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Pharmacological Activity of Morinda Citrifolia [Noni] Fruit

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Abstract: *The "noni," or Morindacitrifolia L., has been utilised in Polynesian traditional medicine for over 2000 years. The evergreen shrub Morindacitrifolia (Rubiaceae) produces mature fruit with a distinct butyric acid flavour and aroma. Around the world, diverse groups (like the Polynesians) use the leaves and, especially, the fruit in a variety of ways. The root is also used as a dye. Because of these purposes.validate the genuine therapeutic effects has become more crucial given the market that is growing around "noni juice". throughout this plant. Although current research has demonstrated that this fruit contains antimicrobial and antioxidant capabilities in vitro, we still do not have. There is solid proof that noni has health benefits for people in terms of nutrition and medicine. The coffee family, Rubiaceae, includes the fruit-bearing tree Morindacitrifolia. Its natural range spans Southeast Asia and Australasia, and Polynesian sailors dispersed it across the Pacific. The more well-known English names of great morinda, Indian mulberry, noni, beach mulberry, and cheese fruit are among the fruit's over 100 regional names.*

Keywords: Morindacitrifolia

I. INTRODUCTION

In the popular press, noni juice—made from the fruit of the Pacific Basin Morindacitrifolia tree—is advertised as a complementary therapy for a range of medical conditions. health issues, such as cancer (Anonymous, 2011a,Solomon (2003) and 2011b The goal of this evaluation. to use Medline to look up relevant publications elucidate any research pertaining to the assertion that noni juice or its extract possesses anti-cancer and/or immuno-attributes of mulants.2.The fruit is marketed as having medicinal properties that can both prevent and treat various illnesses. It is typically employed to boost immune function and combat bacterial,fungus, parasites, and viral diseases are also treated with it.halt the growth and spread of malignancies, including cancerous ones (Dixon et al., 1999; Earle, 2001).[2].NoniJuice is said to reduce inflammation as well. many noni is drunk as juice, despite the fact that leaves, petals, bark, and Using roots is another option (Dixon et al., 1999; Earle, 2001;2002 McClatchey[2]. Worldwide sales for one of the most popular natural product, Morindacitrifolia L. (Rubiaceace) commonly known as “noni”, is estimated at more than $2 billion dollars, which has increased from approximately $33 million to $400 million from 1999 to 2000. 4. We bought male NMRI mice from Charles River in Sulzfeld, Germany. The animals were kept in groups of ten in 12-hour light/dark cycles in 22 °C macrolon cages with free access to food and water.5.Noni is believed to have originated in Southeast Asia and subsequently distributed to the Western Pacific. Noni did not significantly influence ancient Polynesian diets, but was probably consumed during famine 6.The noni plant has an incredibly strong medicinal and safety profile, which makes it popular as a food supplement and health enhancer all over the world. Proteins, carbohydrates, and other hydrophilic substances are present in the fruit. vitamins, minerals, and a tiny quantity of fat.7.Recent times have seen a lot of claims made about the nutritional benefits of noni. Numerous papers have demonstrated that noni can be utilised to treat various diseases. 8.In response to this demand, some countries such as Costa Rica and Cambodia, have increased the fields being cultivated in noni. In these countries, the fruit is often commercialized fresh or as juice in both formal and informal markets, but it is also found as pasteurized juice, either pure or mixed with other juice.

1.1 Geographical Source

Morindacitrifolia is a perennial bush and it is possible to find fruits at different stages of maturity on the same plant at the same time. The species is generally found from sea level to 400 m altitude, although it adapts better to coastal regions (Lu¨berck and Hannes, 2001). Under favorable conditions, the plant bears fruit about nine months to one year

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after planting. At this stage, the fruits can be harvested, but they are generally small and the yield per tree is low. Some producers choose not to harvest in the first year, and they prune in order to let the bush grow stronger. In Hawaii, noni fruits are harvested throughout the year, although there are seasonal patterns in flowering and fruit bearing (meteorological factors, fumigation, and irrigation) (Nelson, 2001, 2003).

Although fruit production is lower in the winter, noni plots in Hawaii are typically harvested twice or three times per month. It is possible to achieve yields of between 7 tonnes/ha/year in the second year after planting to roughly 70 tonnes/ha/year after the fifth year with a density of 638 plants per hectare, good soil fertility, drainage, and irrigation, as well as appropriate pest, disease, and weed control. One hectare can produce approximately 35 tonnes of juice at a 50% (w/w) juice extraction rate. However, many factors may affect these yields, and most producers do not obtain such good results because of diseases or poor agricultural practices(grown wild plants). In Hawaii, an average annual yield

1.2 Cultivation and Collection

One hectare can produce approximately 35 tonnes of juice at a 50% (w/w) juice extraction rate. However, a variety of factors may have an impact on these yields, and the majority of farmers do not achieve such good results due to illnesses or subpar agricultural practises (grown wild plants). Hawaii typically achieves an annual yield of 50 tonnes per ha (Nelson, 2001, 2003).

On the same Morindacitrifolia perennial bush, there may be fruits that are simultaneously in various stages of maturity. The species is typically found between sea level and 400 metres above sea level, though Luberck and Hannes (2001) found that it adapts better to coastal areas.

In ideal circumstances, the plant begins to produce fruit nine to a year after planting. The fruits can be picked at this point, but the yield per tree is low and the fruits are typically small. Some farmers decide not to harvest in the first year and instead prune the bush to make it stronger. Although there are seasonal patterns in flowering and fruit bearing (due to meteorological factors, fumigation, and irrigation), noni fruits are harvested all year long in Hawaii (Nelson, 2001, 2003).

1.3 Chemical Constituents

There are over 80 species in the genus Morinda (Rubiaceae), including the species Morindacitrifolia L. Morindacitrifolia is a 3–10 m tall bush or small tree with numerous, broad, elliptical leaves (5–17 cm long and 10–40 cm wide). The peduncle is covered with clusters of the tiny white tubular blooms. The corolla is greenish-white, and the petioles leave ring-shaped imprints on the stalks (Morton, 1992; Elkins, 1998; Dixon et al., 1999; Ross, 2001; Cardon, 2003). 2. About 160 phytochemical compounds have been already identified in the noni plant, and the major micronutrients are phenolic compounds, organic acids and alkaloids(Wang and Su, 2001). Of the phenolic compounds, the most important reported are anthraquinones (damna-canthal, morindone, morindin, etc.), and also aucubin, asperuloside, and scopoletin The main organic acids are caproicandvcaprylic acids (Dittmar, 1993), while the principal reported alkaloid is xeronine (Heinicke, 1985) 3. Scopoletin, octoanoic acid, potassium, vitamin C, terpenoids, alkaloids, anthraquinones (such as nordamnacanthal, morindone, rubiadin, and rubiadin- 1-methyl ether, anthraquinone glycoside), carotene, vitamin A, flavone glycosides, linoleic acid, Alizarin, amino acids, acubin, L-asperul.

II. BIOLOGICAL ACTIVITY OF MORINDACITRIFOLIA

2.1 Anti-Microbial Effects

The anti-microbial properties may have been the first noticed characteristic since the fruit contains a sizable amount of carbohydrates that do not ferment when kept at room temperature in closed containers. This characteristic is exploited to ship the fruit untreated from the dispersed Pacific islands to processing facilities.

2.2 Anti-Cancer Activity

A Japanese study team has lately investigated the immunomodulatory (ability to strengthen the host immune system) capabilities of noni juice (Hirazumi et al., 1996; Hirazumi and Furusawa, 1999). It has been discovered that Lewis lung cancer can be treated with the ethanol precipitable fraction (ppt) of noni juice, which is a poly- saccharide-rich compound made of glucuronic acid, galactose, arabinose, and rhamnose (LLC). Noni-ppt appears to increase the

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production of T-cells, thymocytes, and macrophages in cell models. Cytokines are crucial mediators of tumourcytostasis and cytotoxicity and are produced by T-cells, thymocytes, and macrophages.

2.3 Anti-Oxidant Properties

The ferric thiocyanate method (FTC) and the thiobarbituric acid test have been used to evaluate the anti-oxidant effects of ethanol and ethyl acetate extracts of noni fruit (TBA). The researchers discovered that the strength of the lipid oxidation inhibition displayed by ethyl acetate extract was comparable to that of pure a-tocopherol and butylatedhydroxy toluene (BHT) at the same weight (Mohd et al., 2001).

The tetrazoliumnitroblue (TNB) assay was used to measure the radical scavenging ability of a commercial juice in vitro. This involved determining if the juice had the potential to shield cells or lipids from the oxidative change caused by superoxide anion radicals (SAR). Noni juice's SAR scavenging activity was shown to be 2.8 times more than vitamin C's, 1.4 times greater than pycnogenol (PYC), and nearly equal to that of pycnogenol (PYC).

2.4 Anti-Inflammatory Activity

By using a pro-inflammatory chemical to provoke a localised acute inflammatory response, an aqueous extract from noni juice's anti-inflammatory properties were discovered (bradykinin). It was demonstrated that giving a noni juice extract orally in doses of 200 mg quickly prevented the development of paw edoema in rats. This impact might have been caused by disruption of the B2 receptor-mediated process through which bradykinin causes rat paw edoema (McKoy et al., 2002). Another study demonstrated the selective inhibitory impact of commercial noni juice on COX-1 and COX-2, which are involved in breast, colon, and lung cancer as well as anti-inflammatory activities (Suet al., 2001). Noni juice's suppression of these enzymes' activity was compared to that of Commercial.

2.5 Analgesic Activity

Recent studies looked at the rat analgesic effects of commercial juice. In comparison to the placebo group, the findings showed that rats given 10% and 20% noni juice had higher pain thresholds (162% and 212%, respectively) (Wang et al., 2002). The writhing and hotplate tests were used by a French research team to examine the analgesic and sedative effects of noni on rats. When administered to mice at a dose of 1600 mg/kg, noni root extract had strong analgesic effectiveness that was comparable to the effects of morphine (75% and 81% protection using noni extract and morphine, respectively), and it also demonstrated that it was non-toxic (Younos et al., 1990).

2.6 Cardiovascular Activity

Recent research has demonstrated the protective effects of noni fruit against arteriosclerosis, a disease associated with the oxidation of low density lipoproteins (LDL). Methanol and ethyl acetate extracts showed 88 and 96% and 97% inhibition, respectively, of copper-induced LDL oxidation using the thiobarbituric acid reactive material method. It's possible that the presence of lignans and phenylpropanoid dimers is what causes this beneficial effect (Kamiya et al., 2004).

III. USES

Numerous goods have been launched to the consumer market, including juice drinks, powders made from dried ripe or unripe fruits, cosmetic products including lotions and soaps, oil made from seeds, and leaf powders used to make capsules or pills.

3.1 Food

Noni is sometimes called a "starvation fruit", implying that it was used by indigenous peoples as emergency food during times of famine.[6] Despite its strong smell and bitter taste, the fruit was nevertheless eaten as a famine food,[7] and, in some Pacific Islands, even as a staple food, either raw or cooked.[8] Southeast Asians and Australian Aboriginals consume the fruit raw with salt or cook it with curry.[9] The seeds are edible when roasted. In Thai cuisine, the leaves (known as bai-yo) are used as a green vegetable and are the main ingredient of kaengbai-yo, cooked with coconut milk. The fruit (luk-yo) is added as a salad ingredient to some versions of somtam.

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3.2 Traditional Medicine

In addition to the traditional use in Polynesian culture as a famine meal, green fruit, leaves, and roots or rhizomes may have been utilised as a general tonic. Despite being regarded as having biological qualities in traditional medicine, there is no proof that any intended application of morinda is clinically effective. A Hawaiian company that produces noni food and skincare items received a warning letter from the FDA in 2018 for violating the US Food, Drug, and Cosmetic Act by advertising medications that had not been approved and making fraudulent health claims.

3.3 Dyes

Noni has historically been used largely to make colours by Austronesian peoples. It was brought by Austronesian explorers to the Pacific Islands as canoe plants. A brownish-purple dye made from morinda bark can be used to create batik. To dye cloth, yellowish dye is produced from the plant's roots in Hawaii.

3.4 Case Studies

Reported on two case studies of individuals with stomach cancer receiving noni juice treatment. Case 1: A 69-year-old male patient was advised to get surgery by his doctor because otherwise he would pass away soon. The patient, whose body weight decreased from 165 to 79 pounds as a result of disobeying the doctor's recommendations, became incapacitated within two months. He began consuming homemade noni juice, which helped him feel better within a month. Six months later, he quit drinking noni juice. He has not experienced any gastrointestinal issues for seven years, but a biopsy revealed that his original malignancy had not progressed. As a result, the patient restarted his Noni juice regimen. Case 2: A 64-year-old patient.

3.5 Effect in Hypertension

One month open label clinical trial on 10 people by daily administrating of 4 oz. of TNJ, Reported Noni juice significantly decreased the high blood pressure, especially systolic high blood pressure.

3.6 Effect on Cholesterol in Non-Smokers

The average pre-test total cholesterol was decreased from 184.4 to 182.4 in a one-month pilot research on 10 non-smoking hypercholesteromic subjects who are not already taking cholesterol drugs. At the conclusion of the experiment, the HDL/LDL ratio was enhanced from 0.36 to 0.37. The researchers came to the conclusion that noni juice may decrease cholesterol by acting as a dual inhibitor of the enzymes HMG-CoA reductase and hepatic/intestinal ACAT.

3.7 Effect of Leaf Extract in Skin Protection

The skin was shielded against UV-induced redness and swelling by noni leaf extract (erythema). According to research, leaves are safe for topical use and may be helpful in reducing skin damage from UVB radiation**.**

3.8 Effect On Skin Care Regimen

49 women participated in a six-week research trial of a skin-care routine based on noni (age 38 to 55 years). The subjects applied three different Noni preparations—Noni juice, Noni seed oil, and Noni leaf juice—to their faces and necks. In addition to enhanced skin elasticity and firmness, the results indicate considerable reductions in lateral canthal fine lines and wrinkles. In any participant at any point during the experiment, there was no indication of skin discomfort. Finally, they came to the conclusion that the experiment's findings support the plant's historical applications for promoting skin health.

3.9 Effects on Serum Lipid Profile

According to a study, consuming 29.5 to 188 ml of noni juice daily lowers triglycerides, hs-CRP, andcholesterol. Additionally, there was a rise in HDL and a drop in LDL and homocysteine among noni juice consumers.

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IV. CONCLUSION

The herbal treatment M. citrifolia is also referred to as noni. On Polynesian islands, the Noni plant's various parts have historically been utilised as herbal remedies for a variety of illnesses. Numerous scientific publications contend that it also includes minerals, vitamins, micro and macronutrients, amino acids, anthraquinones, fatty acids, flavonoids, iridoids, lignans, polysaccharides, sterols, etc. that are beneficial in treating a variety of diseases. Researchers have demonstrated that Noni is pharmacologically active and can prevent cancer, heart disease, diabetes, cognitive impairment, hypertension, and other diseases as well as preserve general health in both preclinical and clinical settings.

REFERENCES

[1]. Brown, Amy C. "Anticancer activity of Morindacitrifolia (Noni) fruit: a review." *Phytotherapy Research* 26.10 (2012): 1427-1440.

[2]. .Chan-Blanco, Yanine, et al. "The noni fruit (Morindacitrifolia L.): A review of agricultural research, nutritional and therapeutic properties." *Journal of food composition and analysis* 19.6-7 (2006): 645-654.

[3]. 3.Basar, Simla, et al. "Analgesic and antiinflammatory activity of MorindacitrifoliaL.(Noni) fruit." *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives* 24.1 (2010): 38-42.

[4]. Chan-Blanco, Yanine, et al. "The noni fruit (Morindacitrifolia L.): A review of agricultural research, nutritional and therapeutic properties." *Journal of food composition and analysis* 19.6-7 (2006): 645-654.

[5]. Wang, Mian-Ying, et al. "Morindacitrifolia (Noni): a literature review and recent advances in Noni research." *Acta PharmacologicaSinica* 23.12 (2002): 1127-1141.

[6]. Nerurkar, Pratibha V., Phoebe W. Hwang, and Erik Saksa. "Anti-diabetic potential of noni: The yin and the yang." *Molecules* 20.10 (2015): 17684-17719.

[7]. Ali, Mohammad, MruthunjayaKenganora, and SanthepeteNanjundaiah Manjula. "Health benefits of Morindacitrifolia (Noni): A review." *Pharmacognosy Journal* 8.4 (2016).

[8]. 8. Mauliku, N. E., et al. "Anti-tubercular activity of extract and coumponds of noni (Morindacitrifolia Linn)." *International Journal of Pharmacy and Pharmaceutical Sciences* 9.12 (2017): 105-109.

[9]. Yang, J. I. A. N., S. J. Afaisen, and R. A. M. A. Gadi. "Antimicrobial activity of noni fruit essential oil on Escherichia coli O157: H7 and Salmonella Enteritidis." *Micronesica* 5 (2016): 1-

[10]. Atkinson, N., 1956. Antibacterial substances from flowering plants. 3.Antibacterial activity of dried Australian plants by rapid direct plate test. Australian Journal of Experimental Biology 34, 17–26.

[11]. Dixon, A.R., McMillen, H., Etkin, N.L., 1999. Ferment this: thetransformation of Noni, a traditional Polynesian medicine (Morindacitrifolia, Rubiaceae). Ecological Botony 53, 51–68.

[12]. Akihisa T, Matsumoto K, Tokuda H et al. 2007. Anti-inflammatory and potential cancer chemopreventive constituents of the fruits of Morindacitrifolia (Noni). J Nat Prod 70: 754–757.

[13]. 13. Akihisa T, Seino K, Kaneko E et al. 2010. Melanogenesis inhibitory activities of iridoid-, hemiterpene-, and fatty acid-glycosidesfrom the fruits of Morindacitrifolia (Noni). J Oleo Sci 59:49–57.

[14]. Dixon AR, McMillan H, Atkin NL. 1999. Ferment this: The transformation of Noni, a traditional Polynesian medicine (MorindaCitrifolia, Rubiaceae). Econ Bot 53: 51–68.

[15]. Grimm T, Chovanova Z, Muchova J et al. 2006. Inhibition of NF-kappaB activation and MMP-9 secretion by plasma of human volunteers after ingestion of maritime pine bark extract (Psychogenic). J Inflamm (Lond) 3: 1.

[16]. Mohd, Z., Abdul-Hamid, A., Osman, A., 2001. Antioxidative activity extracts from Mengkudu (Morindacitrifolia L.) root, fruit and leaf.Food Chemistry 78, 227–231.

[17]. McKoy, M.L.G., Thomas, E.A., Simon, O.R., 2002. Preliminaryinvestigation of the anti-inflammatory properties of an aqueousextract from Morindacitrifolia (Noni). Pharmacological Society 45,76–78.18.

[18]. Wang, M.Y., Su, C., 2001. Cancer preventive effect of Morindacitrifolia (Noni). Annals of the New York Academy of Sciences 952,161–168.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
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[19]. Kamiya, K., Tanaka, Y., Endang, H., Umar, M., Satake, T., 2004.Chemical constituents of Morindacitrifolia fruits inhibit copper-induced Low-Density Lipoprotein oxidation. Journal of Agricultureand Food Chemistry 52, 5843–5848.

[20]. Hiramatsu, T., Imoto, M., Koyano, T., Umezawa, K., 1993. Induction ofnormal phenotypes in RAS transformed cells by damnacanthal fromMorindacitrifolia. Cancer Letters 73, 161–166.

[21]. Hirazumi, A., Furusawa, E., Chou, S.C., Hokama, Y., 1994. Anti canceractivity of Morindacitrifolia on intraperitoneally implanted Lewis lungcarcinoma in syngenic mice. Proceedings of the Western Pharmacological Society 37, 145–146.

[22]. Nagalingam S, Changam SS, Kotturathu MC. Extraction and preliminary phytochemical screening of active compounds in Morindacitrifolia fruit. Asian Journal of Pharmaceutical and Clinical Research. 2012;52(2):179-81.

[23]. Palu AK, Raevonne AS, West BJ, Norman K, Jensen J. The effects of Morindacitrifolia L. Noni on High Blood Pressure: A Mechanistic Investigation and Case Study. Functional Food and Health. 2008c;993(39):446-53.

[24]. Palu AK, Ashley NB, West BJ, Jensen JC, Shixin D, Norman K.The cholesterol lowering mechanisms of MorindacitrifoliaL. (noni): A mechanistic investigation and case study involving hypercholesterolemia nonsmoking subjects. American Chemical Society. 2009;237(3-3):22-6.

[25]. West BJ, Sixin D, Afa KP, Jensen CJ. Morindacitrifolia Linn. (Rubiaceae) leaf extracts mitigate UVB-induced erythema. J Nat Med. 2009b;63(3):351-4.

[26]. West BJ, Rachel AS. Efficacy of a Morindacitrifolia Based Skin Care Regimen.Current Research Journal of Biological Sciences. 2012;4(3):310-14.

[27]. Wang MY, Lin P, Vicki WH, Shixin D, Anderson G, West BJ. Noni juice improves serum lipid profiles and other risk markers in cigarette smokers. The Scientific World. 2012;vol. 2012, 1-8.

[28]. Kumar GS. The effect of Noni (Morindacitrifolia L.) in type 2 diabetes mellitus in inadequately controlled patients. Noni Cli Res J. 2007;1(1-2):20-4.

[29]. Wang MY, Lutfiyya NM, Vicki WH, Lin P, Martin SL, Anderson G. Morindacitri-folia L. (noni) improves the quality of life in adults with osteoarthritis. Functional Foods in Health and Disease. 2011;1(2):1-21.

[30]. Langford J, Doughty A, Wang M, Clayton L, Babich M. Effects of Morindacitrifolia on quality of life and auditory function in postmenopausal women. J Altern Complement Med. 2004;10510(5):737-9.

[31]. Olsen A.A brief summary of Morinda's human clinical trials.2010. Available at:https://morinda.com/en-us/news/316871, Accessed on 16 June 2014.