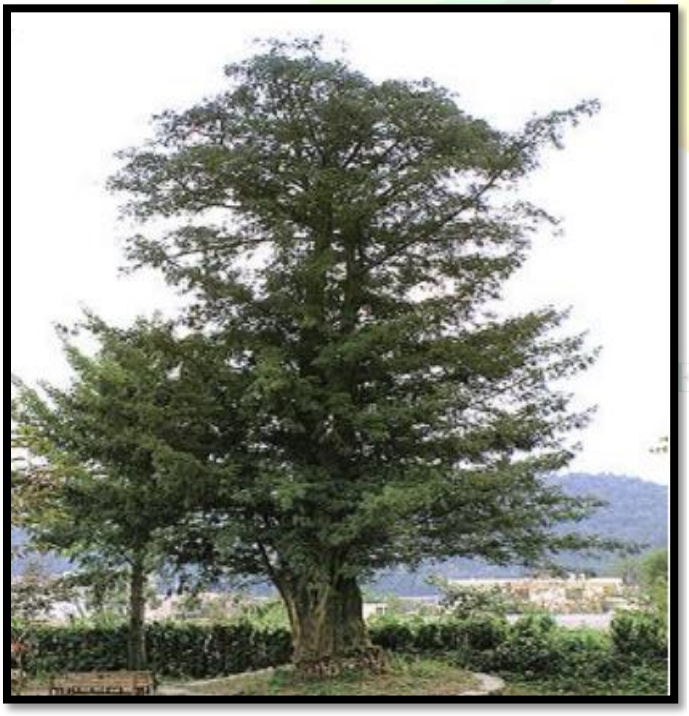
Myristica fragrans

TAXONOMICAL CLASSIFICATION:[1]

- *Kingdom: Plantae*
- *Phylum: Spermatophyta*
- *Subphylum: Angiospermae*
- *Class: Dicotyledonae*
- *Order: Annonales*
- *Family: Myristicaceae*
- *Genus: Myristica*
- *Species: Myristica fragrans*

INTRODUCTION: [2]



Myristica fragrans is commonly known as "nutmeg", it produces two spices: mace and nutmeg. Nutmeg is the seed kernel inside the fruit and mace is the red lacy covering (aril) on the kernel. M. fragrans is a spreading aromatic evergreen tree usually growing to about 5 to13 m high, occasionally 20 m. The bark contains watery pink or red sap. The pointed dark green leaves (5 to 15 cm × 2 to 7 cm) are arranged alternately along the branches and are borne on leaf stems about 1 cm long. Upper leaf surfaces are shiny. Flowers are usually single sexed; occasionally male and female flowers are found

on the same tree. Female flowers arise in groups of 1 to 3; males in groups of 1 to 10. Flowers are pale yellow, waxy, fleshy and bell-shaped. Male flowers are 5 to 7 mm long; female flowers are up to 1 cm long. The fruits are fleshy, drooping, yellow, smooth, 6 to 9 cm long with a longitudinal ridge. When ripe, the succulent yellow fruit coat splits into two halves revealing a purplish-brown, shiny seed (nutmeg) surrounded by a red aril (mace). Seeds (nutmegs) are broadly ovoid (2 to 3 cm long), firm, fleshy, whitish and transversed by red-brown veins. When fresh, the aril (mace) is bright scarlet becoming more horny, brittle and with a yellowish-brown color when dried. Nutmeg is popular as a spice and also possesses various therapeutic properties. Nutmeg has a characteristic pleasant fragrance and a slightly warm taste. It is used to flavor many kinds of baked foods, confections, puddings, meats, sausages, saucers, vegetables and beverages. It is also used as components of curry powder, teas and soft drinks or mixed in milk and alcohol. It is used as a folklore medicine for treating diarrhea, mouth sores and insomnia. Since the Middle Ages, nutmeg has been used as a stomachic, stimulant, carminative as well as for intestinal catarrh and colic, to stimulate appetite, to control flatulence and has a reputation as an abortifacient. The essential oil of nutmeg is used externally for rheumatism and possesses analgesic and antiinflammatory properties. Bioactive compounds including camphene, elemicin, eugenol, isoelemicin, isoeuglenol, methoxyeugenol and elimicin were identified as the main constituents of M. fragrans seed essential oil. Sabinene (41.7), α-pinene (9.4%), β-pinene (7.3%), terpine-4-ol (5.8%), limonene (3.7%), safrole (1.4%) and myristicin (2.7%) were also characterized in the essential oil of nutmeg collected from Andaman Nicobar Island. Glycerides, stearic, lauric, linoleic and palmitic acids were the main components of nutmeg fixed oil . Erythro-austrobailignan-6, meso-dihydroguaiaretic acid and nectandrin-B together with macelignan, machilin F, nectandrin B, licarin A, licarin B, myristagenol and mesodihydroguaiaretic acid are lignans isolated from M. fragrans seeds.

M. fragrans flowers.

M. fragrans kernel covered with red aril (mace).

PROPERTIES AND USES:

- Anti-infammatory
- Analgesic activities
- Antioxidant activity
- Antibacterial
- Antifungal activities
- Anti-obesity
- antidiabetic activity

DOSAGE: [6]

250 mg – 2 gms in divided dose per day.

RESEARCH:

1. The ethanolic extract of nutmeg (*Myristica fragrans*) was studied in albino rabbits for its effects on experimentally induced hyperlipidaemia. After inducing hyperlipidaemia in 12 rabbits a dose of 500 mg/kg of the extract was administered orally daily for a period of 60 days in 6 rabbits (experimental group); the rest of the rabbits were observed as controls. When compared with the control group of rabbits the levels of lipoprotein lipids were significantly lower in the experimental group after 60 days: total cholesterol 573 ± 61 vs. 209 ± 27 mg/dl, low density lipoprotein (LDL) cholesterol 493 ± 57 vs. 131 ± 25 mg/dl, and triglycerides 108 ± 14 vs. 67 ± 9 mg/dl ($P < 0.001$). High density lipoprotein (HDL) cholesterol levels were not significantly different (59 ± 7 vs. 65 ± 4 mg/dl, P = n.s.). Total cholesterol:HDL ratio and LDL:HDL ratio were significantly lower in the experimental group. The *Myristica fragrans* extract showed platelet anti-aggregatory ability. There were significantly lower levels of total cholesterol in heart (3.7 ± 0.5 vs. 2.2 ± 0.5 mg/100 g) and liver (11.9 ± 1 vs. 1.5 ± 0.4 mg/100 g). The toxicity studies showed absence of any adverse effect on various haematological and biochemical parameters. [7]

2. The objective of the present study was to evaluate the antioxidant and lipase inhibitory potential of various extracts of Myristica fragrans (in vitro). Ethanolic extracts of Myristica fragrans were studied for their free radical scavenging and lipase inhibitory potentials by using porcine lipase, PNPB and DPPH. All results were obtained by applying active formulas and calculating the percentage of inhibition. Among all extracts, Myristica fragrans ethanolic extract has shown the

strongest pancreatic lipase inhibitory activity at 100 ìg/mL (66.24%), with the closest potency to tthat of the standard drug, Orlistat (81.57%). This extract has also exhibited a potent antioxidant activity. The findings of the present study clearly showed that DPPH free radical scavenging activity of MFE produced 88% inhibition at 5 mg/mL as compared to standard ascorbic acid, which was 90%. Ethanolic extracts of Myristica fragrans had a marked PL inhibitory action and antioxidant effect. Therefore, based on this research evidence, they could be aternatively used for obesity treatment. [8]

3. The ethyl acetate and ethanol extracts of flesh, mace and seed of *Myristica fragrans* was evaluated the bactericidal potential against three Gram-positive cariogenic bacteria (*Streptococcus mutans* ATCC 25175, *Streptococcus mitis* ATCC 6249, and *Streptococcus salivarius* ATCC 13419) and three Gram-negative periodontopathic bacteria (*Aggregatibacter actinomycetemcomitans* ATCC 29522, *Porphyromonas gingivalis* ATCC 33277, and *Fusobacterium nucleatum* ATCC 25586). Antibacterial activities of the extracts was determined by twofold serial microdilution, with minimum inhibitory concentrations (MIC) ranging from 1.25 to 640 mg/mL and 0.075 to 40 mg/mL. The minimum bactericidal concentration (MBC) was obtained by subculturing method. Among all extracts tested, ethyl acetate extract of flesh has the highest significant inhibitory effects against Gram-positive and Gram-negative bacteria with mean MIC value ranging from 0.625 to 1 . 2 5 ± 0 . 0 0 (SD) mg/mL; P = 0 . 0 1 7) and highest bactericidal effects at mean MBC value ranging from 0.625 mg/mL to 2 0 ± 0 . 0 0 (SD) mg/mL. While for seed and mace of *Myristica fragrans*, their ethanol extracts exhibited good antibacterial activity against both groups of test pathogens compared to its ethyl acetate extracts. All of the extracts of *Myristica fragrans* did not show any antibacterial activities against *Fusobacterium nucleatum* ATCC 25586. Thus, our study showed the potential effect of ethyl acetate and ethanol extracts from flesh, seed and mace of *Myristica fragrans* to be new natural agent that can be incorporated in oral care products. [9]
4. The aril (mace) of *Myristica fragrans*, known as Dok-Chan, is a spice that has long been used for treating stomach discomfort, peptic ulcer, and nausea. It is an ingredient in many remedies in Thai traditional medicine, e.g., Ya-Hom-Thep-Bha-Jit, Ya-Hom-Nao-Wa-Kot, and Ya-That-Bun-Job, which are used to treat dyspepsia and other gastrointestinal tract symptoms. The aqueous and ethanolic extracts of mace were used for all tests. Anti-*H. pylori* activities were determined by the disc diffusion method and agar dilution. Anti-inflammatory activity was determined by the LPS-

induced nitric oxide (NO) inhibition in a RAW264.7 cell line, and cytotoxicity was determined against gastric cancer cell lines (Kato III) using the sulphorhodamine B (SRB) assay. The DPPH radical scavenging and ABTS radical cation decolorization assays were used to determine the antioxidant activities. The result found that the ethanolic extract of mace exhibited antimicrobial activity against *H. pylori* ATCC 43504 and six clinical strains with MIC values of 125–250 μg/ml. The aqueous extract MICs against *H. pylori* ATCC reference strain and six clinical strains were 500 μg/ml compared with 0.5 μg/ml for the positive control, clarithromycin. The inhibitory effect of LPS-induced NO release and cytotoxic activity of the ethanolic extract had IC_{50} values of 82.19 μg/ml and 26.06 μg/ml, respectively, and the EC_{50} values for the DPPH and ABTS antioxidant assays were 13.41 μg/ml and 12.44 μg/ml, respectively. The mace extract also had anticancer properties. In conclusion, the ethanolic mace extract had anti-*H. pylori*, anti-inflammatory, antioxidant, and anticancer activities. These data support further preclinical and clinical investigation to see if the mace extract could have a role in treating patients with dyspepsia, peptic ulcers, and possibly gastric cancer. [10]

PRECAUTIONS & WARNINGS: [5]

Pregnancy and breast-feeding: Nutmeg is **POSSIBLY UNSAFE** when taken by mouth in doses larger than amounts found in foods. In pregnant women, it might cause miscarriages or birth defects.

There is not enough reliable information about the safety of taking nutmeg if you are breast feeding. Stay on the safe side and avoid use.

Infertility: Early research suggests that taking high doses might reduce fertility in men. Avoid nutmeg if you are trying to have a baby.

INTERACTIONS WITH MEDICATIONS: [5]

Drying medications (Anticholinergic drugs) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Nutmeg might increase levels of certain chemicals in the body that work in the brain, heart, and elsewhere. Some drying medications called "anticholinergic drugs" can also these same chemicals, but in a different way. These drying medications might decrease the effects of nutmeg, and nutmeg might decrease

the effects of drying medications.
Some of these drying medications include atropine, benztropine (Cogentin), biperiden (Akineton), procyclidine (Kemadrin), and trihexyphenidyl (Artane).

Medications changed by the liver (Cytochrome P450 1A1 [CYP1A1] substrates) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Some medications are changed and broken down by the liver. Nutmeg might increase how quickly the liver breaks down some medications. Taking nutmeg along with some medications that are changed by the liver can lead to a variety of effects and side effects. Before taking nutmeg talk to your healthcare provider if you take any medications that are changed by the liver.

Some of these medications that are changed by the liver include chlorzoxazone, theophylline, bufuralol, and others.

Medications changed by the liver (Cytochrome P450 1A2 [CYP1A2] substrates) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Some medications are changed and broken down by the liver.

Nutmeg might increase how quickly the liver breaks down some medications. Taking nutmeg along with some medications that are changed by the liver can lead to a variety of effects and side effects. Before taking nutmeg talk to your healthcare provider if you take any medications that are changed by the liver.

Some of these medications that are changed by the liver include clozapine (Clozaril), cyclobenzaprine (Flexeril), fluvoxamine (Luvox), haloperidol (Haldol), imipramine (Tofranil), mexiletine (Mexitil), olanzapine (Zyprexa), pentazocine (Talwin), propranolol (Inderal), tacrine (Cognex), theophylline, zileuton (Zyflo), zolmitriptan (Zomig), and others.

Medications changed by the liver (Cytochrome P450 2B1 [CYP2B1] substrates) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Some medications are changed and broken down by the liver.

Nutmeg might increase how quickly the liver breaks down some medications. Taking nutmeg along with some medications that are changed by the liver can lead to a variety of effects and side effects. Before taking nutmeg talk to your healthcare provider if you take any medications that are changed by the liver.

Medications changed by the liver (Cytochrome P450 2B2 [CYP2B2] substrates) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Some medications are changed and broken down by the liver.

Taking nutmeg along with some medications that are changed by the liver can lead to a variety of effects and side effects. Before taking nutmeg talk to your healthcare provider if you take any medications that are changed by the liver.

Medications for Alzheimer's disease (Acetylcholinesterase (AChE) inhibitors) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Nutmeg might increase certain chemicals in the brain, heart, and elsewhere in the body. Some medications used for Alzheimer's disease also affect these chemicals. Taking nutmeg along with medications for Alzheimer's disease might increase effects and side effects of medications used for Alzheimer's disease. Some medications used for Alzheimer's disease include bethanechol (Urecholine), donepezil (Aricept), echothiophate (Phospholine Iodide), edrophonium (Enlon, Reversol, Tensilon), neostigmine (Prostigmin), physostigmine (Antilirium), pyridostigmine (Mestinon, Regonol), succinylcholine (Anectine, Quelicin), and tacrine (Cognex).

Phenobarbital (Luminal) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

The body breaks down phenobarbital (Luminal) to get rid of it. Nutmeg might increase how quickly the body breaks down phenobarbital (Luminal). Taking nutmeg along with phenobarbital (Luminal) might decrease the effectiveness of phenobarbital (Luminal).

Sedative medications (CNS depressants) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Nutmeg might cause sleepiness and drowsiness. Medications that cause sleepiness are called sedatives. In theory, taking nutmeg along with sedative medications might cause too much sleepiness.
Some sedative medications include clonazepam (Klonopin), lorazepam (Ativan), phenobarbital (Donnatal), zolpidem (Ambien), and others.

Various medications used for glaucoma, Alzheimer's disease, and other conditions (Cholinergic drugs) Interaction Rating: **Moderate** Be cautious with this combination.Talk with your health provider.

Nutmeg might increase certain chemicals in the brain, heart, and elsewhere in the body. Some medications used for glaucoma, Alzheimer's disease, and other conditions also affect these chemicals. Taking nutmeg with these medications might increase the chance of side effects.
Some of these medications used for glaucoma, Alzheimer's disease, and other conditions include bethanechol (Urecholine), donepezil (Aricept), echothiophate (Phospholine Iodide), edrophonium (Enlon, Reversol, Tensilon), neostigmine (Prostigmin), physostigmine (Antilirium), pyridostigmine (Mestinon, Regonol), succinylcholine (Anectine, Quelicin), and tacrine (Cognex).

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