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(REVIEW ARTICLE)

Moringa- the miracle tree's miracles towards human body

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Abstract

Moringa oleifera also known as Miracle tree is known for its beneficial health effects due to its diverse medicinal properties. *Moringa oleifera* consist of different macro and micro nutrients which helps to combat different deficiencies. Thus, it helps to build a good nutritional status of an individual. Besides being a good source in macronutrient protein, it contains different bioactive compounds. Moringa is mentioned as miracle tree because of its diverse beneficial effects from head to toe. It serves as an antioxidant and anti-inflammatory agent. Its beneficial effect is diverse because it has its beneficial effects on Alzheimer which is related to brain and continue to show its favorable effect as a protective barrier to skin and protection against eye ageing. When any food and food ingredient that may provide health benefits beyond their traditional nutrient, it is called functional food. Moringa is considered as a functional food because beyond the traditional macro and micro nutrients, it contains several bioactive compounds which is considered to be a nutraceuticals like quercetin and chlorogenic acid. In this review detailed insight of Moringa with its structure and health benefits are mentioned.

Keywords: Moringa; Macronutrient; Micronutrient; Bioactive; Alzheimer

1. Introduction

Moringa oleifera is popularly known by its different names in different regions like drumstick tree, ben oil tree, benzolive tree, benzoil tree, horsh radish tree [1].

Figure 1 The Miracle tree

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Not only in different regions in the world but also in India subcontinent, it has different names like Sajne(Bengali region), Muringa (Malayalam region),Shevga (Marathi region). Like its diverse names, every part of Moringa has its diverse nutritional properties towards human body. It is growing in fast speed and deciduous tree, usually 10 m to 12m in height [2].

2. Introducing Moringaceae family

The Moringaceae family consist of different species of Moringa. There are actually 13 species of Moringa come under this family. Different species of Moringa are

- *Moringa stenopetala*
- *Moringa peregrina*
- *Moringa concanensis*
- *Moringa longituba*
- *Moringa rivae*
- *Moringa drouhardii*
- *Moringa ovalifolia*

Moringa oleifera is one of the important and prominent species of Moringa because its adaptable and diversified nature [3].

Table 1 Different species of Moringa's and the geographical distribution of them

Species name	Geographical Distribution
Moringa stenopetala	Ethiopia and Kenya
Moringa peregrina	Africa, Sudan, Egypt
Moringa concanensis	India and Pakistan
Moringa ovalifolia	Namibia and Angola
Moringa drouhardii	Madagascar

3. Different Nutritional components of *Moringa oleifera*

Moringa oleifera is useful because each and every part has its own characteristics and usefulness. Every parts like leaves, roots, seeds, fruits, flowers, immature pods have their own usefulness towards human body [4].

Moringa oleifera contains different macro and micro nutrients

3.1. Carbohydrates

We know that carbohydrates, proteins, fats are important components in macronutrient category. From different nutritional analysis, it is found that Moringa contains near about 28.50% of carbohydrates [5]. Especially the Moringa leaf powder is a rich source of carbohydrate which can contribute to the total energy requirement of an individual [6].

3.2. Proteins

Protein is important for human growth and development. *Moringa oleifera* is found to be a good source of building blocks of proteins, which are essential and non- essential amino acids. Moringa leaf powder specially is a good source of several essential amino acids. There are specifically 9 essential amino acids, out of them valine, isoleucine, methionine are present prominently in the leaves of Moringa [7].

3.3. Fats

Too much of excessive is bad for anything. We know that fat as a nutrient has different beneficial benefits but its excessiveness can lead to different problems. Moringa leaves contain a low amount of fat content which is desirable for any individual (4.03-9.5%) [6]. It is observed that low fat content is present in all parts of Moringa.

3.4. Vitamins

Vitamins are of two types

- Fat soluble
- Water soluble

Moringa oleifera is itself a powerhouse of different fat- and water-soluble vitamins. There is a presence of several fat-soluble vitamins like vitamin D and Vitamin E [7].

Vitamin D is found to be a good medicine for bone health, whereas Vitamin E itself acts as a chain blocking antioxidant. The pro -vitamin of vitamin A which is beta carotene is also present in every parts of *Moringa oleifera*. There is presence of several water-soluble vitamins like vitamin B9 and vitamin B6 etc. [8].

3.5. Minerals

It is found that 13 essential minerals like calcium, chromium, cobalt, magnesium, zinc, selenium is present in Moringa leaves. Selenium is found to be more prominent in Moringa. Sodium and Magnesium is in lower amount[9].

3.6. Other special components in *Moringa oleifera*:

Besides the traditional components of foods, there are different special bioactive components like terpenes, anthraquinones, flavonoids, isothiocyanates, tannins, saponins etc.[10]. These all components are biologically active compounds in plant material. So, we can say that every parts of Moringa act as nutraceuticals because the components of it acts as preventive drugs.

Moringa plant provides different combination of rich bioactive components like Zeatin, Quercetin, Kaempferol, Caffeoylquinic acid [4].

Table 2 Different bioactive compounds in *Moringa oleifera*

Flavonoids and Zeatin	**Combat ageing**
Anthraquinones	Combat auto immune disorders
Isothiocyanate	Combat cancer
Quercetin	Combat hypercholesteremia
Kaempferol	Combat depression
Saponins	Combat viral infections

3.7. Other food vs Moringa

It is seen that Moringa is way a better option than other nutrient in perspective of nutritive value. From, one specific review we can understand it [11].

Table 3 Different Nutrients amount in different food vs Moringa

Food component	**Food name**	**Amount in that food**	**Amount in Moringa**
Vitamin C	Orange	x	7x (7 times more)
Vitamin A	Carrots	x	10x(10 times more)
Calcium	Milk	x	17x (17 times more)
Potassium	Bananas	x	15x(15 times more)
Iron	Spinach	x	25x (25 times more)

4. Miracles towards human body

Moringa oleifera is a powerhouse of nutrients and bioactive compounds, offering numerous health benefits. Its leaves, in particular, have shown promise in improving reproductive health, reducing stunted growth in children, and even fighting cancer cells. The presence of phenolic compounds, vitamins and minerals makes it an attractive candidate for developing new medications, functional foods, and nutritional supplements. As research continues to uncover its potential, *Moringa oleifera* is likely to become an increasingly important resource for promoting human health and wellbeing.

4.1. Moringa and skin

Moringa oleifera is full of different types of fat and water-soluble vitamins. Vitamin A and vitamin C both are prominent in Moringa. Ascorbic acid is an important component for the production of collagen. We also know that vitamin A is beneficial to prevent different skin related disorders like phrynoderma.

From different studies on rats, it is observed that *Moringa oleifera* steam extract is found to be protective against UV-B induced oxidative stress in the epidermis cell layer [12]. *Moringa oleifera* extracted powder has a profound source of omega. Omega component in moringa makes it a great moisturizer[13].

4.2. Moringa and eye

From an invitro experiment where mouse lenses are cultured and diffused with *Moringa oleifera* stem extract for the first 24 hours and for the next 24 hours, the mouse lenses are cultured with H2O2, which itself is found to be one of the causes of oxidative stress. After two days, it is observed that superoxide dismutase and catalase enzymes are increased. Both these enzymes are effective against oxidative stress [14].

Moringa is a prominent source of vitamin A and it is the open secret that vitamin A is effective against different eye related disorders like night blindness, corneal xerosis, conjunctival xerosis, corneal scar etc.

4.3. Moringa and reproductive system

In the long run, feeding mice a diet with *Moringa oleifera* leaves (MOL) improve reproductive health in mice.

Benefits included

- Healthier babies and larger litters
- Reduced oxidative stress
- Healthier sperm in males

MDA (malondialdehyde), a marker of oxidative stress. The study with mice found that mice fed with MOL had lower MDA levels, meaning their bodies had less oxidative damage [15].

4.4. Moringa and undernutrition

Moringa oleifera extract given to pregnant women shown reduced stunted growth in kids from 36 to 42th months. Stunting meaning too short for his or her age. Stunting is an important sign of chronic long term undernutrition indicator in children. It is proven from the studies that Moringa extract had lower stunting rates[16].

Moringa is filled with different micro-nutrients like iron and several vitamins like vitamin A and C which makes Moringa a tough fighter against hidden hunger-micronutrient deficiency disorders.

4.5. Moringa and cancer

Moringa oleifera leaves have shown anticancer potential particularly against lung cells by

- Inhibiting cell growth
- Triggering apoptosis

Moringa extract stopped cancer cells from multiplying in a dose dependent way. Moringa caused cancer cells to die, showing signs like cell shrinkage and DNA fragmentation. *Moringa oleifera* triggers cell death in human lung cancer cells (A549)[17].

5. Conclusion

Moringa is beneficial because not only, it is fully packed with nutrients but also for its availability. In recent dietary guidelines it is said that out of ten food groups, minimum five food groups should be included in every day diet. Moringa, one of the vegetables loaded with different nutrients that can give additional benefits to human body. Each and every part of Moringa somehow doing something extraordinary to the human body. So, we should include Moringa in our diet when it is available specially in our winter to mid spring plates.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest.

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