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Review on Moringa Oleifera

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ABSTRACT:

Miracle plant Moringa oleifera is hailed for having healthy minerals and perhaps decreasing cholesterol. The Moringa oleifera plant has potential bioactivity in almost all of its components. The primary chemical components of Moringa oleifera include flavonoids, alkaloids, phenols, vitamins, minerals, proteins, glycosides, glucosinolates, and isothiocyanates as well as terpenes, saponins, tannins, and a host of other substances. The Moringa oleifera is highly effective against a wide range of disorders, including cancer, diabetes, inflammation, antimicrobial qualities, cardiovascular problems, and many others. Cardiovascular disorders are brought on by hyperlipidemia, which is the term used to describe a rise in the level of lipid in plasma. According to reports, phytochemicals like flavonoids, phytosterols, and phenols are what provide Moringa oleifera its antihyperlipidemic properties. The primary focus of this review is on the pharmacological function of Moringa oleifera in the management of hyperlipidemia. Cardiovascular disorders are brought on by hyperlipidemia, which is a rise in plasma lipid levels. Moringa oleifera is said to have antihyperlipidemic properties because to phytochemicals such flavonoids, phytosterols, and phenols. The primary emphasis of this review is Moringa oleifera's pharmacological role in the management of hyperlipidemia. The bioactive components of Moringa oleifera and its medicinal activity are also covered in this article.

1. INTRODUCTION:

One of the most well-known, widely-distributed, and naturalised species of the monogeneric family Moringaceae is Moringa oleifera Lam (syn. M. ptreygosperma Gaertn). (Nadkarni, 1976; Ramachandran et al., 1980). The tree is between five and ten metres tall (Morton, 1991). It is common near the sandy banks of rivers and streams, and is both wild and farmed across the plains, especially in hedges and home yards. It does best in a tropical island climate (The Wealth of India, 1962; Qaiser, 1973). It can thrive in hot, arid climates or humid tropics, endure barren soil, and suffer little from drought (Morton, 1991). The minimum and maximum annual rainfall requirements are estimated to be 250 mm and over 3000 mm, respectively, with a pH range of 5.0 to 9.0. (Palada and Changl, 2003).

One of the plants in the Brassica order and a member of the Moringaceae family is the vegetable Moringa oleifera. With 13 recognised species, the Moringaceae is a single genus family (Khawaja et al., 2010). A little tree originally from the sub-Himalayan regions of North West India, Moringa oleifera is now native to numerous areas of South America and the Islands. The Moringa is traditionally known and utilised for its health benefits in addition to being a common food in these areas. Due to its extraordinary healing powers for a variety of disorders and even certain chronic conditions, it has gained the nickname "the miracle tree" among common people. Due to the plant's numerous benefits, several studies were conducted to isolate bioactive chemicals from different portions of the plant (Guevara et al., 1999). Thus, the use of herbal plants in medicine, also known as phytomedicine, is still generally accepted and accepted as one of the most affordable (Abalaka et al., 2009). In most nations where it is not a native plant, there has recently been a significant resurgence of interest in the nutritional benefits of moringa (Reyes et al., 2006; Oduro et al., 2008). This might be as a result of assertions that it boosts animal output since it has beneficial nutritional, medicinal, and preventative effects (Fahey, 2005). Research from other nations show that the leaves are incredibly nutrient-dense, containing vitamins, minerals, and amino acids (Anwar et al., 2007). The leaves have so been used to treat malnutrition, particularly in young children and nursing mothers. Moreover, feeding is essential for both humans and livestock as a temporary substitute for chemoprophylaxis. Animals' ability to combat the negative impacts of parasitism and disease depends heavily on nutrition (Anwar et al., 2007). An animal that is well-fed is more resistant to disease than one that is already weak from starvation, even when exposed to infection. An animal's immune system responds to pathogen exposure by mounting an attack to ward off infection. Both the production of antibodies to fight the illness and the use of white blood cells to combat pathogens are examples of this (FAO, 2002). Energy, proteins for the production of antibodies and cells, minerals (zinc, copper, and iron), and vitamins (A and E) are all necessary for an animal to build immunity. These nutrients also help the animal's body components communicate with one another and fight illnesses (Conroy, 2005). In traditional medicine, seeds, leaves, oil, sap, bark, roots, and flowers are frequently employed. It has been noted that moringa leaves have a balanced nutritional makeup, including vitamins, minerals, amino acids, and fatty acids (Moyo et al., 2011; Teixeira et al., 2014; Razis et al., 2014). Several types of antioxidant chemicals, including ascorbic acid, flavonoids, phenolics, and

carotenoids, are also said to be present in the leaves (Alhakmani et al., 2013; Vongsak et al., 2014). Various preparations of M. oleifera are used for their antiinflammatory, antihypertensive, diuretic, antimicrobial, antioxidant, antidiabetic, antihyperlipidemic, antineoplastic, antipyretic, antiulcer, cardioprotectant, and hepatoprotectant activities, according to several commentaries (Anwar et al., 2007; Mbikay, 2012; Razis et al., 2014). Mbikay studied the medicinal value of M. oleifera leaves for treating hyperglycemia and dyslipidemia (2012). M. oleifera's possible health advantages were outlined by Razis et al. (2014), who concentrated on its nutritional value as well as their antioxidant and antibacterial properties.

BIOACTIVE COMPOUNDS:

1. Bioactive Constituents of Moringa oleifera:

The "wonder tree," Moringa oleifera, is acclaimed for its abundance of antioxidants and health-promoting minerals, and nearly all components are regarded as nourishing in conventional herbal therapy. The plant provides a variety of vitamins and minerals. A good amount of amino acids, proteins, beta-carotene, alkaloids, flavonoids, phenolics, and other phytoconstituents like glucosinolates, isothiocyanates, tannins, and saponins are found in various portions of this plant. This plant's phytoconstituents provide important nutrients and chemical compounds that aid in the treatment and prevention of disease . Many pieces of evidence support the claims that Moringa oleifera is a healthy, nutritious plant with positive benefits on people. Several in-vitro and in-vivo research 19 have demonstrated the bioactive components' prospective pharmacological action.

2.1 Polyphenols: Polyphenolic components such flavonoids and phenolic acid are primarily found in the dried leaves, roots, flowers, stems, pods, and seeds of Moringa oleifera (24, 25). Flavonoids are the most prevalent phytoconstituents found in plants and are secondary metabolites. They have positive effects on human health and shield us from numerous illnesses. The leaves of M. oleifera contain a variety of flavonoids, however the most prevalent flavonoids with significant pharmacological activity are quercetin, apigenin, kaempferol, and isorhamnetin. 24 . As measured by colorimetric analysis 26, M. oleifera seeds contain 2.900 0.0002 (mg Quercetin equivalents / g dry matter) flavonoids. Together with anti-inflammatory, anti-allergic, anti-microbial, and many other properties, flavonoids have been shown to have anticancer and antioxidant properties 27. The M. oleifera leaf extract has a phenol concentration of around 962.6 mg RE/g, and among the several phenolic components, Quercetin-3-O-Dglucoside shows strong antioxidant action 28, 29.

2.2 Vitamins: The primary source of a number of vitamins, minerals, proteins, amino acids, and organic acids is moringa. The dietary chemical substances known as vitamins are vital for human health (30, 31). Vitamin A, Vitamin B, and Vitamin C concentrations in Moringa oleifera leaf extract were found to be 80 g, 2.324 mg, and 8.6 mg, respectively 61. In a different study, it was shown that the amounts of vitamin C and beta carotene in 100 ml of moringa leaf extract were 6.26 0.028 mg and 223 5.657RE, respectively. These nutrients have strong bioactivity, function as antioxidants, and maintain a balanced diet.

2.3 Glucosinolates and Isothiocyanates: Glucosinolates, which have bioactive and nutraceutical potentials, are the secondary metabolites of plants that have received the most attention. Two highly effective glucosinolates, such as acetyl—4-rhamno-pyranosyloxy-benzyl glucosinolate Isomer III and -4-rhamnopyranosyloxybenzyl glucosinolate, are found in the moringa oleifera plant. Glucomoringin, a rare glucosinolate found in Moringa oleifera, is a strong anti-proliferative and antibacterial compound 36. When myrosinase, an enzyme found in plant tissues and the human GIT tract, is present, glucosinolates are transformed into isothiocyanates 37, 38. A component of plants called isothiocyanates has anti-inflammatory and antioxidant properties 39, 40.

2.4 Terpenes, Saponins and Tannins: Moringa oleifera has a saponin concentration of approximately 0.67% 41. Furthermore, Jain et al., IJPSR, 2020; Vol. 11(12): 5968-5973. E-ISSN: 0975-8232; P-ISSN: 2320-5148. Journal of Pharmaceutical Sciences and Research International The stated percentages for 5970 seed are 1.20 0.70%, 3.20 0.90 %, and 13.65 4.56%, respectively 27. High-performance liquid chromatography 42 was used to separate and analyse the saponin from Moringa leaves. Many plants include terpenes and tannins, which also exist in glycosidic form. Tannins and terpenoids were also found in Moringa Oleifera, according to phytochemical analysis 21, 43.

2.5 Alkaloids: Alkaloids, which have a wide range of therapeutic effects (5.60 0.60 -13.83 1.03%), are abundant in all parts of this plant. Others estimated the alkaloids to be 460 mg. extract from 100 g-1 of moringa leaves 27. The anti-hypertensive activity of Moringa oleifera's total alkaloids was assessed.

PYTHOCHEMISTRY:

In the purest sense, phytochemicals are substances made by plants. However, the term is typically only used to describe substances that might affect a plant's flavour, texture, fragrance, or colour without having any effect on human health. A variety of rather rare compounds can be examined by looking at the phytochemicals of Moringa species. This plant family is particularly rich in compounds that include the simple sugar rhamnose and in a class of very uncommon substances known as glucosinolates and isothiocyanates (10,38). For instance, various Moringa preparations' ingredients have been shown to exhibit hypotensive, anticancer, and antibacterial activity. These ingredients include 4-(4'-O-acetyl-a-L-rhamnopyranosyloxy)benzyl isothiocyanate [1], 4-(a-L-rhamnopyranosyloxy)benzyl isothiocyanate [2], niazimicin [3], p Although these substances are somewhat specific to the Moringa family, it is also abundant in vitamins, minerals, and other phytochemicals that are more widely known, such as carotenoids (including -carotene or pro-vitamin A). These qualities will be the focus of a subsequent assessment in this series and are all covered in depth by Lowell Fuglie (47) and others.

METHODS:

2.1. Preparation of Moringa oleifera seeds powder:

The Klang, Selangor area provided the Moringa oleifera. When seeds were opened, those that were not rotten, old, diseased, brownish, or dried out were distinguished from those that were. The seeds were dried in an oven for 24 hours at 50 degrees Celsius (Memmert, ULE 400, Germany). The hulls and wings were taken off the rice kernels using a Satake THU class rice husk-removing machine. With a home food blender, the kernels were broken down and ground into a medium-fine powder (Moulinex, France).

2.2. Preparation of Moringa oleifera seeds extract:

A beaker containing 0.2 litres of distilled water was filled with 5000 mg of powdered Moringa oleifera seeds. To extract the active ingredient from Moringa oleifera, the mixture was mixed for two minutes at high speed in a home blender (Moul-inex). In order to create a stock solution with 10,000 mg/l, the suspension was filtered through a muslin cloth in a beaker and the filtrate was produced up to 0.5 l. To find the best doses of Moringa oleifera for water samples with various beginning turbidities, jar test experiments were carried out using 10,000 mg/l of Moringa oleifera stock solution.

2.3. Preparation of water samples:

In order to create artificially turbid water samples, distilled water was mixed with kaolin from Laguna Clay in California, USA. One litre of distilled water was mixed with ten grammes of kaolin. For consistent kaolin particle dispersion, the suspension was agitated slowly at 20 rpm for 1 hour in a jar test device (BIBBY Stuart Scientific, UK). The suspension was then let to stand for 24 hours to allow the kaolin to fully hydrate. Scanning Electron Microscopy (JEOL 6400, Tokyo, Japan) estimated the largest particle size to be in the kaolin suspension to be around 1 lm. During the coagulation tests, water samples of varied turbidities were prepared using this kaolin suspension as the stock solution. Muyibi and Evison (1995, 1996) conducted three different types of turbidity tests: medium (50–100 NTU), high (100–200 NTU), and very high (>200 NTU) (greater than 300 NTU).

2.4. Packing and storage of Moringa oleifera:

The ground Moringa oleifera seeds were divided into two groups and packaged in closed and open containers, respectively. Glass bottle with plastic top was the closed container utilised in this investigation. The open container was a 500 ml glass beaker. The packaging was kept in two separate environments: ambient temperature (28 °C) and a refrigerator (3C). One month, three months, and five months were the storage times.

2.5. Coagulation test:

Jar testing was used to conduct the coagulation test (BIBBY Stuart Scientific, UK). The batch technique used in the study included quick mixing, gradual mixing, and sedimentation. The water samples were put into six 500 ml glass beakers, which were then stirred simultaneously while the rotational speed was changed to simulate varying mixing intensities and the ensuing flocculation process.

2.6. Experimental runs:

First, a number of trial runs were conducted to determine the best dosages of Moringa oleifera for coagulating water samples. 500 cc of the synthetic water was poured into beakers, which were then placed on the floc illuminator and stirred at the predetermined rate of quick mixing. The coagulant dosage of Moringa oleifera was simultaneously added into each beaker using 20 ml test tubes during rapid mixing. After a fast mixing phase, the predetermined gradual mixing intensity was rapidly established, and the beakers were carefully removed from the mixture. and departed for the sedimentation stage using the flocilluminator. Upon settling, 20 ml of the sample was drawn from the centre of each beaker to determine the turbidity. The amount of Moringa oleifera stock solution that produced the lowest turbidity in the beakers was the optimal dosage for that particular water when it came to dosage determination. Second, randomised trial runs using the best doses of Moringa oleifera stored under various packaging and temperature conditions were conducted. Turbidimeter was used to measure the turbidity (HACH, 21200P). Using a pH metre, pH values of the samples were determined (CyberScan pH 2000).

2.7. Statistical analyses:

The statistical analysis was performed using the SPSS statistics software (Version 11.0). At p 0.05, all statistical significance was taken into account. To confirm the significance of differences between the means, one-way analysis of variance (ANOVA) with the Tukey-HSD test was used. The significant differences between the two means were confirmed using the independent sample test (t-test). Bivariate analysis of variance was used to examine the correlation between two variables. Experiments were conducted in duplicate.

CONCLUSION:

A powerful and important plant with outstanding biological and medicinal activities is moringa oleifera. It contains a large number of strong, bioactive ingredients that have bioactivity against a wide range of diseases. The bioactive components of Moringa oleifera are discussed in this review along with its effective medicinal uses. This review also focuses on Moringa oleifera's potential value in the management of hyperlipidemia. More research should be done to determine the precise mechanism of action of the Moringa oleifera components in the treatment of hyperlipidemia. This updated review attests to Moringa oleifera's pharmacological efficacy.

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