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Development of health mix powder to combat anaemia

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***Abstract*---**In India, anaemia is a leading cause of death. According to statistics, anaemia is the cause of every maternal fatality. Anaemia is a nutritional illness that affects both adults and children of both sexes, however it is more common in pregnant women and teenage girls and is caused mostly by iron deficiency. Iron and other critical elements required for iron metabolism are abundant in leaves of *Moringa oleifera*. An increasing finding have found extracts of M. oleifera leaves that aqueous alcohol, or hydro alcohol have a variety of extra activities of biologically, including antiulcer, tissue protective (heart, kidneys, testes, liver, or lungs), radio protective, antioxidant, analgesic, immunomodulatory and antihypertensive properties. The Central Council for Ayurvedic Research has issued preliminary recommendations for standardising commonly used formulas. Standardization of herbal formulations is necessary for determining the quality of pharmaceuticals based on the quantity of active ingredients, as well as physical and chemical parameters. We will briefly discuss many elements of herbal medicinal properties of *Moringa oleifera*.

***Keywords*---**adolescent, anaemia, Moringa oleifera**,** iron, health mix powder.

Introduction

Mother Nature has supplied us with a variety of options for maintaining our health. Herbal medicines are one of them. For thousands of years, herbal medicines have been used to cure a variety of illnesses. People are becoming increasingly interested in using herbal medicines to treat a variety of conditions.

Plant medication 'rasayana' has traditionally played a vital part in the treatment of a type of human illnesses.[1]

According to the WHO (World Health Organization), traditional medicine is used by more than 80% of the world's population for basic health care.[2] The use of a plant's roots, seeds, leaves, bark, barriers, or flowers for therapeutic reasons is known as herbal medicine. As advancements in analysis and quality control, as well as breakthroughs in clinical research, demonstrate the benefit of herbal medications in the treatment and prevention of illness, their use is becoming more streamlined.[3]According to the WHO Herbal medicines include herbal materials and preparations, herbs, and completed herbal products that comprise plant parts, other plant components, or mixtures of these as active substances. Indigenous plants have been utilised to cure a variety of ailments in many regions of the globe since prehistoric times.[4] There is a large range of plants with therapeutic characteristics that are used to make herbal medications. Herbal medicine is an alternative therapy that involves the medicinal use of various plants and plant extracts.[3]*Moringa oleifera,* a tree abundant in the dry tropics, has been discovered to contain most of the important nutrients needed for great health. Several studies have demonstrated that MOLP (Moringa oleifera leaf powder) contains almost all of the necessary elements required for optimal health.[5-7]The powder of leaf contains a variety of minerals and vitamins, including carotenoid, vitamin A & C and iron, all of these are essential for metabolism of iron. Moringa also has a benefit in addressing many nutritional issues since it contains proteins required for cell development.[8,9] Moringa has been shown to alleviate malnutrition in children, along with vitamin A and protein deficits, in studies done in countries like Senegal.[10-12] Moringa is not toxic even in high quantities, and no harmful side effects have been observed by people who have included it in their regular diet.[13,14]

Moringa Oleifera

Moringa oleifera is a plant Ben oil or drumstick tree is the popular name for the Lamarck tree. For a long period, Senegalese rural households have ingested *Moringa oleifera* leaves. According to the book "the miracle tree," thepowderedor dried leaves, may inhibit malnutrition and replenish iron stores due to its high protein and vitamin content, particularly iron. However, there were no scientific investigations to back up these claims. Aside from the benefits of anecdotal proof of *Moringa Oleifera's*, no clinical trials of human or randomised research have been undertaken to prove the effectivenessof the leavesof*Moringa Oleifera* intake in the treatment ofmalnutrition or iron deficiency anaemia. Thurber et al. reported on this.[15]

M. pygmaea, local to Somalia; *M. arborea,* endemic to Kenya; *M. stenopetala,* native to Kenya and Ethiopia; *M. longituba,* native to Ethiopia, Kenya, and Somalia) are among the roughly 14 species. *M. ruspoliana* is an Ethiopian native. *M. drouhardii* and M. hildebrandi are local to Madagascar; *M. ovalifolia* is native to Angola and Namibia; *M. concanensisand M. oleifera* are native to Northern India's sub-Himalayan tracts; M. peregrine is native to the Red Sea and the Horn of Africa.The size of *Moringa oleifera*treeis medium- native to India that may reach a height of 10 metres.

The *tree's* height ranges from 10 to 12 metres, and it is classified as a soft wood tree. The ancient pharmaceutical system known as ayurveda medicine claimed to be able to heal and prevent 300 different illnesses, and its leaves were used to treat a variety of maladies.[16]*Moringa oleifera* is a large plant with a wide range of applications, including nourishment and several therapeutic purposes, as well as water purification, biopesticide for a variety of crops, and biodiesel generation. It contains several bioactive components, including alkaloids, vitamins, tannins, flavonoids, carotenoids, saponins, and glucosinolates, which are abundant in the leaves of this species. Many in vitro and in vivo researches have been conducted to verify the pharmacological activity of this very powerful plant species.

Leaves of*Moringa*tree are rich in iron, vitamin C, potassium, and beta carotene, among other minerals. The findings of a 2014 study of iron content in Moringa leaves conducted by the Research Institute for Spices and Medicines reveal promising results, with 1 kilogramme of Simplicia producing 54.92 mg of iron.[17-20] Iron (Fe) is a micromineral that plays a crucial role in the development of RBC(red blood cells) in the body. Iron (Fe) has a role in the production of RBC and the manufacture of haemoglobin (Hb), as well as activating several enzymes, one of which is the antibody-forming enzyme.

Sitosterol 1.15% per 100 g, Fe 5.49 mg per 100 g, and stigmasterol 1.52% per 100 g are all found in moringa leaf extract.[21] Carbohydrate, fat, and protein composition of mango seed flour after sulfurization: 20.00% carbs, 14.83% fat, and 4.84 percent protein. Protein has a crucial function in iron absorption in the body. Iron absorption is impeded, resulting in iron insufficiency. Moringa has been discovered to be particularly effective in treating mild anaemia rather than severe anaemia.Moringa might be utilised as a locally grown food-based nutritional supplement to help pregnant women avoid anaemia and stunted development in their children.[22]

Figure 1. Moringa oleifera leaves[23]

The tree of Moringa may be planted in a home garden (see fig 1), and it can withstand lengthy periods of dryness. Moringa leaf powder's nutritional value makes it a significant component in boosting nutrient diversity in supplemental

foods for infants and adolescents.The powder of Moringa leaf may be kept at home for up to six months under suggested storage conditions, allowing even impoverished households access to the product throughout the year.

According to the "the Miracle Tree" bookdry leavesof *Moringa Oleifera*, when added to a person's normal diet, maytreat, or prevent malnutrition and anaemia. Although, no scientific investigation has been conducted to determine the effectiveness of Moringa leaves in preventing or recovering from iron deficiency anaemia and malnutrition. This reviewwas to study how daily ingestion of Moringa dry leaf powder affected anaemic nursing women's nutritional and iron status.

Every portion of the *Moringa oleifera* tree is utilised for many kinds of purposes, but most commonly Moringa *oleifera*provide a very nutritious meal for people and animals, as well as medical applications to prevent various ailments. Vitamins (A, B, C, and E), minerals (Fe, Ca, P, Zn, Cu, and others), essential fatty acids, necessary amino acids (both omega-6 and 3), and phytochemicals are all found in it.[24]

Table 1. Medicinal properties of *Moringa oleifera*

Parts of the plant	Common medicinal properties	References
Flowers	Lowers the serum cholesterol, used to cure inflammations, reduces the incidence of oedema and swelling, used to treat urinary infections, acts as antibiotics, acts as a supplement for breast feeding, reduces high blood pressure, lowers blood sugar, , hair oil, perfumes, cosmetics, decreases the lipid profile of heart, liver, and aorta in rabbits, lowers the serum cholesterol level and analgesic activity, used to cure muscle and tumour diseases and also the enlargement of spleen.	25-27
Root	Used to relieve intermittent cold and fever, used as carminative, acts as an abortifacient, laxative, diuretic, circulatory and cardiac tonic, hysteria, nervous debility, rheumatism and also articular pain, used to treat epilepsy, used as a purgative, relieves lower back pain or kidney pain, used to cure plasy, used to cure inflammations and swelling of tissues in foot(pedal oedema), dyspepsia and also insect bites, antiurolithiatic activity, used as counterirritant, enlargement of spleen, anti-scorbutic,	28,29
Leaves	When mixed with honey used as a remedy for diarrhoea, colitis, and dysentery lower blood pressure, rubbed on temples for headache, used as diuretic, used to treat fever, used as purgative, bronchitis, ear and eye infections, inflammation of the mucus membrane and scurvy, skin antiseptic,anthelmintic, prescribed forantioxidant and anaemia.	30

Stem	used to cure eye disease, used as an animal fodder, scurvy, acts as aphrodisiacs, rich in antibiotic properties, anthelmintic, anaemia and asthma in young girls, used to treat bronchitis, used in the treatment of impotence (week semen and premature ejaculation), vesicant, acts as a rubefacient, appetizers and abortifacient.	28
Pods	Used in treating the articular pains, acts as antioxidants, anthelmintic, used in the affections of liver and liver, used to treat arthritis and other inflammatory diseases, reduces swelling and inflammation.	31-33
Root bark	scurvy, rubefacient, acts as appetizers, abortifacient and vesicant, used to treat sores and skin infections, hysteria, used to treat epilepsy, calculous infections and intestinal spasms, earache, prevents enlargement of spleen, tooth ache, destroys heals ulcer and tumour, used as a good appetizers and antimicrobial activity.	34-36
Seeds and seed oil	Used as a remedy for the abdominal tumours, used against fever, crushed seeds spread on warts, antihypertensive activity, swellings in case of gout or rheumatism and relieves pain, used as a natural flocculant, prostrate and bladder troubles, used to treat hysteria, scurvy, used as a purgative and tonic, reduces the amount of oxidized lipids in our body.	37
Gum exudate	Used as a dental carrier, used to relieve headaches, diuretic,earaches, used to treat fever, asthma and dysentery, astringent and rubefacient (skin tonic), used to treat syphilis and rheumatism, used as abortifacient, used to treat intestinal cancer, and used to treat intestinal complaints, blood pressure lowering effect.	28

Nutritional constituents of *Moringa oleifera*

Moringa oleifera contains a variety of nutrients (Table 2), including:

- Protein, which is essential for tissue development and shortage may result in growth kwashiorkor, retardation, and other problems.[38]
- The tree's leaves and other components have a high concentration of crude proteins and amino acids, similar to soybean.
- Vitamin A, which is crucial for eye and hair health, as well as vitamin C and other B group vitamins.Minerals like calcium aid in the formation of teeth and bones, and a lack of it may lead to rickets, bone discomfort, and osteoporosis. Eight ounces of Moringa leaves are said to provide 1000 mg of calcium, and dried Moringa powder may provide 4000 mg of calcium, while milk only provides 300-400 mg.[39]
- Potassium carries nerve signals, and a lack of it may lead to loss of appetite and even unconsciousness.
- Phosphorus is required for the construction of bones and teeth, as well as the ATP production, production of protein for growth, cell and tissue maintenance, and repair.

- Iron and may be used instead of iron pills. Moringa's zinc concentration is also in line with dietary needs, which is crucial for RNA and DNA synthesis.
- Fiber aids in the maintenance of a healthy gut flora.
- Alkaloids, Tannins, amino acids, phenolic compounds, sterols, and carbohydrates are examples of bioactive substances.[40]

Table 2. Nutritional content of fresh and dried *Moringa oleifera* leaves (per 100gm)

Nutrient	Fresh leaves	Oven dried
Energy (Kcal)	92	271.54
Vitamin C (mg)	220	56
Iron (mg)	0.85	19
Protein (g)	6.7	23.78
Moisture (%)	75.9	6
Beta- carotene (µg)	6780	37800
Phosphorus (mg)	70	215
Fibre (g)	0.9	11.8
Fat (g)	1.7	7.014
Carbohydrates (g)	12.5	28.32
Calcium (mg)	440	3467

Applications of Moringa oleifera

Agriculture Uses

- Fertilizer- The seed cake formed after the extraction of oil from seeds includes hazardous chemicals and thus cannot be ingested. It does, however, have a high protein content and may be used as a fertiliser in agriculture. *Moringa oleifera* is well renowned for its ability to fix nitrogenous chemicals in the soil.
- Fuel wood- despite its low weight, wood is a reasonably excellent cooking fuel.[41]
- Viscose resin is produced by the trees, which is used in the textile industry.
- Sources of growth hormones- Effective growth hormones may be made from the juice of fresh Moringa leaves, and yields can be enhanced by 25-30% for almost every plant group (tomato, bell pepper, maize, chili, coffee, sorghum, tea, onion, melon and soya). Zeatin, a plant hormone from the cytokinin family, is one of the active ingredients.[42]
- Fodder—its high crude protein content and availability, as well as its low anti-nutritional component concentration, making it excellent for use as fodder. Saponins found in other plants have a negative impact on animal development, whereas those found in Moringa have no haemolytic action. Many issues, including as feed shortages during dry seasons and nutritional imbalances in feed, may be addressed by employing Moringa as a fodder.
- Biogas source: 580 litres of gas per 1 kilogramme of volatile solids were produced with an average input of 5.7 g of volatile solids. The gas had an average methane concentration of 81%.[43]

Economic Uses

The seeds of Moringa may be used to coagulate and remove algae from rivers and lakes to prevent eutrophication caused by the discharge of large loads of both phosphorus and nitrogen. Typically, the seeds are utilised as an anticoagulant. 30 to 300 mg of Moringa seed powder was found to be adequate for purifying 1 litre of water. The seeds have antibacterial capabilities and include a recombinant protein that can flocculate Gram-negative and Gram-positive bacterial cells, in addition to acting as a natural coagulant. It may also be used for intercropping. When maize and sweet potato alone were compared to maize plus Moringa and sweet potato plus Moringa, the findings showed that soil acidity decreased from 1.86 to 1.60. The combination of Moringa and maize, as well as Moringa and sweet potato, gave the maximum crop growth compared to the solitary crop. Plant growth promoters may be made from Moringa oleifera leaves. Gibberellins, auxins, ethylene, abscisic acid, and cytokinins are five distinct types of growth regulators that improve food output.

Incessant problem ofAnaemia and adolescent

In underdeveloped nations, anaemia caused by malnutrition is still one of the most serious public health issues. Fifty-nine percent of Senegalese women anaemic in 2005, the Demographic and Health Survey reports in Senegal, showed the malnutrition prevalence in women (BMI 18.5 kg/m2) grew from 15% in 1993to 18% in 2005.[44] In the Ziguinchor region, the prevalence of moderate (7.0-9.9 g/dl), mild (10.0-10.9 g/dl), and severe anaemic women was 34.1 percent, 8.7 percent, and 0.9 percent, respectively.[45] Local techniques are widely adopted since measures to stop anaemia and malnutrition are costly for rural communities in poor nations.

More than 2 billion people worldwide suffer from iron deficiency, which is the most frequent type of malnutrition. Fe deficiency anaemia (inadequate red blood cell production due to a lack of iron) is common in developing nations, but it is also a concern in industrialised countries where other kinds of malnutrition have been almost eradicated. Although iron deficiency is not the sole cause of anaemia, it is the most frequent cause in areas where the condition is widespread.

Anemia is widely used to measure the severity of iron deficiency in a population by measuring the prevalence of low haemoglobin or haematocrit. Iron deficiency anaemia is most common and severe in young children (624 months) and pregnant women, although it may also affect older children and adolescents, as well as adult males and the elderly. When iron reserves are depleted and the delivery of iron to the tissues is limited, iron deficiency anaemia develops. Iron deficiency anaemia is a severe form of iron deficiency in which the haemoglobin (or haematocrit) levels fall below the cut-offs listed above. Anemia with biochemical evidence of iron shortage is known as iron deficiency anaemia.

The main causes of iron deficiency anaemia in teenage females include reduced poor absorption, dietary iron intake, worm infestation, menstruation, and increased body demand. Iron deficiency is the most common type of malnutrition, affecting over 2 million individuals worldwide. In US, iron deficiency is the most

prevalent cause of anaemia in adolescents, with teenage girls being 10 times more likely than boys to develop anaemia. Menstruation, on the other hand, worsens iron deficiency anaemia in females throughout their adolescence and reproductive years.

Teenagers will gain the information and skills that will enable them to become self-sufficient, successful young adults throughout adolescence, but iron deficiency anaemia will interfere with this learning and development. Tea, coffee, and milk are known to limit iron absorption owing to phytates, tannins, and phosvitin in eggs. However, according to research published in "The American Journal of Clinical Nutrition," calcium from dairy products has been proven to impede iron absorption by up to 50%. Dairy products should thus be avoided by children, adolescents, and women who are iron deficient. Supplementing with iron and folic acid pills is indicated to treat moderate and severe anaemia. Periodic deworming should be promoted once every 6 months, as well as maintaining sanitary behaviours such as hand washing and wearing proper footwear while going to the bathroom. Iron deficiency anaemia may be detected early with regular haemoglobin screening tests.

In rural regions, education about avoiding meal skipping, Jung foods, and fast meals would help to prevent anaemia and increase the use of cheap priced iron-rich foods including dates, green leaves, ragi, drumstick leaves, jaggary, andchickoo. Drumstick leaves, formally known as *Moringa oleifera*, are a kind of green leafy vegetable that is high in iron and a natural source of it. Nearly 300 ailments may be cured with drumstick leaves. It contains over 90 minerals as well as 46 antioxidants. Drumstick leaves have a significant nutritional value as well as therapeutic benefits. Drumstick leaves provide three times the potassium of bananas, four times the vitamin A of carrots, seven times the vitamin C of oranges,two times the protein of yoghurt, four times the calcium of milk, nine times the iron of spinach and four times the fibre of oats. Anemia may be cured by eating drumstick leaves curry or drinking juice on a regular basis. To combat this load, edible plants such as *Moringa Oleifera* leaves are employed. *Moringa Oleifera*, a well-known ancient plant belonging to the Moringaceae genus, has lately been recognised as a various-purpose tree with a wide range of possible applications. Because of its drought resilience and quick growth, in Senegal the plant is also known as 'Nebeday' (never die).

The Moringa tree may be found growing in both rural and urban areas, and its leaves can be purchased in both urban and rural markets. Its leaves are used in a variety of techniques, including dried leaf powder, which is used to a variety of porridges, and "Mbumm," is a sauce which is served with millet or maize. Moringa leaves have both therapeutic and nutritional benefits owing to their high concentration of protein, copper, calcium, iron, important amino acids, and different vitamins.[45]Drumstick leaves, which contain a significant amount of beta carotene (19690 mcg/100g) and vitamin C from lemon juice, may help mobilise stored iron and raise anaemia-related haemoglobin levels. India was the first country to start a national nutritional anaemia prophylaxis programme in 1970, and it was also included in the fourth five-year plan. At the Koramangala indoor stadium in Bangalore in 2013, the minister of health and family welfare, Mr. Gulam Nabi Azad, and the honourable chief minister, Mr. Siddaramaiah,

launched a Weekly Iron and Folic Acid Supplementation Program (WIFS) for adolescents. Under the Chadha Nehru Sehat Yojana project, it was incorporated in a nationwide effort to decrease the prevalence and severity of anaemia.

Effect of Moringa oleifera Leaf Powder on Brown and White Bread Nutritional Composition, Consumer Acceptability and Physical Quality

Food malnutrition and insecurity, particularly undernutrition (stunting, wasting, vitamin deficiencies and underweight), are major worldwide issues. Around two billion people worldwide suffer from moderate to severe hunger,[46] contributing considerably to the world's high rates of malnutrition. Stunted, wasting, and overweight children account for 21.3 percent, 6.9 percent, and 5.6 percent of children worldwide, respectively. Furthermore, according to the 2020 nutrition worldwide report, one in nine and one in three people are hungry or malnourished, while one in nine and one in three people are obese or overweight, respectively.[47] The pandemic of COVID-19 has led to a rise in undernutrition, particularly in nations where people are struggling financially. Low- to middle-income nations, like South Africa, have mainly monolithic diets consisting mostly of starchy staple foods (SA). Furthermore, the bulk of these nations' populations eat just small quantities of fruits and vegetables, as well as animal-based diets. Animal source foods are rich in quality protein, but they are more expensive than plant-based protein sources for many underprivileged families in South Africa and other developing nations.[48] This sort of diet is also deficient in nutritional variety and may result in micronutrient deficits. Micronutrient deficiency is a public health issue, particularly in underdeveloped nations like South Africa. Deficiencies in iron, zinc and vitamin A are especially significant.[49]

Native plants, like *Moringa oleifera*, are known to be nutrient-dense and to offer a wide range of health benefits. Thirteen species of plant in the Moringaceae family *Moringa oleifera* is one of them that has been extensively studied. This plant is native to India and Africa, but it is currently cultivated all over the globe.[50]*Moringa oleifera* can grow in a variety of climates, including sub-tropical and tropical areas, and it also providesantioxidant, phytochemical, and nutritional advantages.[51] Moringa is also a strong source of iron, which is often lacking in most popular plant-based diets, like starchy staples.[52] Iron is an essential vitamin, particularly during pregnancy, since it helps the foetus thrive. A pregnant woman with iron deficiency anaemia has a high risk of perinatal and maternal death, as well as early birth and a low-birth-weight baby.[53, 54]

Vitamin A deficiency impairs eyesight, growth, development, protein synthesis, and might prevent a kid from reaching their full physical and mental potential.[48]*Moringa oleifera* also includes 16–19 amino acids, making it an excellent source of protein. Ten of these amino acids are required for survival.[55] In South Africa, staple foods such as bread are widely eaten, and wheat flour fortification hasbeen mandated since October 2003.[56,57] However, for many disadvantaged people, access to fortified foods remains a challenge since many of them depend on social assistance to buy food.[58]

Baked bread is abundant in calories, carbs, and fat, but it is lacking in other elements like protein, minerals, and vitamins.[59]*Moringa oleifera* leaf powder might

be utilised to improve the nutritional content of bread since it is high incertain micronutrients and proteins that are lacking in bread. Bread is a cheap source of energy (in the form of starch) and would thus be a good choice for *Moringa oleifera* leaf powder augmentation.[60] Theconsumer acceptability and nutritional content of bread supplemented with *Moringa oleifera* leaf powder have been examined in much research.

Other Uses of Moringa Oleifera

In Pakistan, M. oleifera bears fruit from April to June. Because practically every portion of the Moringa tree may be utilised for food or has some other beneficial quality, it is regarded one of the world's most useful trees. It is utilised as feed for animals in the tropics, and a natural anthelmintic (kills parasites) moringa micronutrient liquid, and adjuvant (aids or enhances another medicine), is used as a metabolic conditioner in many poor nations to help combat endemic illnesses.[9] It's the most nutrient-dense plant ever identified, with a unique blend of amino acids, nutrients, anti-aging, antioxidant and anti-inflammatorycharacteristics forhealing and nourishment. *M. oleifera* is a wonder tree that provides a rich natural supply of easily digestible calcium, proteins, vitamin C and iron.[61] It has the ability to fight vitamin A and other nutritional deficiencies, according to experts. Green, roasted, or steaming seeds may also be used in teas and curries.

Table 3. Few statements about *Moringa oleifera* leaves by some researchers

Author	Study
[62]	Demonstrated that Moringa did not enhance iron or haemoglobin concentration in the liver. Furthermore, the study population's meat intake was low, according to the food consumption questionnaire. Muscle tissue, such as red meat, is a powerful booster of non-haem iron absorption, outperforming retinol, poultry, fish, carotenes, and Vitamin C.
[10]	Even in locations where Moringa has been utilised for a long time, like India and several West African nations, much of the benefits of Moringa advertising is only focused on its therapeutic advantages, according to their reports.
[63]	Compiled a list of *M. oleifera's possible* health advantages, concentrating on nutritional content as well as antibacterial and antioxidant properties.
[64]	In many distinct experimental setups, they investigated the possible aqueous leaf extract of M. oleifera toxicity. In one series of studies, human peripheral blood mononuclear cells were exposed to graded doses of the extract in vitro, and cytotoxicity was assessed.
[65]	For 93 days, 24 rats were separated into 4 groups and given different quantities of powdered *M. oleifera* leaves mixed with regular (25%, 50%, 75%, and control) livestock feed. It was not possible to determine the total quantity of *M. oleifera* leaves eaten. Following the trial period, various organs of the treated animals acquired microscopic lesions, splenic blood vessels, with necrosis of hepatic cells, and neural glial cells occurring in the 75 percent group. In all organs investigated, the control

animals had no visible microscopic abnormalities. There were no photomicrographs of any tissues available. The authors did not quantify the number of leaves ingested, although it much above the levels that would be utilised in people or rats. For example, if the rats consumed 15–20 g of chow per day, the daily dosage would be roughly 15 to 20 g of leaves per kilogramme for an adult rat, which would amount to 195–260 g for an 80-kg person, even at the modest dose of 25% of the chow.

66 In a three-month research, 60 type 2 diabetes participants were given two pills of *M. oleifera* leaf powder each day or a placebo. Unfortunately, the weight of the pills was not provided, and hence the dosage of the leaf powder was unknown. After three months compared to the control group the postprandial blood glucose had fallen by 29%, while haemoglobin A1c, a glycosylation measure linked to blood glucose levels, had decreased by 0.4%.

67 For 40 days, type 2 diabetes participants were given 8 g of powdered *M. oleifera* leaf in tablet form. The research enlisted the participation of 46 people. The treated patients' fasting, and postprandial blood glucose levels were 26 percent and 28 percent lower, respectively, at the conclusion of the trial. Furthermore, compared to the total cholesterol, control group, LDL-cholesterol, triglycerides, and LDL-cholesterol were 14 %, 29%, and 15% lower, respectively.

68 In 35 type 2 diabetics, the anti-dyslipidemic benefits of M. oleifera were investigated. For 50 days, the treatment group was given in tablet form, which was 4.6 g of leaf powder. The treated participants had a 1.6 percent drop in total plasma cholesterol and a 6.3 percent rise in high-density lipoprotein when compared to the control group. When comparing this study to prior research, it seems that greater dosages are more beneficial.

Conclusion

Moringa oleifera is high in macro and micronutrients, as well as antioxidants. *Moringa oleifera* leaves are not as widely consumed as other green vegetables such as spinach and fenugreek, but they are substituted in soups, lentils, and other dishes in Southern and Eastern India. The applications potential of Moringa and its usage in food fortification are unknown. Moringa has a lot of potential applications, but it's not well-known. It can be used to create meals that might help to alleviate malnutrition. Identification, isolation, and standardisation of plant extracts might be evaluated for in-depth investigations that could aid in the creation of potential food items with health benefits and nutrients to treat malnutrition.Weekly folic acid and iron therapy are successful in curing iron deficiency anaemia but not in maintaining body weight. However, because of its high protein content and other possible health benefits, it might be a terrific addition to the diet. Diet-based methods, such as the consumption and production of animal-derived foods, vegetables, fruits, and food fortification programmes, should be included in intervention programmes to enhance micronutrient status and recovery of vulnerable populations

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