Peer Reviewed Journal, ISSN 2581-7795

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FORMULATION OF MORINGA POWDER AND-ACNE GEL BY MORINGA OLIFERA LEAVES

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Abstract:

The concept of nutraceuticals originated from a study conducted in the UK, Germany, and France, which revealed that consumers prioritize nutrition over exercise or genetic factors in maintaining good health. In recent years, nutraceuticals, which provide health benefits and act as alternatives to conventional medicine, have gained increasing attention. The use of nutraceuticals may render traditional pharmaceuticals unnecessary or less essential, thereby reducing the risk of adverse side effects. The biochemical effects of nutraceuticals often differ from those of conventional medications. Contemporary health issues such as obesity, osteoporosis, cancer, diabetes, allergies, and dental problems are being addressed globally. Both exercise and nutrition are crucial in preventing and managing obesity, which is becoming increasingly widespread around the globe. Key components of nutraceuticals include nutrients, herbs, and dietary supplements, making them vital for maintaining health, combating various diseases, and improving quality of life. It is widely recognized that food products can be utilized for disease prevention and treatment. Most pharmaceutical compounds used in current formulations were originally derived from their natural forms.

INTRODUCTION:-

Moringa is a member of the Moringaceae family and serves as an effective solution for malnutrition. The leaves, peels, and seeds of Moringa are rich in essential phytochemicals, rendering them advantageous. Indeed, Moringa is reported to contain 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yogurt, 15 times more potassium, and a greater amount of iron than bananas. It also has 0.25 times more iron than spinach [1]. Moringa's ease of cultivation makes it a viable

remedy for malnutrition. Nations such as Senegal and Benin utilize Moringa to address the nutritional needs of children [2]. Children who are not breastfed frequently exhibit signs of malnutrition. To enhance milk production, galactagogues are often administered to breastfeeding mothers. These galactagogues are derived from plant sterols, which serve as precursors to hormones vital for the development of children. Moringa is abundant in phytosterols, including stigmasterol, sitosterol, and campesterol, which act as hormone precursors. These compounds promote the increase of estrogen, thereby stimulating the growth of mammary ducts to facilitate milk production. It is employed as a treatment for malnutrition in children under the age of 3.



Material and methods Nutritive properties

Every component of Moringa serves as a reservoir of vital nutrients and antioxidants. The leaves of Moringa are abundant in minerals including calcium, potassium, zinc, magnesium, iron, and copper. [2] Additionally, olive oil is rich in vitamins C, D, and E, along with vitamin A, vitamin B, beta-carotene, folic acid, pyridoxine, and niacin. [8] Phytochemicals such as tannins, sterols, terpenoids, flavonoids, saponins, anthraquinones, alkaloids, and reducing sugars, as well as antioxidants like alucosinolates. isothiocyanates, glycoside compounds, and Glyceryl-1-9octadecanote[9] are also present in Moringa leaves, which are low in calories and suitable for the diets of individuals with obesity. Broad beans are high in fiber and are advantageous for addressing digestive issues and cancer prevention. [10,62] Research indicates that ripe fruit contains roughly 46.78% fiber and about 20.66% protein. The amino acid composition of pods is 30%, leaves 44%, and flowers 31%. Fruits and immature flowers have comparable levels of palmitic, linolenic, linoleic, and oleic acids. [11] Moringa is rich in numerous nutrients essential for growth and development; calcium is regarded as one of the most crucial nutrients for human growth. Eight ounces of milk provide 300-400 mg, while Moringa leaves offer 1000 mg, and Moringa powder exceeds 4000 mg. Moringa powder can serve as a substitute for iron supplements in diabetes management. In contrast, beef contains only 2 mg of iron, whereas Moringa leaf powder has 28 mg of iron. Moringa is said to have a higher iron content than spinach. [12] Sufficient dietary zinc is vital for sperm cell development and is necessary for DNA and RNA synthesis. Moringa leaves contain approximately 25.5-31.03 mg/kg of zinc, fulfilling the daily zinc requirement. [13] Polyunsaturated fatty acids (PUFA) include linoleic acid, linoleic acid, and oleic acid; these fatty acids can help regulate cholesterol levels. Studies reveal that Moringa seed oil comprises about 76% PUFA, making it an excellent alternative to olive oil.

Processing of moringa

Most plants tend to lose their nutritional value during processing. A comparison of the nutritional content in raw, germinated, and fermented Moringa oleifera seed powder revealed that raw Moringa oleifera seed powder is richer in phytochemicals, whereas the fermented and sprouted versions contain a higher concentration of amino acids. [17,59] This outcome is attributed to the biochemical processes occurring during germination and the microbial activities involved in fermentation. Additionally, one study investigated the impact of boiling, simmering, and steaming on the nutrient levels in Moringa leaves. Notably, boiling emerged as the most effective method among those examined, as it significantly lowered the levels of cyanide, oxalate, and phytate compared to the other techniques. The presence of phytates and similar compounds can hinder the bioavailability of certain nutrients, necessitating processing to enhance the utilization of essential nutrients found in the seeds and leaves. [18,63] indicated that anger heightened the iron and antioxidant levels. Consequently, Moringa seed powder

treatment may be beneficial for addressing various health issues. Nevertheless, some research indicates that children may be hesitant to consume moringa due to its slightly bitter taste. [70] employed three cooking methods—stir-frying, steaming, and boiling—when preparing moringa noodles. These noodles were tested on mice to assess their effects on mammary tumors. Interestingly, the stir-fried noodles positively influenced the mammary glands of the mice and enhanced milk production. The advantage of stir-fried noodles lies in their ability to increase lactose content, as the oil used is abundant in sterols. Olea europaea is also incorporated into chocolate. A recent study evaluated various concentrations of moringa in chocolate supplements and determined that a 20% concentration of moringa in cocoa powder was beneficial. Similarly, the addition of moringa to halava tahini enhances the nutritional profile of this delightful dish. These investigations highlight the potential for creating chocolate and halva tahini that are rich in protein and minerals. [20] A variety of moringa supplements can help ensure that children receive sufficient nutrients.

Preservation methods

Moringa can be stored for extended periods without compromising its nutritional value. The leaves may be preserved either in a dry state or frozen. Research conducted by [15] indicated that using oven heat to dry the leaves retains more nutrients, excluding vitamin C, compared to simply dried leaves. Consequently, to maintain the health of the leaves, the drying process can be performed using common household appliances like ovens. The shelf life of Moringa can be prolonged through drying without altering its nutritional content. However, excessive consumption of moringa may lead to significant iron deficiency. An overabundance of iron can result in intestinal complications and hemochromatosis. Therefore, it is advisable to limit the intake to 70 grams of moringa daily to avoid overeating.[21]

Morphology

The tree exhibits rapid growth in fertile, well-drained sandy soil and favors upright growth, although its branches can sometimes be uneven and of inferior quality, forming an umbrella-shaped crown. The brown seeds possess a halved, transparent shell. Each canopy is umbrella-shaped, and the brown seeds have an outer shell capable of containing approximately 15,000 to 25,000 seeds per plant annually.

Botanical and Geographical Distribution

Moringa oleifera is extensively found across the globe, with its origins traced back to India. It can be observed in regions such as Asia, Africa, the Caribbean, Latin America, Arabia, and the East Indies. This plant is prevalent in Asia, Africa, the Caribbean, Latin America, the Pacific Islands, Florida, Madagascar, Central America, Cuba, the Philippines, Ethiopia, and Nigeria. Historical accounts indicate that M. Camellia oleifera was brought to other regions from Nigeria. The historical narrative of Olea oleifera outlines its journey from India to Africa, Southeast Africa,



Peer Reviewed Journal, ISSN 2581-7795



and the Philippines. In ancient times, its distribution extended from India to Africa, Southeast Africa, and the Philippines. This plant thrives in tropical and subtropical climates where temperatures range from 25 to 35°C. Olea europaea is a deciduous tree that typically flourishes in tropical and subtropical areas. It predominantly grows in these regions around the world. The tree prefers indirect sunlight and should not be subjected to waterlogging. It thrives best in direct sunlight without water stagnation, and the soil should be slightly acidic or alkaline. The tree starts to produce fruit between 6 and 8 months of age, and the soil should maintain a slightly acidic to alkaline pH. Commercial cultivation of this tree occurs in various countries, including Africa and Mexico. It is also cultivated commercially in regions such as Africa, Mexico, Hawaii, and South America. However, the quality of food produced varies in South America due to differences in soil composition. Consequently, the primary characteristics also differ in South America, highlighting these variations.

Cultivation and Collection

Moringa is a small to medium-sized deciduous or evergreen tree, commonly found in tropical, mountainous, and certain central regions of Nepal.

It can reach heights of 25-30 meters and thrives in the middle table, Siwalik, and Terai areas, which are most suitable for its cultivation. It flourishes best in direct sunlight at altitudes ranging from 0 to 1000 meters. Moringa is adaptable to various soil types but shows a preference for neutral to slightly acidic soils (pH 6.3-7.0). This suggests that it favors well-drained sandy or loamy soil. The minimum annual rainfall required is approximately 250 mm, while the maximum can exceed 3,000 mm. However, the roots are susceptible to rot in waterlogged conditions. In regions with heavy rainfall, it is advisable to plant the trees on slopes to facilitate water drainage. The presence of a long taproot enables the plant to endure drought conditions. The optimal temperature range for growth is between 12-40 degrees Celsius, although the tree can tolerate temperatures up to 48 degrees in shaded areas and can survive light frosts. It readily establishes itself in coastal and savanna regions where the soil is well-drained and the water table remains relatively high throughout the year. While the plant is drought-resistant, its leaf production significantly declines under persistent water stress. Although it is not harmed by frost, it may freeze back to the ground and perish.

Benefits of Moringa oleifera

Nutritional properties:-

Moringa is often referred to as the "miracle tree" because of its exceptional nutritional content and its capacity to address various health issues. Every component of the plant is nutrient-rich. The leaves of Moringa are abundant in minerals including calcium, potassium, zinc, magnesium, iron, and copper. They are calorie-free, making them suitable for inclusion in the diets of individuals with obesity. Additionally, the leaves provide all essential amino acids and are high in both protein and minerals. Broad beans are composed of roughly 46.78% fiber and 20.66% protein, and they are beneficial in managing stomach disorders and cancer. Furthermore, Moringa is a source of several vitamins, including vitamin A, vitamin B, beta-carotene, pyridoxine, niacin, vitamin C, and vitamin D.

The use of different parts of Moringa oleifera is described as below:-

1. Leaves: The leaves of the Moringa Oleifera (MO) plant are considered to be an abundant source of vitamins and minerals, exhibiting significant antioxidant properties primarily derived from plant-based vitamins and phenolic compounds like quercetin and kaempferol. These leaves can be utilized as a vegetable and are also suitable for making tea, powder, and other medicinal applications. Furthermore, the juice extracted from fresh leaves offers growth advantages and has the potential to enhance yields by 25-35%. A study conducted in Japan in 2009 indicated that the leaves serve as effective sinks for the absorption and utilization of carbon dioxide. Moringa trees are capable of absorbing carbon dioxide at a rate 20 times greater than that of typical plants. It is reported that Moringa provides seven times more vitamin C than oranges, ten times more vitamin A than carrots, seventeen times more calcium than milk, nine times more protein than yogurt, fifteen times more potassium than bananas, and twenty-five times more iron than spinach.

2. Root: The bark of the Moringa root has therapeutic properties that can address stomach ulcers and lesions of the gastric mucosa. It also plays a role in reducing acidity and elevating the pH level of the juice. Consequently, Moringa Oleifera exhibits anti-inflammatory characteristics, suggesting its potential use as an anti-inflammatory medication in the future.

3. PODhusks: The bark of the Moringa Oleifera contains a variety of bioactive compounds, including alkaloids, flavonoids, tannins, triterpenes, diterpenes, and cardiac glycosides. The extract from the broad bean shell of Moringa Oleifera demonstrates antibacterial activity against certain Gram-positive bacteria, such as Staphylococcus epidermidis. The water table remains relatively high throughout the year, although the plant is capable of withstanding drought conditions; however, leaf production significantly declines under prolonged water stress. While it is not adversely affected by frost, it may freeze back to the ground and perish.

Medicinal Properties

Moringa possesses numerous medicinal properties and is capable of treating a variety of ailments. It is utilized for the management of diabetes, heart disease, anemia, arthritis, respiratory issues, skin conditions, liver disorders, stroke, infertility, rheumatism, digestive problems, and other health concerns. In 2008, it was honored as the tree of the year by the National Institute of Health and Home Care in India. Additionally, it is employed in the treatment of acid, pneumonia, and insect bites across various countries, including those in Africa. Various studies indicate that the leaves exhibit antiseptic, antibacterial, and anti-abortion properties, and they function as a flocculant and stimulant. Moringa powder can serve as an alternative to iron supplements, thereby aiding in the management of diabetes. The health advantages of this remarkable herb appear to be limitless.



Peer Reviewed Journal, ISSN 2581-7795



IT FIGHTS AGAINST FREE RADICALS

Antioxidants are well-regarded for their ability to eliminate free radicals that lead to oxidative stress, cellular damage, and inflammation. Furthermore, the leaves, flowers, and seeds of Moringa are rich in antioxidants such as flavonoids, polyphenols, and ascorbic acid, which offer numerous benefits. A particular study revealed that leaf extracts demonstrated superior antioxidant activity, enhanced free radical scavenging capacity, and more significant inhibition of lipid, protein, and DNA oxidation compared to flowers and seeds. This indicates that it protects cells in various organs from damage caused by free radicals, thereby maintaining their health and optimal function. [19]

IT PROTECTS CARDIOVASCULAR SYSTEM:-

Moringa leaf powder is particularly advantageous for cardiovascular health as it helps regulate blood lipids, prevents arterial plaque formation, and reduces cholesterol levels. The remarkable blend of diuretics along with properties that lower lipids and blood pressure renders this herb effective against heart-related ailments. Additionally, moringa leaf juice offers considerable benefits in managing blood pressure.Glucosinolates and thiocarbamate glycosides have been extracted from moringa leaves, demonstrating anti-inflammatory properties. [20]

ANTI DIABETIC:-

Moringa exhibits notable antidiabetic characteristics. The leaf powder is proficient in reducing blood lipid and glucose levels while managing oxidative stress in individuals with diabetes; this indicates its ability to decrease blood sugar and cholesterol levels, as well as enhance the protective repair mechanisms of the body. Moringa has been proven effective in treating patients with both type 1 and type 2 diabetes (referred to as type 1 diabetes) who lack the ability to produce insulin. Insulin serves as a medication that regulates blood sugar levels within the body. Type 2 diabetes is characterized by insulin resistance and arises from beta cell dysfunction. [20]

NUTRIENT CHART:



Alpha-Carotene Arginine Beta-Carotene Beta-Sitosterol Caffeoylquinic Acid Campesterol Carotenoids Chlorophyll Chromium Delta 5-Avenasterol Glutathione Histidine Indole Acetic Acid Indoleacetonitrile Kaempferal Leucine Lutein Methionine Myristic Acid Palmitic Acid

Proline Quercetin Rutin Selenium Threonine Tryptophan Xanthins Xanthophyll Zeatin Zeaxanthin

Vitamin B1 (Thiamin) Vitamin B2 (Riboflavin) Vitamin B3 (Niacin) Vitamin B6 (Pyridoxine) Vitamin B7 (Biotin) Vitamin C Vitamin D Vitamin E Vitamin K

Arginine Quercetin Beta-Carotene Rutin Beta-Sitosterol Selenium Caffeoylquinic Acid Threonine Campesterol Tryptophan Glutathione Indoleacetonitrile Histidine Kaempferal Indole Acetic Acid Leucine

Proline

Essential Amino Acids

Isoleucine

Leucine

Phenylalanine Threonine

Tryptophan Valine

Lysine Methionine Alanine Aspartic Acid Arginine Cystine

Glutamine Glycine

Non-essential Amino Acids

Histidine Serine Tyrosine IRJEdT

Peer Reviewed Journal, ISSN 2581-7795



How To Make Moringa Powder

While fresh moringa leaves are readily available in the market, it is advisable to grind them into powder for use as needed. Making powder from moringa leaves is quite simple. Begin by taking the fresh leaves, detaching them from the stalks and stems, and washing them thoroughly 2-3 times with sufficient water. Next, spread the leaves on a kitchen towel to absorb any excess moisture. Afterward, place them on a colander or paper towel and keep the mixture in a covered area, avoiding direct sunlight to preserve the vibrant green color of the leaves. If sun drying is not an option, drying them under a fan is acceptable.

The leaves will become dry after approximately 12 days. Once they are crispy, gently crush them, discarding any remaining stems, and then grind the leaves in a blender. Store the powder in an airtight container, where it will remain fresh for up to 6 months at room temperature. After this period, it may lose some potency but remains safe for consumption. If there is an excess amount, it can be refrigerated. Note that the taste may be slightly bitter, so it is recommended to use it in small quantities.

How to Use Moringa Powder-

- 1. Incorporate 1 teaspoon of powder into your regular daal to enhance its nutritional value.
- 2. Mix it into your chapati or bread dough.

3. Sprinkle it over any stir-fry, similar to how you would use coriander powder.

4. Combine some Moringa powder, lemon juice, and honey in a cup of boiling water to prepare a healthy Moringa tea.

5. Stir some moringa powder into your yogurt, raita, soup, and stew.

6. It can be included in your dosa or cheela batter.

7. My preferred method – Blend some moringa powder into your coriander powder container so it can be consistently added to your daily daal and sabzi; I always incorporate dried Moringa leaves and dried curry leaves into my homemade Coriander powder to enhance its flavor and health benefits.

- 8. Add it to your favorite breakfast smoothies.
- 9. Whenever you prepare green chutney, include ½ teaspoon of moringa powder.
- 10. Incorporate a small amount into your salad dressing.
- 11. It does not dissolve in cold water, so add it to hot water or other liquids. Conclusion:-
- 1. Moringa leaves possess antibacterial, antifungal, and anti-inflammatory properties. They can help lower blood sugar and cholesterol levels. The leaves of this plant are effective in treating various diseases, particularly cancer, heart disease, and diabetes.
- 2. Moringa seeds serve as a suitable alternative to alum.
- 3. Increasing the dosage of moringa leads to a reduction in the apparent dose, followed by an increase in residual turbidity due to the re-stabilization of the initial turbidity caused by flocculation, which is then followed by a significant increase.

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Peer Reviewed Journal, ISSN 2581-7795



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