International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

# Comprehensive Review on Moringa Oleifera tablet and It's Health Benefits

Harshada Angre, Anjali Yadav, Simran Rajbhar, Harsh Kamble, Mr.Abhishek Palav, Ms.Shivani pawar

Date of Submission: 08-06-2024 Date of Acceptance: 18-06-2024

**ABSTRACT**
Moringa oleifera is a remarkable herbal plant that serves multiple purposes, including human food and medicinal uses across the globe. Scientific research has identified numerous health benefits associated with this plant, making it a highly valued and soughtafter resource. The leaves of Moringa oleifera contain essential amino acids, carotenoids, and other components with nutraceutical properties, which makes it a highly nutritious plant that can be used as a supplement or added to various food preparations. The stem of the plant is also evaluated for its nutritional benefits. One of the most significant factors contributing to the medicinal value of Moringa oleifera is its incredible range of vital antioxidants, antibiotics, and nutrients, including vitamins and minerals. Almost every part of the plant can be used as a source of nutrition and other useful values. This mini-review provides a comprehensive overview of the health benefits of Moringa oleifera that make it an essential resource for human health and well-being. Phytomedicines, which refer to plant-based medicines, are believed to have several advantages over conventional drugs, including fewer side effects, lower toxicity levels, and greater efficacy. As a result, they are regaining interest in current research and are being explored as an alternative to traditional pharmaceuticals. Moringa oleifera, a member of the Moringaceae family, is a versatile plant that has been used for centuries in traditional medicine. It is native to northwestern India, but is now cultivated in many tropical and subtropical regions across the world. Moringa is known for its numerous health benefits and is widely consumed in Africa for self-medication by patients affected by diabetes, hypertension, or HIV/AIDS. The plant is a rich source of vitamins, minerals, and antioxidants, and is believed to have anti-inflammatory, antifungal, and antibacterial properties. It is used to treat a variety of ailments, including digestive disorders, skin infections, and respiratory problems.

**KEY WORDS:** Moringa oleifera, traditional medicinal uses, phytochemistry, phytopharmaceutical formulation, toxicity. carotenoids, and glucosinolates.

## I. INTRODUCTION

Moringa oleifera is a tree that belongs to the Moringaceaefamily. This tree is native to the Indian subcontinent and is widely used in South and Southeast Asia. It is known by many names, such as moringa, drumstick tree (because of its long, slender, triangular seed-pods), horseradish tree (because the taste of its roots resembles horseradish), or malunggay (known in Asia's maritime or archipelagic areas). Additionally, it is a fast-growing and drought resistant tree.[1] Moringa oleifera is known to be extremely beneficial for the liver as it protects it from damage, oxidation and toxicity through its leaves and flowers which are packed with polyphenols. The oil extracted from Moringa oleifera can help restore liver enzymes to normal levels, reduce oxidative stress and increase protein content in the liver.[2]The tree typically reaches a height of 10 to 12 meters and has a wide, open crown composed of brittle branches that droop. The tree's foliage consists of tripinnate leaves that are feathery, and its bark is thick, corky, and deeply fissured with a whitish color. The tree is highly prized for its edible fruits, leaves, flowers, roots, and seed oil, and is extensively used in traditional medicine in both its native and introduced ranges.[3]Moringa is a plant that grows best in warm temperatures between 77 and 95 degrees Fahrenheit. However, they can also tolerate extremely hot temperatures up to 118 degrees Fahrenheit, provided they are in the shade during the afternoon. On the other hand, Moringa plants do not tolerate cold temperatures well, although they are able to withstand a light frost. If you live in the USDA zones 10 and 11, you can grow this plant outdoors year-round. In regions with warm summers, you can grow it outdoors for part of the year.[4]There are two main

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

**Figure.1.Moringa leaves**

groups of Moringa varieties: perennial and annual.[5]Moringa leaves boast anti-diabetic, antibacterial, anti-cancer, and anti-inflammatory properties due to their high content of phytochemicals, carotenoids, and glucosinolates.[6]The chemical constituents of Moringa oleifera, including stems, leaves, flowers, pods, and seeds, have been analyzed for the presence of bioactive compounds. These studies have shown the predominance of secondary metabolites, such as phenolic acids, gallic acid, ellagic acid, chlorogenic acid, ferulic acid, glucosinolates, flavonoids, quercetin, vanillin, and kaempferol. These compounds have been found to have nutritional, pharmaceutical, and/or antimicrobial properties.[7]The leaves and seeds contain compounds with multiple applications. The complex matrix can reduce costs and improve processes in agriculture.[8] Moringa trees have been used to combat malnutrition, especially among infants and nursing mothers.

Since moringa thrives in arid and semiarid environments, it may provide a versatile, nutritious food source throughout the year in various geographic regions.[9]Moringa leaves are a fantastic source of various essential vitamins and minerals. A 21-gram cup of fresh chopped leaves contain the following nutrients:

- protein:2grams vitamin
- B6:19% of the Recommended Daily Allowance (RDA)
- Vitamin C:12%of the RDA
- Iron:11%of the RDA
- Riboflavin (B2):11%of the RDA
- Vitamin A(from beta carotene):9%of the RDA
- Magnesium:8%of the RDA.[10]

The manufacturing process for Moringa leaf tablets involves the use of fresh green leaves, maize starch, and acacia gum as raw materials. The process starts with washing and grading the leaves based on the required standards. The next steps include trimming, scraping, cutting, blanching, cooling, and drying. Pulverization, screening, granule preparation, tablet production, packaging, labeling, and personal hygiene are the steps involved in Moringa processing.[11].The seeds of M. Oleifera are approximately 1 cm in diameter and have a globular shape. They are three-angled, with an average weight of 0.3 g and have three wings that extend from the base to the apex of the seed. These wings are 2-2.5cm long and 0.4-0.7 cm wide. The kernel makes up about 70%75% of the seed's weight.[12]The extracts from leaves, seeds, and stems of M. Oleifera have been shown to have inhibitory effects on various fungal strains. These strains include Aspergillusflavus, Aspergillusterreus, Aspergillusnidulans, Rhizoctoniasolani, Aspergillusniger, Aspergillusoryzae, Fusariumsolani, Penicilliumsclerotigenum, Cladosporiumcladosporioides, Trichophytonmentagrophytes, Penicillium species, and Pullarium species.[13]. Antioxidants are popular due to their ability to fight against free radicals that cause oxidative stress, cell damage, and inflammation. Moringa, in particular, contains flavonoids, polyphenols, and ascorbic acid in its leaves, flowers, and seeds, which are beneficial in many ways.

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

Figure

**Figure.2.Diffrent parts of Moringa oleifera.**

A study found that leaf extracts have :

- Higher antioxidant activity
- Free-radical-scavenging capacity
- Higher inhibition of lipid, protein, and DNA oxidation than flowers and seeds

This means that it prevents the damage and degradation that free radicals cause in the cells of different organs in the body, keeping them healthy and functioning at their best. it prevents the damage and degradation that free radicals cause in the cells of different organs in the body, keeping them healthy and functioning at their best.[14] "Moringa is believed to contain 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."[15].Moringa is a nutrient powerhouse, containing 92 nutrients and all nine essential amino acids, , vitamins and minerals are essential for our bodies to function properly. Here are some of the important vitamins and minerals that we need: - Vitamin B1 (thiamine) helps in the conversion of food into energy and is important for cell health. Vitamin B2 (riboflavin) helps in converting carbohydrates from our food into glucose and also metabolizes protein and fats.Vitamin B3 (niacin) is important for the proper functioning of every part of our body. It may also boost brain function and help lower cholesterol. Vitamin B5 helps in the production and breakdown of fats. Vitamin B9 (folate) converts the food we eat into energy. Vitamin C is a key vitamin in our body, known as ascorbic acid, which helps in the formation of blood vessels, muscles, collagen, cartilage, and supports our immune system. Moringa reportedly has up to seven times more Vitamin C than oranges. Vitamin E helps in protecting our body against free radicals, which can damage our cells. Vitamin K helps in blood clotting and building healthy bones. Calcium helps build strong teeth and bones, supports a healthy nervous system, and the proper functioning of muscles.Potassium helps in the proper functioning of our nervous system,muscle contraction, and maintaining a regular heartbeat. Iron helps in making hemoglobin which our red [16]. It can help eliminate various pathogens, such as bacteria, fungi, viruses, and parasites. It can also assist in the inhibition of chronic inflammation, including conditions like asthma, ulcerative colitis, and metabolic diseases. Moringa has been proven to alleviate immune disorders caused by physical and chemical irritation, such as metal intoxication, drug side effects, or food additives. Furthermore, it has been found to be effective in inhibiting

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

autoimmune diseases like rheumatoid arthritis, atopic dermatitis, and multiple sclerosis [17]

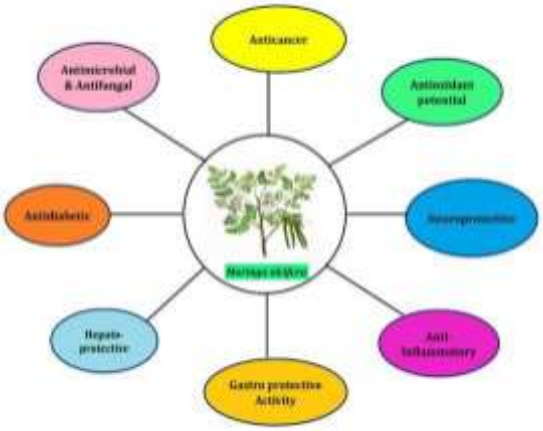

**Figure.3.. Health benefits** It is beneficial in several chronic conditions, including :

- Antimicrobial &Antifungal
- High blood pressure
- Anti Diabetic
- Anti inflammatory
- Neuroprotective
- Anti Cancer
- Gastro protectiveActivity [18]

All parts of the moringa tree and its extracts may have health benefits.

**PHARMACOGNOSY OF MORINGA OLEIFERA**

| | |
|---|---|
| **KINGDOM.** | **:PLANTAE** |
| **SUBKINGDOM.** | **:TRACHEOBIONTA** |
| **DIVISION.** | **:MAGNOLIOPHYTA** |
| **SUPERDIVISION.** | **:SPERMATOPHYTA** |
| **CLASS.** | **:MAGNOLIOPSIDA** |
| **SUBCLASS.** | **:DILLENIIDAE** |
| **ORDER.** | **:CAPPARALES** |
| **FAMILY.** | **:MORINGACEAE** |
| **GENUS.** | **: MORINGA** |
| **SPECIES.** | **:MORINGA OLEIFERA LAM** |

## II. LITERATURE SURVEY

A literature survey on moringa oleifera would involve the various knowledge about the moringa oleifera plant which consist of key points, benefits, experimental process, formulation and evaluation of moringa oleifera tablet.

John.A.Parrota, (2014) It is valued mainly for its edible fruits, leaves, flowers, roots and seed oil which has been used extensively in traditional medicine throughout its native and introduced ranges.

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

Julie Thomson Adolf, (2023) in this it is mentioned that the plant can tolerate extremely hot temperature of up to 118-degree Fahrenheit.

Paula Garcia Milla et al, (2021) Moringa Oleifera is known to be extremely beneficial for the liver has it protects it from damage.

PiyushKashyap et al, (2022) It boasts anti-inflammatory properties due to their high content of phytochemicals, carotenoids and glucosinolates.

Suian Jose Granella et al, (2021) It contains compounds with multiple applications it involves complex matrix that reduces cost and improves processes in agriculture.

RaimundaSamiaNogueriaBrihante et al, (2017) The chemical constituents of Moringa oleifera have been analyzed for the presence of bio-active compoud

Alessandro Leone et al, (2016) It is mentioned about the size, shape, diameter and weight of. The seeds.

AshutoshPareek et al, (2023) the extracts from leaves, seeds and stems of moringa oleifera have been shown to have inhibitory effects on various fungal strains.

KhantilathaThapa, (2019) a study found that leave extracts have higher antioxidant activity and higher inhibition of lipid, protein and DNA oxidation.

Zahidul Islam et al, (2021) In this it is mentioned about the level and the percent of vitamins that is available in moringa oleifera.

Marcela Vergara Jimenez et al, (2017) It can help to eliminate various pethogens and it also assist in the inhibition of chronic inflammation.

Bethany Cadman, (2024) all parts of moringa tree and its extract may have health benefits

Ahmad FaizalAbdullRazis et al, (2014) Moringa oleifera is a plant with essential amino acid and. nutraceutical properties, making it a good supplement or food ingredient.

Naif Al- Jadabi et al, (2023) it is used for the study of water treatment.

Chuene Victor Mashamaite et al, (2022) Moringa leaf extract promotes seed germination, plant growth, root development, delays fruit senescence and improves yield and product quality.

Mohamed E Abd El- Hack et al, (2014) it is used as a feed supplement to improve feet efficiency and livestock performance.

Sabina Devkota et al, (2020) it is drought tolerant tree which can grow in poor soil condition with minimal rainfall.

Aduna, it is adaptogen that enhances resistance to stress, whether its physical, chemical, or biological.

IJIPSM (International Journal of Pharmaceutical Sciences and Medicine), it is a technique used to separate the components and remove them from the plant matrix.

MusibaBaliruno Denis, (2012) in this the extraction is done with chloroform.

Abubakar Usman et al, (2022) extraction with methanol and comparative effects of methanol leaf.

Armando Caceres et al, (1991) the study aimed to investigate the anti-microbial properties of moringa oleifera.

Alessandro Leone et al, (2016) it is used to test the appearance of the tablet.

D.S Panda et al, (2008) it indicates the tablets strength to withstand mechanical shocks.

Ehab Ali Fouad et al, (2019) its study states about the cold aqueous extracts of moringa oleifera leaves.

MusibaBaliruno Denis, (2012) the study shows anti-bacterial assay

## III. AIM AND OBJECTIVES

### 3.1AIM

To study the formulation and evaluation of moringa oleifera tablet which is a versatile plant used for food and medicine globally.

### 3.2OBJECTIVES

- NUTRITIONAL SUPPLEMENT: Moringa oleifera is a plant with essential amino acids, carotenoids, and nutraceutical properties, making it a good supplement or food ingredient.[20]
- MEDICINAL USES: Moringa may have various health benefits, such as speeding up wound healing and managing blood glucose. However, further research is necessary to confirm these benefits.[21]
- WATER PURIFICATION: Moringa Oleifera seeds are used in water treatment as a primary coagulant to reduce turbidity due to their cationic coagulant protein content[22]
- AGRICULTURAL FERTILIZER:. Moringa leaf extract promotes seed germination, plant growth, root development, delays fruit senescence and improves yield and product quality.[23]
- LIVESTOCK FEED: Moringa oleifera leaves can be used as a feed supplement to improve feed efficiency and livestock performance.[24]

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

- EROSION CONTROL: M. oleifera is well-suited to areas with high winds and prolonged dry spells, which can lead to severe soil erosion.[25]
- SUSTAINABLE AGRICULTURE: Moringa is a drought-tolerant tree that can grow well in poor soil conditions with minimal rainfall. It grows best in areas with annual rainfall between 250-1500 mm and altitudes below 600 m.[26]
- OIL EXTRACTION: The oil can be extracted mainly by solvent extraction using nhexane, while cold press extraction results in lower yield.[27]
- ALTERNATIVE TO SYNTHETIC PRODUCTS: An alternative to synthetic food additives is natural additives, derived from plants, fungi, algae and animals, which are often used empirically by the population.[28]
- COMMUNITY DEVELOPMENT: The cultivation of agroforestry and permaculture promotes economic empowerment. Moringa can provide incomegenerating opportunities for smallholder farmers and local communities through the sale of its leaves, seeds, and oil.[29].
- ADAPTOGENIC PROPERTIES: Moringa is an adaptogen that enhances resistance to stress, whether it's physical, chemical or biological.[30]

## IV. FORMULATION OF TABLET

### 4.1.Equipment/Apparatus

Tablet compression machine, disintegration tester machine, friability testing machine.

### 4.2.Extraction

### 4.3.1.Extraction of crude drug from leaf

The leaves must be washed with sterile distilled water, air-dried , ground to powder, and sieved forconsistent particle size.[30]

### VARIOUS METHODS FOR EXTRACTION OF CRUDE DRUG

### 4.3.2.Extraction of plant material

Hydro-alcoholic extraction should be performed using powder of Moringa Oleifera leaves.The ratio of water to ethanol set at 40:60%. To start, weight 30 grams of plant leave powder and percolate 300ml of hydro-alcoholic solution (180ml of ethanol and 120ml of water) in a Soxhlet apparatus. Maintain 70°C temperature eight hours, dark green extract obtained. . Then the ethanol from the extract separated by using the simple distillation method. At 38°C. The extract is heated again using a water bath and the crude drug is obtained. Before use, the extract is stored in the refrigerator.[31]

### 4.3.3.Extraction with chloroform

A flat bottom flask used to hold one hundred grams of powder and one liter of chloroform added to it. Afterward, the mixture left untouched on the bench for 48 hours, with daily swirling of the flat bottom flask. Subsequently, the mixture is carefully filtered and subjected to a rotary vacuum evaporator to reduce it to dryness. The reduced filtrate then placed in an oven set at 37 ℃ and allowed to dry. Finally, the wet powder material is spread out evenly on a clean flat surface and subjected to air dry. The percentage yield is to be calculated from the amount of dry powder material obtained.[32]

### 4.3.4.Extraction with methanol

To extract the valuable compounds from the leaves a cold extraction method employed with leaves and methanol used in the process. The mixture is kept sit in a glass funnel for 48 hours, with periodic shaking to ensure maximum extraction. Following this, the solution is subjected to filtration using Whatman No.1 filter paper, this step remove any impurity and provides a clear solution. Finally, the filtrate is concentrated using a water bath, resulting in a potent extract with high concentrations of the desired compounds.[33]

### 4.3.5 Assay for antimicrobial activity

The study investigate the antimicrobial properties of Moringa oleifera against various pathogens that affect humans. It finds that the fresh leaf juice and aqueous extracts from the seeds are effective against Pseudomonas aeruginosa and Staphylococcus aureus, highlighting their potential as natural remedies. However, it also finds that the aqueous extracts did not exhibit any activity against several other pathogenic bacteria, Candida albicans, and dermatophytes. While the results are not as expected, they provide valuable insights into the Limitations of Moringa oleifera as an antimicrobial agent. Further research can explore ways to improve the effectiveness of this plant extract against a wider range of pathogens.[34]

### 4.6 Preparation for tablet

The preparation of four batches of basic formulations of M. oleifera leaf powder should be carried out with unwavering confidence and expertise. Moringa leaf powder and a disintegrant

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

meticulously dry mixed for 10 minutes in a glass beaker. The mixture is moistened with the appropriate amount of binder solution which is prepared by maintaining the volume of the solutions in the final tablet. To achieve consistent weights of the different formulations, lactose monohydrate is used as a filler. Wet massing of the ingredients assertively carried out in a mortar using a pestle for 10 minutes. The homogeneous wet mass should be offloaded and screened through a sieve and confidently dried in a hot air oven at 50℃ for 2 hours. Thereafter, the dried granules must be screened again through a sieve to generate uniformly sized granules and transferred into a glass beaker. Talc and Sodium Lauryl Sulphate added as glidant and antiadherent. Talc and Sodium Lauryl Sulphate mixed for 5 minutes. Magnesium stearate is added as a lubricant and mixed for 1 minute. The granulated material is offloaded into well-labeled clean containers, ready for compression into tablets using a round punch. Samples from the different batches individually weighed and confidently placed in the compression chamber. For each formulation, the compressive force is precisely adjusted. After compression,the formulations is collected and stored away from light and rehydration (in desiccation chamber) at room temperature until further analysis.[35]


Figure.4.Moringa leaf production

## V. DRUG AND EXCIPIENT PROFILE

5.1 BINDERS :Aqueous extract of moringa oleifera leaves is extracted and formulated using different binders which included. (Maize Starch, Gelatin and Micro Crystalline Cellulose (MCC), to find out which one produce better tablets of Aqueous extract of moringa oleifera leaves.

5.2 **EXICIPIENT:**Tablets are prepared by wet granulation method containing Calcium SulphateDihydrate as excipient, propanol hydrochloride as a model using 10%,20% and 30% of gum as release retardant, magnesium stearate was used as lubricant

5.3 **PRESERVATIVES :**The moringa oleifera tablets consist of nothing rather than organic moringapowder.it does not contain synthetic binders and disintegrators in the process. Instead, it as smallquantity ofnatural gum as a binder.no artificial color, flavor and preservatives are added to these tablets.

5.4 **ACTIVE INGREDIENT:**Leaves of moringa tree have been found to contain flavonoids includingmyricetin, quercetin,kaempferol,isorhamnetin,orrutin,as well as phenolic acids. Fresh leaves are a goodsource of carotenoids such as lutein, β-carotene, and zeaxanthin.

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

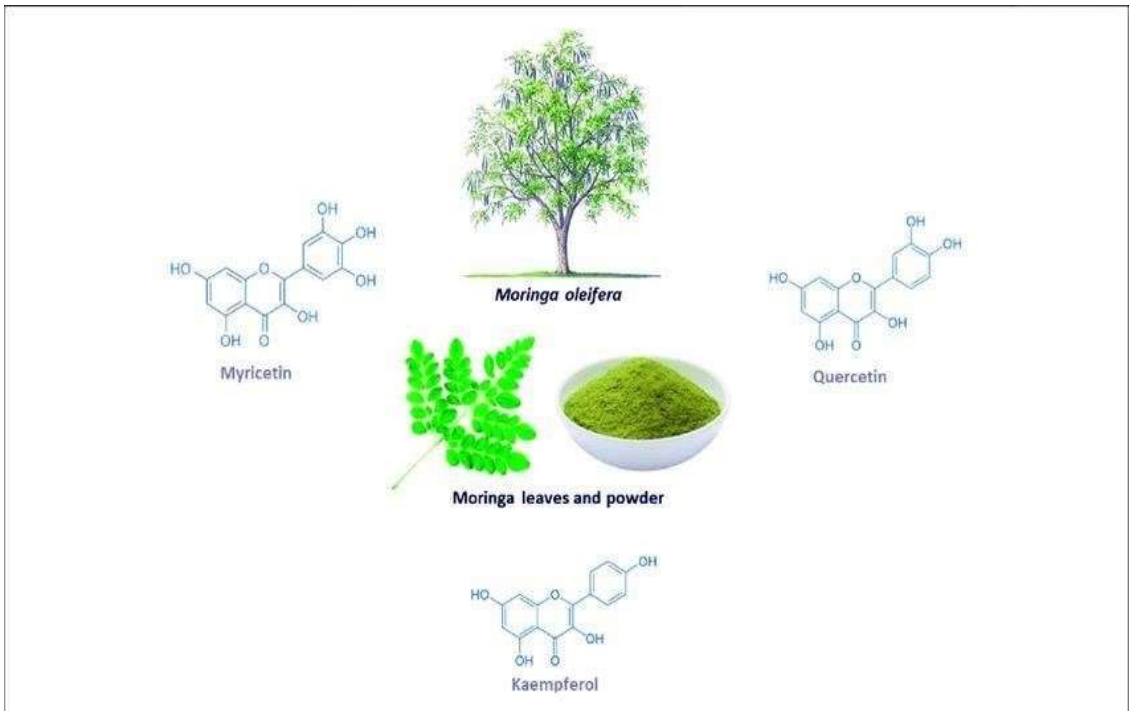


**Figure.5.Active ingredient .**

## VI. SUMMARY AND CONCLUSION

Moringa oleifera is a tree that belongs to the Moringaceae family. This tree is native to the Indian subcontinent and is widely used in South and Southeast Asia. It is known by many names, such as moringa, drumstick tree (because of its long, slender, triangular seed-pods), horseradish tree (because the taste of its roots resembles horseradish), or malunggay (known in Asia's maritime or archipelagic areas). Additionally, it is a fast-growing and droughtresistant tree . Moringa oleifera is known to be extremely beneficial for the liver as it protects it from damage, oxidation and toxicity through its leaves and flowers which are packed with polyphenols. The oil extracted from Moringa oleifera can help restore liver enzymes to normal levels, reduce oxidativestress and increase protein content in the liver ranges.Moringa is a plant that grows best in warm temperatures between 77 and 95 degrees Fahrenheit.annual.,Moringa leaves boast anti-diabetic, antibacterial, anti-cancer, and antiinflammatory properties due to their high content of phytochemicals, carotenoids, and glucosinolates.Moringa trees have been used to combat malnutrition, especially among infants and nursing mothers. cup of fresh chopped leaves contain the following nutrients:protein:2grams,vitamin B6:19%of the Recommended Daily Allowance (RDA),Vitamin C:12%of the RDA,Iron:11%of the RDA,Riboflavin (B2):11%of the RDA,vitamin A(from beta carotene):9%of the RDA,Magnesium:8%of the RDA.The manufacturing process for Moringa leaf tablets involves the use of fresh green leaves, maize starch, and acacia gum as raw materials. The process starts with washing and grading the leaves based on the required standards. The next steps include trimming, scraping, cutting, blanching, cooling, and drying.Pulverization, screening, granule preparation, tablet production, packaging, labeling, and personal hygiene are the steps involved in Moringaprocessing.Moringa is believed to Contain 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."It can help eliminate various Pathogens, such as bacteria, fungi, viruses, and parasites. It can also assist in the inhibition of Chronic inflammation, including conditions like asthma, ulcerative colitis, and metabolic diseases. It Is beneficial in several chronic conditions, including hypercholesterolemia, high blood pressure, Diabetes, insulin resistance, non-alcoholic liver disease, cancer, and inflammation. All parts of the Moringa tree and its extracts may have health benefits.Objective :- used as natural

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

supplement,used For medicinal purpose,used for water purification,as a fertilizer used in agricultural field, mainly Preferred for soil erosion control,oil extraction is done ,used for sustainable agriculture , alternative To synthetic purpose, community development, hasadaptogenic properties used for stress relief .

## VII. FUTURE SCOPE

In today's fast-paced world, people have become more conscious of their lifestyle and health due to the changing socioeconomic status and increased awareness of detrimental effects of synthetic products. As a result, natural products have gained immense popularity over the years. Derived from plants, they are widely preferred as they offer health benefits with fewer side effects. From skin care to dietary supplements, natural products have a diverse range of applications. With the increasing demand for natural products, there is a lot of potential for discoveries and innovations in the field, which can offer even better health benefits. The Moringa oleifera tree is a true marvel of nature, boasting a wealth of nutritional and medicinal benefits that extend far beyond traditional nutrients. This remarkable tree is packed with an impressive array of macro- and micronutrients, as well as other bioactive compounds that are essential for maintaining normal bodily function and preventing a range of diseases. Whether it's the leaves, flowers, seeds, or any other part, almost every component of the Moringa oleifera tree is edible and brimming with therapeutic properties, including antidiabetic, anticancer, antiulcer, antimicrobial, and antioxidant effects. Recent scientific studies have even suggested that Moringa oleifera should be utilized as a functional ingredient in food products, given its incredible potential to enhance health and well-being. In this review, we'll delve deeper into the many benefits of Moringa oleifera as a potential ingredient in food products, exploring its incredible nutritional value and medicinal properties in more detail. The chemical composition of Moringa products can vary significantly depending on the plant part used, as well as cultivation, processing, and storage conditions. Nutrients and anti-nutritive components are primarily determined by these factors. Anti-nutrients, such as phytic acid or tannins, are present in significant amounts and can impact the bioavailability of micronutrients. Moringa oleifera products are known for their potential health benefits and have been proposed as an alternative treatment for various diseases. However, there is a lack of risk assessment studies that evaluate contamination levels. Recent research has shown that Moringa oleifera products may contain high levels of heavy metals, polycyclic aromatic hydrocarbons, and mycotoxins, which highlights the need for a comprehensive risk assessment and legal regulation of these products. The Moringa sector has the potential to bring about significant positive change in developing countries by boosting employment opportunities. The rising demand for Moringa-based products is expected to create new avenues in farming, processing, and distribution, which, in turn, will help to reduce poverty and foster economic growth. With increased employment opportunities, people in developing countries can look forward to a better standard of living, improved access to education and healthcare, and a brighter future overall. In addition to its nutritional benefits, Moringa has been discovered to have a profound effect on soil health and biodiversity. Its extensive root system assists in enhancing soil structure and preventing erosion, while its leaves serve as a valuable source of sustenance for farm animals. As a lowcarbon crop, Moringa has the potential to play a vital role in mitigating climate change by sequestering carbon in the soil.

## REFERENCES

[1]. https://en.m.wikipedia.org/wiki/Moringa_oleifera
[2]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7915875/
[3]. https://www.researchgate.net/publication/288327947_Moringa_oleifera
[4]. https://www.thespruce.com/how-to-grow-and-care-for-moringa-plants-5076022
[5]. https://sustainablebioresources.com/plants/plantfamilies/moringaceae/moringaoleifera2/varieties-ecotypes-moringa-oleifera/
[6]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8869219/#:~:text=Moringa%20leaves%20provide%20several%20health,as%20reported%20in%20the%20literature.
[7]. https://www.sciencedirect.com/science/article/pii/S1995764516307143
[8]. https://www.sciencedirect.com/science/article/pii/S0254629920311169
[9]. https://en.m.wikipedia.org/wiki/Moringa_oleifera
[10]. https://www.healthline.com/nutrition/6benefitsofmoringaoleifera#TOC_TITLE_HDR_2

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 3 May-June 2024, pp: 2124-2133 www.ijprajournal.com ISSN: 2456-4494

[11]. https://www.niir.org/blog/wpcontent/uploads/2020/10/ManufacturingofMoringaTablets.pdf
[12]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5187941/#:~:text=Seeds%20and%20Oil-,M.,20%5D%20(Figure%201).
[13]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9916933/#:~:text=Moringa%20oleifera%2C%20also%20known%20as,disease%2C%20cancer%2C%20and%20inflammation.
[14]. https://actascientific.com/ASAG/pdf/ASAG-03-0683.pdf
[15]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8373516/#:~:text=In%20fact%2C%20Moringa%20is%20said,iron%20than%20spinach%20%5B3%5D.
[16]. https://www.phlabs.com/moringa-the-nutrient-powerhouse-youveprobablyneverheardabout#:~:text=Moringa's%20Nutritional%20Value&text=Moringa%20is %20a %20tr ue%20powerhouse,food%20you%20eat%20into%20energy.
[17]. .https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7773658/#:~:text=Moringa%20can%20not%20only%20eliminate,ulcerative%20colitis%2C%20and%20metabolic%20diseases.
[18]. Bioactive Components in Moringa Oleifera Leaves Protect against ... https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5745501/
[19]. https://www.medicalnewstoday.com/articles/319916#summary
[20]. https://pubmed.ncbi.nlm.nih.gov/25374169/
[21]. https://www.medicalnewstoday.com/articles/319916
[22]. https://www.mdpi.com/2071-1050/15/5/4280
[23]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9459878/
[24]. https://www.mdpi.com/2077-0472/8/9/145
[25]. https://apps.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1169
[26]. https://www.tandfonline.com/doi/full/10.1080/23311932.2020.1805951
[27]. Moringa oleifera Seeds and Oil: Characteristics and Uses for ...https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5187941/
[28]. .https://www.scielo.br/j/aabc/a/fbjxDWcDJGLsRjPNtVCj5cf/
[29]. https://www.linkedin.com/pulse/moringa-products-market-size-share-trends
[30]. Nature's Answer To Tackling Stress - Say Hello to Moringa - Adunahttps://aduna.com/blogs/learn/adaptogens-nature-s-answer-to-tackling-stress
[31]. http://ijpsm.com/Publish/May2022/V7l502.pdf
[32]. https://scholar.googleusercontent.com/scholar?q=cache:I71tWh1ez8YJ:scholar.google.com/&hl=en&as_sdt=0,5&scioq=extraction+of+moringa+oleifera+tablet+chloroform+
[33]. https://www.sciencedirect.com/science/article/pii/S2667142521000300
[34]. https://www.sciencedirect.com/science/article/abs/pii/037887419190078R
[35]. https://www.sciencedirect.com/science/article/pii/S2667142521000300
[36]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5187941/#:~:text=Moringa%20inflorescences%20are%20loose%20panicles,(staminoid)%20%5B12%5D
[37]. https://erepository.uonbi.ac.ke/bitstream/handle/11295/76564/Musiba_Formulation%20Development%20of%20Moringa%20Oleifera%20Film%20Coated%20Tablets.pdf?sequ ence=3
[38]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3038286/
[39]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6661477/
[40]. http://erepository.uonbi.ac.ke/bitstream/handle/11295/76564/Musiba_Formulation%20Development%20of%20Moringa%20Oleifera%20Film%20Coated%20Tablets.pdf?seque nce=3
[41]. https://plants.usda.gov/home/classification/6