



## Dried Moringa Leaf Powder Play a Role in Malnutrition in India

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Received: July 05, 2022

Published: December 07, 2022

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### Abstract

Moringa is called as “Miracle tree” due to its medicinal abilities. Moringa is botanically called as *Moringa oleifera*. Its belongs to the family Moringaceae falls under order Brassicales. India accounts first rank in Moringa production and contributes 80 percent in global production. Moringa is cultivated under an area of 43,600 ha with the total production of 51 tonnes per ha in India. WHO states that the pregnant adolescents are at particular risk of developing anaemia because of their own growth and the growth of the foetus. The iron deficiency anemia is one of the main nutritional problems in many countries. Moringa leaf powder is used as nutritional supplement. It has antioxidant properties. It acts against the free radicals and oxidative damage. The leaf powder is wealthy in more than one mineral and nutrients including iron, vitamin A (carotenoid), and vitamin C which are crucial for iron metabolism. The daily dose of 70 g of Moringa is suggested in the daily diet to meet out the malnutritional defects caused by Iron deficiency. Moringa leaf powder cookies that can be developed for the prevention of anemia. The consumption of moringa leaf incorporated cookies helps to boost up the hemoglobin level in pregnant women. So, Dried moringa leaf powder consumption in daily life is more important due to unavailability of fresh leaves..

**Keywords:** Moringa; Dried Moringa Leaf Powder; Malnutrition; Iron Deficiency; Cookies

### Introduction

*Moringa oleifera* is worldwide cultivated as an important vegetable for human consumption. Moringa contains various phytonutrients and secondary metabolites. These metabolites have potential role in preventing the cell damage. Therefore, the secondary metabolites in *M. oleifera* have a great potential in anti-inflammatory, chemotherapeutic and antioxidant capacity when compared to other fruits and vegetables [1]. FAO reports that roughly one third of the world's population get affected nearly 800 million women and children by anaemia due to lower level of Iron content in the blood.

### Plant metabolites and beneficial effects of Moringa

A variety of flavonoids and phenolic acids, as secondary plant metabolites having health-promoting effects are present in Mo-

ringa [2]. Most part of Moringa have been used to treat various diseases, including scurvy, abdominal tumours, sores, hysteria, and helminthic bladder. In recent decades, an increasing number of studies have assessed the beneficial effects of Moringa against diseases such as obesity, diabetes, and cancer [3].

### Anti-obesity properties of Moringa

In general, Obesity is defined as abnormal or excessive body fat, is a major health problem worldwide. The WHO reported that 39% of men and 40% of women were overweight and more than 340 million adolescents and children were overweight or obese (boys: 19%, girls: 18%) in 2016 [4]. Factors related to an excessive danger of weight loss program-brought on obesity include consumption of fast food with a excessive ldl cholesterol content and occasional degrees of bodily workout, ensuing in a high energy intake to expen-

diture ratio and, in flip, obesity. In addition, crude and methanol extracts of *M. oleifera* leaves decreased cholesterol levels in serum, kidney and liver.

### Role of moringa leaf extract in cancer

*M. oleifera* leaves ethanol extract has shown potential anticancer effects in human breast cancer cells, colorectal cancer cell lines, and lung cancer cells. The induction of apoptosis by *M. oleifera* aqueous leaf extract in human esophageal cancer cells was confirmed by decreased ATP levels and increased phosphatidylserine externalization [5].

### Moringa leaves play a role in Malnutrition

Moringa leaves having high level of protein but it get easily digested. Dietary polyunsaturated fatty acids were more in Moringa leaves compared to saturated fatty acids [6]. Comparing to other plant source calcium is observed to be high in amount [7]. Osteoporosis is prevented by more uptake of moringa leaves and also it helps for the formation and maintenance of bones and teeth. It's also wished for regular blood clotting and anxious characteristic. Iron play a more in haemoglobin and myoglobin. Iron facilitates the oxygen to cells. Iron plays a major role in energy metabolism and it facilitates the transfer of electrons in the electron transport chain and also in formation of ATP. It is also an essential element and get involved in oxidation of protein, fat and sugar and also in the functions of central nervous system [8]. The synthesis of several enzymes, DNA and RNA are based on the availability of Zinc. It is required for cell duplication and enhancement of sperm cells. Moringa leaves contains 25.5 mg/kg of Zn. Efficiency of microbial boom is based on the sulphur content, in addition the moringa leaf contains more sulphur containing compounds [9].

The copper content present in the Moringa dried leaves play a vital role in the immune System [10]. Copper content have ability to stimulate the body for defence mechanism. It is involved in neutrophil production. It is required for antibody improvement and lymphocyte Replication [11]. Copper in mixture with Zn, performs a role in superoxide dismutase hobby and the elimination of oxygen unfastened radicals. The protective mechanism of mobile membranes in opposition to superoxide unfastened radicals damage [12].

Moringa can be used in the conventional medicine over many centuries in many cultures worldwide to treat the fever, head ache, TB, pimples, eye and ear infections, skin infections, blood impuri-

ties, cholera, cough, anaemia, anxiety, asthma, blackheads, diarrhoea, lactation, pregnancy and diabetes [13]. It also states that the therapeutic properties of Moringa oil have been recognized by ancient cultures and Moringa oil have been used in skin treatments and ointments since Egyptian times. Moringa oil is used as hair care as a moisturizer, skin conditioner and has great cosmetic value [14].

Moringa is supportive in relieving from pain and decreases infection due to its hot tendency. It is very most effective in stimulating the nervous device. It's also useful in curing the frame infection. It is effective in treating the computer virus infestation, digestive problems, constipation and allows in resolving from greater mucus inside the respiration tract because it has sour taste. It motivates heart, increases the blood density, beneficial in keeping the menstrual cycle because of its hot potency. It is also beneficial in relieving from pores and skin issues because it produces sweat inside the frame, rheumatism, infection, venomous bites, improving cardiac function, treatment of ascites, liver ailment, cancer, hepatic and renal feature. All of the parts of this plant: gum, root, bark, fruit, leaf, plants, seed and seed oil have been used for several illnesses inside the indigenous medicinal drug of South Asia, including the remedy of infection and infectious sicknesses in conjunction with haematological, cardiovascular, hepatorenal and gastrointestinal issues [15].

Moringa supplements can reduce harm to the liver caused by instruction and over-the-counter medications and a few instances may even heal the damage and protect against further damage to the liver from infection. The healing effects of Moringa supplements are still being investigated, but medical studies have already confirmed numerous useful effects of this multipurpose herb in treating and protecting against lives dysfunction in sensitive patients. Moringa dietary supplements may help to minimize and opposite the effects of liver infection and restore a healthy liver [16].

*Moringa oleifera* have distinct medicinal makes use of with high nutritional significance. One of a kind parts of this plant include a profile of vital minerals, and region decent source of beta-carotene, protein, amino acids and numerous phenolic. Other than that, this plant also a wealthy supply of vitamins and some vital factors like manganese, phosphorus, zinc, magnesium, calcium in trace quantity. The moringa plant provides a high-quality supply of micronutrients and macronutrients. Hence, it improves dietary supplement in future, which may be beneficial in numerous sickness situations

and thus sell the nice of life. A major public health problem in many developing countries is Protein energy malnutrition (PEM) [17].

All over the world, roughly 149 million children under- 5 suffer from suppressing. In 2018, 17 million and 49 million children under-5 were affected. Globally, there are 40 million children's were affected due to fat. It's estimated that by 2050, 25 million further children than moment will be glutted. Iron insufficiency get affects the mental health and labour efficiency. Iron insufficiency is the cause of about deaths and 2.4 of the global burden of complaint.

Vitamin A insufficiency (VAD) harms the eyes and increases non age and motherly mortality. The death rate of children increased to 21 percent globally due to diarrhoea, malaria and other similar problems. The significance of zinc insufficiency is being decreasingly honoured. The supplement of zinc resulted in better growth of children and decreases the rate of child mortality, water borne diseases and anemia. In total about child deaths per time are attributable to zinc insufficiency. Zinc insufficiency is the cause of 1.9 of global burden of complaint. According to WHO, 1971 of the 10.8 million children were died due to the deficit of vitamin A, zinc, iodine and iron. The supplement of vitamins, zinc, iodine and other nutrients have potential to reduce the risk of HIV. India is one among the numerous countries where child undernutrition is severe and also undernutrition is a major beginning cause of child mortality in India. Many countries are planned to eradicate the all kinds of malnutrition within 2030.

This effort helps to address the nutritional requirement of the children, adolescent pregnant, lactating women and aged persons. India ranks 103<sup>rd</sup> out of 119 countries in Global Hunger Index during 2018.

### The advantages of Moringa in malnutrition

- In India, the young leaves of moringa to be added in diets of breastfeeding mothers
- One 100 g portion of leaves may give a girl with over common fraction of her daily would like of metal and provides her necessary quantities of iron, protein, copper, sulphur and B-vitamins. Moringa is very helpful for youngsters and ladies United Nations agency area unit anaemic thanks to their emission cycles.
- Moringa has forty-six antioxidants and is one in all the foremost powerful sources of natural anti-oxidants.
- *Moringa oleifera* may be a nutrient plant that may facilitate to keep up traditional glucose levels.

- There are not any negative facet effects related to *Moringa oleifera* use that means that it's a secure, natural approach for folks to manage their glucose and look after their polygenic disease symptoms. Essential fatty acids are rich in moringa leaves. The opposite nutrients needed for optimum cellular health area unit the essential Fatty Acids. As strange because it could sound, there are a unit smart fats that actively facilitate produce healthiness. These area units the now-famous omeg-3 and polyunsaturated fatty acid fatty acids.
- *Moringa oleifera* as an upscale supply of water-soluble vitamin helps in hormone secretion.
- Cancer could be a common unwellness and one in seven deaths is attributed because of improper medication. Around 2.4 million cases square measure rife in Asian country, whereas there are not any specific reasons for cancer to develop.
- Cancer treatments like surgery, therapy and radiation square measure big-ticket and have facet effects. Moringa leaves were used as natural medicine at certain concentration for treating tumour. Studies have shown that moringa are often used as associate degree anti - neo proliferative agent, there by inhibiting the expansion of cancer cells. The extracts of moringa leaves were tested against the tumour and it act as antitumor agents [18].

The consumption of Moringa splint greasepaint for 60 days had shown significant enhancement in the children nutritional status. Recently reported that the children under the age 5 may be supplemented with Moringa splint greasepaint, it will be a good to enhance the nutritive values. Most of the babies are benefited through moringa leaves because rich in vitamins, B-complex, iron, calcium, potassium, magnesium, selenium, zinc and amino acids like arginine and histidine.

### Impact of anaemia in children and adult

Anaemia is blood disorder. Blood is an important living material which flows throughout the body via veins and arteries. Your body includes approximately five to 6 quarts of blood, which might be continuously being pumped at some point of your frame by means of your coronary heart. Blood consists of oxygen, nutrients, and other critical compounds. It also helps modify your frame temperature, fights contamination. When something goes incorrect in your blood, it could have a big impact to your fitness and excellent of existence. In anaemia, your body doesn't have sufficient red blood cells (RBCs). RBCs are one of the three principal types of blood cells. It contains a protein called haemoglobin that carries

oxygen to the blood. The RBCs level or the quantity of haemoglobin on blood get reduced, the supply of oxygen to the body get reduced. It causes tiredness to the body (NIH, 2011).

Haemoglobin (Hb) awareness underneath cut off levels mounted by the world fitness agency, <11 g/dl in kids elderly 6–fifty-nine months, <11.5 g/dl in kids elderly 5–11 years and 12 g/dl in older children (aged 12–14) [4].

International anaemia estimates in ladies of reproductive age, by way of being pregnant reputation, and in children elderly 6–59 months. Anaemia is related to terrible cognitive and motor improvement in kids, and paintings capability in adults, influencing United States monetary improvement. Iron deficiency among pregnant women is also related with the preterm delivery and low weight birth of foetus. Deficiency of Iron content decreases the iron supplies for the baby and it may favour for impaired growth. Failure to lessen anaemia may additionally bring about thousands and thousands of ladies experiencing impaired health and first-class of existence, and might impair youngsters' improvement and mastering. Anaemia is a trademark of both bad nutrients and poor health. In 2019, the prevalence of anemia in women (15–49 years) and children (6–59 months) is 29.9 and 39.8% respectively. In African region, the children's under the age of 0.5–3 years were affected over 60.2% due to anemia in 2019 [19].

### Role of Moringa cookies in human life

Milla, *et al.* 2021 conducted an experiment on Health Benefits of Uses and Applications of *Moringa oleifera* in bakery Products and concluded that the entire *Moringa oleifera* plant is edible, including its flora, however, it isn't completely safe, due to compounds that have been found especially inside the root and bark, so the leaf changed into diagnosed because the most secure [20]. It is as an excellent source of phytochemicals with medicinal preproperties. Recently most of the research have experimented with incorporating moringa dried leaf powder especially in biscuits, Cakes, cookies, brownies, soup, juices and other bakery products. These kinds of products increase their nutritional value but the concentrations of moringa leaf powder cannot be high. The higher concentration may affect the organoleptic features of the incorporated products. Organoleptic evaluation discovered that the beverage of moringa was widely accepted [21].

Riaz, *et al.* 2022 reported on Food to food fortification of whole flour biscuit victimization moringa leaves powder and MLP will be a tool to alleviate deficiency disease and solve food insecurity particularly within the developing countries. MLP will be a tool to alleviate deficiency disease [22].

### Conclusion

The dry *Moringa oleifera*, contains mineral, vitamin, ash, crude fibre, fat and phytochemical composition. The protein of moringa is 0.66 percent whereas carbohydrate contents is 2.63%. Iron, calcium, Vitamin C, flavonoids, alkaloids and betacarotene contents are highly available in dried moringa leaf powder. Daily uptake of DMLP will help the mankind to reduce anemia, cholesterol, cancer and malnutrition. The availability of fresh leafy vegetables is reduced. So, the alternate way to overcome this problem is dried leaf powder preparation. Raw leaf powder may be incorporated in the cookies, it will increase the consumption rate.

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