Plant Archives Volume 20 No. 2, 2020 pp. 5060-5064 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

SPECTROPHOTOMETRIC STUDIES OF NUTMEG PLANT COMPONENTS AND THEIR BIOLOGICAL PROCESS INSIDE THE HUMAN BODY

Suaad A. Mahdi* and Noori Y. Salman

Faculty of Pharmacy, University of Kufa, Iraq.

Abstract

The study examined the nutmeg plant components spectrophotometrically using FT-IR and UV-Visible devices and knowing its components using FT-IR device. The solubility were measured using different solvent (e.g.: benzene, diethyl ether, water, hexane, ether, acetone & chloroform). The study also examined the effect of the nutmeg components on the biological processes of the human body for its various constituents. g.: oils and others. It was also observed that an increase in absorbance of solvents after the addition of the nutmeg to the solvents and according to the following sequence (Di ethyl ether> Hexane > Benzene> Chloroform> Water>Acetone> Ethanol).

Key words: Medicinal plants; workers; environments; chemical components.

Introduction

The Scientific name of nutmeg is *Torreya nucifera* its type of Torreya genus of the Taxaceae family (Determann, R. & Gardner, M. 2010, Roy, Douglass F. 1974, Wunderlin, Richard P.; Hansen, Bruce F.; Franck, Alan R.; Essig, F. B.2020). The tree of nutmeg was known from ancient times for use as a kind of spice that gives the food a delicious aroma and flavor and it was also used by the ancient Egyptians as a drug for stomachache and also as carminative. The tree of nutmeg is evergreen and about 10meters of height. The fruit of nutmeg is pear shaped and when it ripens the fruit turns into hard cover. It is cultivated in the tropics and in India, Indonesia and Ceylon. It is also used in the composition of some medicines and beverages that help digest food. Nutmeg contains volatile oil, including boronol, eugenol, solid fat and starch.

The part used in the research processes is nutmeg seed and its used as it is or grinded and an extraction of a volatile oil from it.

The nutmeg has different medicinal properties (Crask, Paul 2017, Mrunal- 2019, John Staughton 2020, Ehab A. Abourashed & Abir T. El-Alfy 2016). It's used as carminative and its oil used in the manufacture of ointments that treat rheumatism, also the grinded part of nutmeg used in the manufacture of digestive beverages, perfumes and toothpastes (Crask, Paul 2017, Dilon Daniel 1994, Retrieved 2017). Also Nutmeg in small doses causes a stimulating effect. While if it was taken in large doses (15-20 grams), it causes hallucinations (El-Alfy AT, Wilson L, ElSohly MA, Abourashed EA2009. U Stein [1], H Greyer, H Hentschel 2001, Gable, R.S. 2006, Jamie E. Ehrenpreis, Carol DesLauriers, Patrick Lank, P. Keelan Armstrong and Jerrold B. Leikin 2014).

The most important active ingredient in the nutmeg is myresticin which causes euphoria and visual hallucinations. And this effect is similar to the effect of amphetamine and mescaline (Jamie E. Ehrenpreis, Carol DesLauriers, Patrick Lank, P. Keelan Armstrong and Jerrold B. Leikin 2014, Deveux, p. 1996, Ehab A. Abourashed & Abir T. El-Alfy 2016).

The herbal medicine (Herbal Remedies) is known as the Science that deals with the study and use of medicinal properties of plant **(**Ehab A. Abourashed & Abir T. El-Alfy 2016, Lichterman, B.L. 2004) Chemical compounds in plants make their effects on the human body through similar processes that we are fully understand With regard to chemical compounds in Traditional drugs Hence, herbal medicines do not differ

***Author for correspondence :** E-mail : suaad.toobi@uokufa.edu.iq

much from traditional drugs With regard to the way it works , This makes the herbal medicine the same degree of effectiveness as traditional medication. But it also offers the same potential to cause harmful side effects (S. Wahyuni and N. Bermawie 2020, Ehrenpreis, J.E.; Deslauriers, C.; Lank, P.; Armstrong, P.K.; Leikin, J.B. 2014, Lai. Pk, Roy J. 2004).

In this research study of nutmeg constituents for what it contains of compounds and their therapeutic effects, have been investigated and knowing the harmfulness of taking excessive amounts of this plant.

Materials and Methods

In this study , equal weights were taken from nutmeg after grinding it well such (0.5g) and placed in 7 volumetric flasks of (25 ml flask) And put in each volumetric flask equal volume of organic solvent , which the study examined, which is diethyl ether , hexane, benzene, chloroform, water, acetone, ethanol, of (20ml) for each flask. And leaves it at lab. Temperature for 24 hours. And the absorbance was taken before and after the addition of nutmeg by using UV-Visible spectroscopy. And write the readings obtained. Nutmeg powder was also analyzed by using FT-IR spectrophotometer to find out the functional group.

Results and Discussion

In this study, nutmeg powder was examined by FT-IR device to find out the components and the functional groups in this planet and determine their type and according to the scheme below; it's defiantly an aliphatic compound with a Probability of a carboxylic acid or an ester due to the presence of (C=O) group at (1734) belongs to carboxyl group (O=C-OH) and a (C-O) group at (1000-1300) region and a presence of hydrogen bonding and also hydroxyl groups (OH), this chemical formula and various compounds in nutmeg gives it importance and therapeutic activity in some pathological cases. Also

Fig. 1: Picture of a Device UV-Visible.

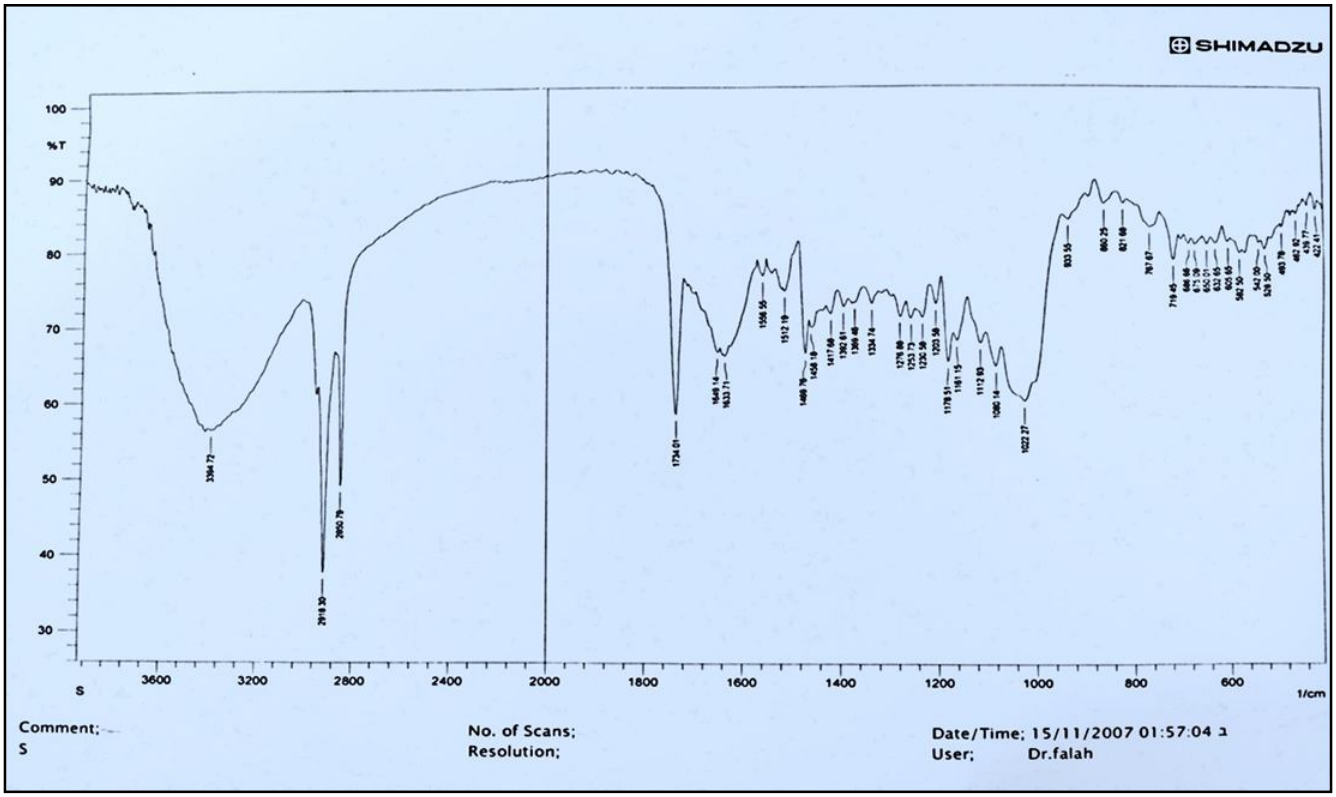

Fig. 2:

the availability of nutmeg in markets, ease of having it and its low cost in comparable with other drugs and chemicals makes it of value to.

Also the study of nutmeg powder the solubility varied according to the following order

(Di ethyl ether> Hexane > Benzene> Chloroform> Water>Acetone> Ethanol) as shown in the Figs. 3-5.

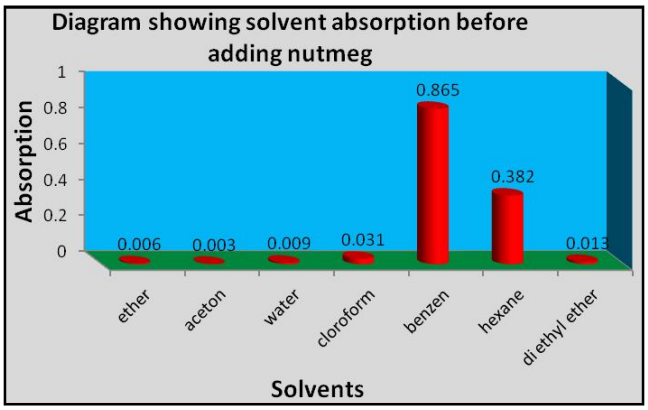

Fig. 3: Shows solubility of the solvent before adding nutmeg plant.

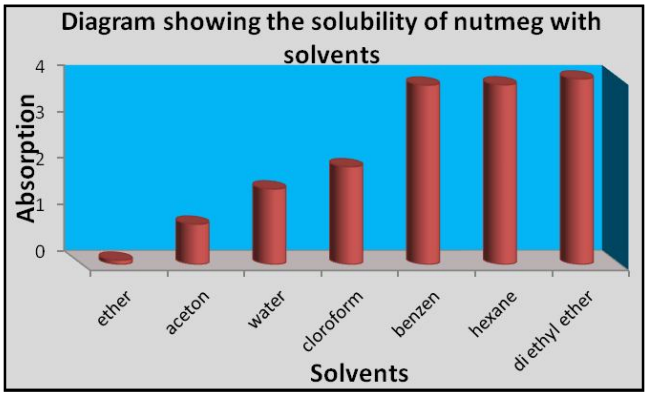

Fig. 4: Shows solubility of solvent after addition of nutmeg plant.

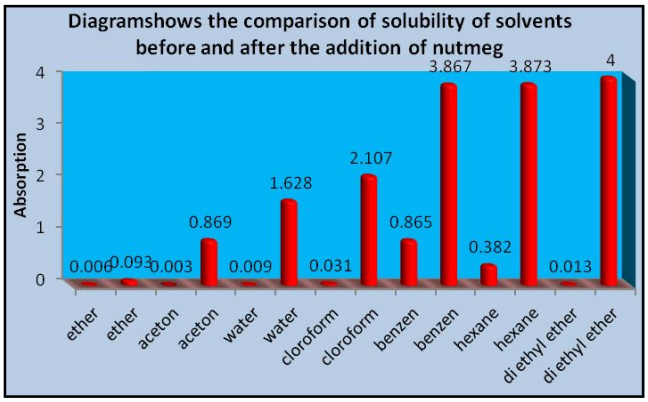

Fig. 5: Shows the comparison of solubility of solvents before and after the addition of nutmeg.

Because of different solubility in nutmeg with each solvent used in this study, there will be a major rule for the polarity of each solvent which gives specific geometric figure that helps to binds with other molecules as in nutmeg.

The water has an advantage over other solvents which considers a general solvent because most compound dissolve in it but with different degrees where it binds mostly as covalent. As most compounds molecules binds to each other with simple electrostatic forces resulted from owing different charges. And this types of bonds considers much weaker than the covalent bonds which present in water molecule and hydrogen bonds in water also, and as a result of presence these compounds atoms in water so its surround with water molecules and separates it physically from each other and being ionized and becomes water soluble and on the other side water retains its standard composition because of strong covalent bonds. So most chemist prefers water as general solvent because it's always available and low cost, and for its polar properties water considers to have the ability to dissolve many organic and inorganic compounds without reacting with them or changing the basic chemical properties which is in conflict with the other organic solvents which cannot dissolve materials without reacting with them.

The solubility of the compounds involved in this study increased with the solvents have high density according to the following.

solvent	chlor-oform	wa-ter	Ace-tone	ben-zene	eth-anol	Di ethyl ether	He-xane
Density(g\ml)	1.498	1	0.819	0.879	0.789	0.713	0.655

(Chloroform> Water> Benzene>Acetone>Ethanol> Di ethyl ether> Hexane).

Also the difference in solubility resulted from the hydrogen bonding, the dipole moment and Molecular polarization had been taken in consideration **(**Tinoco, sauer, wang and pugtisi Hall 2002, Lowery, T.H. and Richardson, K.S., 1987**)**. The solubility of solvents was measured before and after adding the samples powder of the study and was observed that, an increase in the absorbance after adding the sample as shown in Fig. 5. Additionally to nature of bonds and groups in the compound which explained previously in the FT-IR analyses. And also the presence of myristicin the compound that belongs to phenyl propene class and this active ingredient is water insoluble but dissolves in ethanol and acetone.

The nutmeg plant has variety of nutritional uses as a seasoning or spice individually or within the types of mix of different spices such as curry mix, it gives taste distinctive and sweet flavor , Also used in the manufacture of some baked, pancakes, sweets and food sauces and

in the preparation of dishes of vegetables and in the spicing of meat and poultry prepared for barbecues, With the increasing interest in nutmeg in terms of medical and nutritional aspects, scientists and researchers have sought to know their components of the natural plant chemical elements. It has been used by some people as a hallucinogenic substance and as an alternative to the narcotic substance which gives its owner a sense of euphoria and artificial happiness has proved by scientists it contain two chemical compounds attributed to the negative effects that mentioned above and they are compounded Myrisiticin and Elimicin these two compounds are transformed into the body by metabolism and biological conversion to compounds similar to amphetamines it is a known stimulant and internationally prohibited, and it is attributed to the hallucinatory and fragmented effect, which we previously referred to it **(***Gils, Carl Van, and Paul Alan Cox. 1994***)** and also the effect of nutmeg as psychoactive herb Specifically the hallucinogenic effect or the cause of hallucinations **(***Gils, Carl Van, and Paul Alan Cox. 1994***)**. And the risk of nutmeg and through medical research published in the scientific journals that the harmful effect of nutmeg does not come only through the ingestion of large amounts of nutmeg powder about (10-15 g) but if taken in larger quantities (15-20 g) it will cause the hallucination (Gable, R.S. 2006, Deveux, p. 1996, Dorman H.J., Figueiredo A.C., Barroso J.G., Deans S.G. 2000, Nwozo Sarah Onyenibe,[1] Kasumu Titilayo Fowokemi,[1] and Oyinloye Babatunji Emmanuel[2] 2015).

Nutmeg in some studies also showed antidepressant properties. This antidepressant effect was attributed to the ability of nutmeg compounds (Myristicin and Elimicin) on preventing and inhibition Monoamine oxidase enzyme, Which is the enzyme responsible for metabolizing the main amino hormones in the human body, such as adrenalin, which stimulates the nervous system, Finally, it was possible to isolate a new chemical compound from the crust of nutmeg, named Argenteane, a compound belonging to the group of Lignin's which belong to poly phenolic compounds it is a compound with anti-oxidant effect. Recent studies have indicated that the nutmeg shell contains high phenolic compounds with a high ability to prevent oxidation in the fatty blood components and to inhibit free radicals that have harmful effects on heart health and carcinogenicity as well as to protect DNA in the living cell from the risk of harmful KMA radiation and carcinogenic effect (Gils, Carl Van and Paul Alan Cox.1994, Dorman HJ, Figueiredo AC, Barroso JG, Deans SG. 2000).

References

13 Scientifically Proven Benefits Of Nutmeg by John Staughton (BASc, BFA) last updated - January 24, 2020 Medically reviewed by Vanessa Voltolina (MS, RD).

African Nutmeg (Monodora myristica) Lowers Cholesterol and Modulates Lipid Peroxidation in Experimentally Induced Hypercholesterolemic Male Wistar Rats (2015). Nwozo Sarah Onyenibe, Kasumu Titilayo Fowokemi and Oyinloye Babatunji Emmanuel. *Int. J. Biomed. Sci.,* Jun; **11(2):** 86-92.

Benefits of Nutmeg-knowhow this spice can make your family's life Better by Mrunal-January 19, 2019.

Chemical diversity and pharmacological significance of the secondary metabolites of nutmeg (Myristica fragrans Houtt.) (2016). Ehab A. Abourashed and Abir T. El-Alfy Phytochemistry Reviews, **15:** pages1035-1056.

Chemical diversity and pharmacological significance of the secondary metabolites of nutmeg (Myristica fragrans Houtt.) Ehab A. Abourashed and Abir T. El-Alfy, pages1035–1056 10 May 2016.

Crask, Paul (2017-11-05). Grenada: Carriacou and Petite Martinique. Bradt Travel Guides. ISBN 9781784770624.

Deveux, P. (1996). Re-visioning the Earth: A guide to opening the healing channels between the mind and nature. New York: fire side, p. 261-262.

Dorman, H.J., A.C. Figueiredo, J.G. Barroso and S.G. Deans (2000). In vitro evaluation of antioxidant activity of essential oils and their components. *Flavour Fragr J.,* **15:** 12-16.

Ehrenpreis, J.E., C. Deslauriers, P. Lank, P.K. Armstrong and J.B. Leikin (2014). "Nutmeg Poisonings: A Retrospective Review of 10 Years Experience from the Illinois Poison Center, (2001–2011). *Journal of Medical Toxicology,* **10(2):** 148-151. doi:10.1007/s13181-013-0379-7. PMC 4057546. PMID 24452991.

Gable, R.S. (2006). The toxicity of relational drugs. *American scientist,* **44:** 206-208.

Gable, R.S. (2006). The toxicity of recreational drugs, *American scientist,* **94:** 206-208.

Gils, Carl Van and Paul Alan Cox (1994). "Ethnobotany of Nutmeg in the Spice Islands." *Journal of Ethnopharmacology,* **42(2):** 117-24.

Dilon Daniel Description of components of nutmeg". Food and Agriculture Organization of the United Nations. September 1994. Page7-14 Retrieved 2017-04-13.

El-Alfy, A.T., L. Wilson, M.A. ElSohly, E.A. Abourashed (2009). Towards a better understanding of the psychopharmacology of nutmeg: Activities in the mouse tetrad assay. *J. Ethnopharmacol.,* **126(2):** 280-286.19703539.

Lai, P.K. and J. Roy (2004). "Antimicrobial and chemoprevention properties of herbs and spices. *Curr. Med. Chem. Jun.,* **11(11):** 1451-60. PMID 15180577. doi: 10.2174/0929867043365107.

Lichterman, B.L. (2004). "Aspirin: the story of wonder drug" *British medical Journal,* **329(7479):** 1408.doi:10.1136/bmj.329.7479.1408.

Lowery, T.H. and K.S. Richardson (1987). Mechanism and theory in organic chemistry , harper Collins publishers 3rd.ed. p.181-183.

Lowery, T.H. and K.S. Richardson (1987). Mechanism and theory in organic chemistry, harper Collins publishers 3rd.ed. p.177.

Nutmeg (Myristicin) Poisoning Report on a Fatal Case and a Series of Cases Recorded by a Poison Information Centre U Stein [1], H. Greyer, H. Hentschel (2001). Apr 15; 118(1): 87-90. doi: 10.1016/s0379-0738(00)00369-8.

Nutmeg Poisonings: A Retrospective Review of 10 Years Experience from the Illinois Poison Center, 2001-2011 Jamie E. Ehrenpreis, Carol DesLauriers, Patrick Lank, P. Keelan Armstrong and Jerrold B. Leikin. June 2014, 10(2): pp 148-151.

Roy, Douglass F. (1974). Torreya Arn. Torreya. In: C.S. Schopmeyer, ed. Seeds of woody plants in the United States. Agriculture Handbook No. 450. Washington: U.S. Department of Agriculture, Forest Service, 815-816. 7768.

Spector, T., R. Determann and M. Gardner (10 August 2010). "Torreya taxifolia". IUCN Red List of Threatened Species. 2011: e.T30968A9585489. doi:10.2305/IUCN.UK.2011-2.RLTS.T30968A958548. en. Retrieved August 15, 2014. Listed as Critically Endangered (CR A2ace v3.1).

Tinoco, sauer, wang and pugtisi, physical chemistry practice. Hall (2002) p.134.

Yield and fruit morphology of selected high productive Papua nutmeg trees (Myristica argentea Warb.) To cite this article: S. Wahyuni and N. Bermawie 2020. IOP Conf. Ser.: *Earth Environ. Sci.,* 418-012032.

Wunderlin, P. Richard, F. Hansen, F. Bruce, Franck, R. Alan and F.B. Essig (17 March 2020). "Torreya taxifolia - Species Page". ISB Atlas of Florida Plants. Institute for Systematic Botany, University of South Florida, Tampa. Retrieved 18 March 2020.