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Research Article

### FORMULATION OF HERBAL TABLETS CONTAINING *MORINGA OLEIFERA* LEAF POWDER

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Washim, Maharashtra, India<sup>3</sup>Principal, Department of Pharmacology, Shraddha Institute of Pharmacy, Washim,  
Maharashtra, India**Abstract:**

*The process of developing Moringa oleifera leaf tablets in a pharmaceutical way marks an important step from using the plant in traditional medicine to using it in a standardized way in clinical settings. This is needed because raw powder has problems like inconsistent dosing, breaking down quickly in the environment, and not being taken regularly by patients. Moringa is often called the "Miracle Tree" because of its high nutritional value and wide range of health benefits. It contains many active compounds, including flavonoids like quercetin and kaempferol, as well as different phenolic acids that need to be protected using modern methods. This study used a systematic wet granulation method and included pharmaceutical-grade ingredients like lactose for bulk, starch paste as a binder, and sodium starch glycolate as a disintegrant. This helped create a solid oral dosage form that releases these important compounds quickly and evenly. The production process was checked thoroughly, first before compression, which showed good flow properties with a Carr's Index of 22.1% and a Hausner's Ratio of 1.28. After compression, the tablets had strong hardness of 5.84 kg/cm<sup>2</sup> and low friability of 0.71%. The final tablets showed a consistent disintegration time of 18 to 28 minutes, making them a reliable and stable option that delivers the plant's immune-supporting effects in a convenient and accurate dose, suitable for modern healthcare.*

**Keywords:** - Moringa oleifera, Miracle Tree, herbal tablet formulation, standardized dosage form, short shelf life, flavonoids, patient convenience, immune-supporting effects.

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## INTRODUCTION:

*Moringa oleifera*, also called the drumstick tree, is a rapidly growing plant native to the Indian subcontinent<sup>1</sup>. It is widely utilized in various fields such as food, medicine, chemical industries, and oil production<sup>2</sup>. The plant is highly nutritious, containing abundant vitamins, minerals, and proteins<sup>3</sup>. Almost every part of the plant—including leaves, roots, stems, and seeds—possesses significant therapeutic benefits<sup>4</sup>. It has been reported to exhibit antihypertensive and antidiabetic effects and also acts as a potent antioxidant due to the presence of bioactive compounds such as flavonoids and phenolic constituents<sup>5</sup>.

Despite its numerous advantages, the use of raw moringa leaf powder presents several limitations. The powder has poor stability and is highly susceptible to environmental factors such as moisture, light, and temperature fluctuations, which may lead to degradation of its active constituents<sup>6</sup>. Additionally, it exhibits poor flow properties, bulkiness, and an unpleasant taste and odor, making it inconvenient for administration<sup>7</sup>. Another major challenge is the lack of uniformity in dosing, which can result in inconsistent therapeutic outcomes<sup>8</sup>.

To overcome these limitations, pharmaceutical researchers have focused on developing tablet formulations of moringa leaf powder. Tablets offer several advantages, including accurate dosing, improved stability, and extended shelf-life of the product<sup>9</sup>. Furthermore, they are easy to handle, transport, and administer, thereby enhancing patient compliance<sup>10</sup>. Tablets also help in masking undesirable taste and odor while ensuring uniformity in drug content and quality. Thus, converting moringa into tablet dosage form provides a more convenient, reliable, and effective way to utilize its therapeutic potential.



Fig. No 01. Moringa Oleifera Tree

## PHYTOCHEMICAL AND NUTRITIONAL PROFILE

*Moringa oleifera* leaves are considered one of the most nutrient-rich plant sources, providing a balanced combination of macronutrients such as proteins and essential amino acids, along with micronutrients including vitamins A, C, and E, as well as calcium, iron, and potassium<sup>10</sup>. The levels of protein and essential minerals present in moringa leaves are often higher than those found in commonly consumed foods, making them highly effective in improving nutritional status and preventing deficiencies<sup>11</sup>. In addition to their nutritional richness, moringa leaves contain a wide variety of bioactive compounds responsible for their therapeutic properties<sup>12</sup>.

The medicinal potential of moringa leaves is mainly attributed to phytochemicals such as flavonoids, phenolic acids, and other secondary metabolites<sup>13</sup>. Flavonoids including quercetin, kaempferol, and apigenin act as potent antioxidants that neutralize harmful free radicals, thereby reducing oxidative stress and lowering the risk of chronic diseases such as cardiovascular disorders and diabetes<sup>14</sup>. Phenolic acids such as chlorogenic acid, gallic acid, and caffeoylquinic acid exhibit strong antioxidant and anti-inflammatory effects and play a role in protecting tissues and regulating blood glucose levels<sup>15</sup>.

Furthermore, moringa leaves contain several other important bioactive constituents including alkaloids, saponins, tannins, and isothiocyanates, each contributing to its pharmacological activities<sup>16</sup>. Alkaloids are known for their analgesic and antimicrobial effects, while saponins help in reducing cholesterol levels and enhancing immune response<sup>17</sup>. Tannins possess antimicrobial and astringent properties, whereas isothiocyanates are recognized for their anticancer and detoxifying activities<sup>18</sup>.

Overall, the synergistic combination of essential nutrients and bioactive compounds makes moringa leaves highly beneficial for maintaining overall health<sup>19</sup>. These properties contribute to immune system support, reduction of inflammation, and prevention and management of various chronic diseases<sup>20</sup>.



**Fig No 02.** Leaves of moringa *Oleifera*

**Table: Nutritional Comparison of Fresh Leaves vs Leaf Protein Concentrate**

Nutrient	Fresh Leaves	Leaf Protein Concentrate
Protein (g)	6.7	27.1
Calcium (mg)	440	2003
Iron (mg)	0.85	28.2
Vitamin A (mg)	1.28	16.3

The comparison clearly indicates that the leaf protein concentrate (LPC) has significantly higher nutritional values than fresh leaves. The protein content increases approximately fourfold, showing its effectiveness as a concentrated protein source. Similarly, minerals such as calcium and iron are highly enriched in LPC, which enhances its potential role in combating deficiencies like anemia and osteoporosis. The vitamin A content is also markedly increased, suggesting improved antioxidant and vision-supporting properties. Overall, this data supports the use of LPC as a nutrient-dense functional food ingredient, especially in the formulation of nutraceutical products such as fortified foods or gummies.

### PHARMACOLOGICAL HIGHLIGHTS

*Moringa oleifera* has been extensively studied in modern scientific research, and many of its traditional uses are now supported by experimental evidence<sup>21</sup>. One of its most significant pharmacological benefits is its antidiabetic activity. Several studies, particularly in animal models, have demonstrated that moringa extracts can effectively reduce blood glucose levels<sup>22</sup>. This effect is attributed to the presence of bioactive compounds that enhance insulin sensitivity, promote glucose uptake by cells, and reduce oxidative stress associated with diabetes<sup>23</sup>.

Moringa also exhibits strong wound healing properties. Both aqueous and alcoholic extracts of its leaves and seeds have been shown to accelerate wound contraction, enhance tissue regeneration, and improve skin strength<sup>24</sup>. These effects are primarily due to its antioxidant, anti-inflammatory, and antimicrobial constituents, which help prevent infection and promote faster healing of damaged tissues<sup>25</sup>.

Another important pharmacological activity of *Moringa oleifera* is its hepatoprotective effect. Studies have reported its ability to protect the liver from drug-induced toxicity, particularly from drugs such as isoniazid<sup>26</sup>. The protective mechanism involves stabilization of liver enzymes, reduction of oxidative stress, and prevention of cellular damage, thereby maintaining normal liver function and detoxification processes<sup>27</sup>.

In addition, moringa possesses significant antimicrobial activity against a wide range of microorganisms. It has been found to be effective against bacteria such as *Escherichia coli* and *Staphylococcus aureus*, as well as various fungal species<sup>28</sup>. These antimicrobial effects are mainly due to the presence of phytochemicals such as isothiocyanates and flavonoids, which inhibit the growth of pathogenic organisms. Overall, the diverse pharmacological properties of moringa highlight its potential as a natural therapeutic agent for the prevention and management of various diseases.

## INSTRUMENTS



Fig. No 03. P-fizer Hardness Tester



Fig. No 04. Tablet Compression Machine



Fig. No 05. Disintegration Test Apparatus

**Formulation Methodology**

The formulation of *Moringa oleifera* leaf tablets requires a well-planned pharmaceutical approach due to the inherent limitations of the raw leaf powder<sup>29</sup>. The powder typically exhibits poor flow properties, low compressibility, and non-uniform particle size distribution, which can affect the quality of the final dosage form<sup>30</sup>. To overcome these challenges, suitable excipients are carefully selected to enhance the processing characteristics and overall tablet performance<sup>31</sup>. Diluents such as lactose and microcrystalline cellulose are commonly incorporated to increase bulk volume, achieve the desired tablet weight, and improve compressibility of the formulation<sup>32</sup>.



Fig. No 06. Friability Test Apparatus

Starch plays a dual role in tablet formulation, acting as a binder during the granulation process to provide cohesion among particles, and also functioning as a disintegrant to facilitate rapid tablet breakup after administration<sup>33</sup>. Sodium starch glycolate is widely used as a superdisintegrant due to its high swelling capacity, which promotes rapid disintegration and enhances drug release<sup>34</sup>. Additionally, lubricants such as magnesium stearate and glidants like talc are incorporated to prevent sticking of the tablet to punches and dies and to improve the flow of granules during compression<sup>35</sup>.

Wet granulation is considered the most suitable technique for the preparation of moringa tablets, as

it significantly improves flow properties, compressibility, and uniformity of the blend. This method ensures the production of tablets with consistent quality, adequate mechanical strength, and reliable performance.



**Fig No 7:** Prepared Herbal Tablets of *Moringa oleifera* Leaf Powder

The process starts with mixing the powdered leaves with diluents to ensure everything is evenly spread out. Then, a binder like starch paste is added to create a damp mixture, which is then sieved to form uniform granules. Next, the granules are dried under controlled conditions to remove moisture without harming the heat-sensitive compounds in *Moringa*. Finally, the dried granules are mixed with lubricants and pressed into tablets using a machine. This careful process makes the final tablets uniform, stable, and effective in delivering the active ingredients, making them suitable for use in modern medicine.<sup>36</sup>

### CONCLUSION:

The formulation of *Moringa oleifera* leaf powder into tablet form represents an important step forward in bringing traditional herbal medicine into modern healthcare. While *moringa* has long been valued as the “Miracle Tree” for its rich nutritional and medicinal properties, converting it into tablets using standardized pharmaceutical techniques like wet granulation makes its use more reliable and practical. This approach helps overcome the limitations of raw leaf powder by improving stability, ensuring accurate dosing, and making the product easier to consume and carry, which ultimately enhances patient compliance. In addition, tablet formulation allows better protection of the plant’s active compounds and ensures consistent quality across different batches. This is especially important in herbal medicine, where natural variations can affect the effectiveness of the product. By applying proper quality control and formulation strategies, *moringa* tablets can provide predictable and reproducible therapeutic benefits, making them suitable for wider clinical use. Looking ahead,

further research is needed to strengthen the scientific evidence supporting these formulations. In particular, well-designed clinical trials in human subjects should be conducted to evaluate the bioavailability, safety, and long-term efficacy of standardized *moringa* tablets. Such studies will help establish stronger clinical acceptance and open the door for integrating *moringa*-based formulations into mainstream medical practice

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