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# Formulation and Evaluation Of Anti-Imflammatory And Anti- Oxidant Polyherbal Capsule Made From Moringa Powder

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**Abstract:** *This study aimed to formulate and evaluate polyherbal capsules containing Moringa oleifera, Turmeric, Ginger, and Ashwagandha. The capsules were prepared using a blend of herbal powders and evaluated for their physicochemical properties, phytochemical composition, and antioxidant activity. The results showed that the capsules met the required standards for weight variation, content uniformity, and disintegration time.*

*The phytochemical analysis revealed the presence of various bioactive compounds, including flavonoids, phenolic acids, and alkaloids. The capsules also exhibited significant antioxidant activity, indicating their potential health benefits. The stability studies showed that the capsules were stable under various storage conditions. Overall, the polyherbal capsules containing Moringa oleifera demonstrated promising results, suggesting their potential use as a dietary supplement for health benefits.*

**Keywords:** Moringa oleifera, Polyherbal capsules, Phytochemical analysis, Antioxidant activity, Stability studies

## I. INTRODUCTION

The present study focuses on the Formulation and evalution of polyherbal capsule from moringa oleifera derived from the leaves of moringa oleifera belonging into moringaceae

Moringa oleifera, commonly known as the drumstick tree or "miracle tree," is a highly valued plant recognized for its rich nutritional profile and diverse pharmacological properties, including antioxidant, anti-inflammatory, antidiabetic, antimicrobial, and hepatoprotective effects.

Various parts of the plant, particularly the leaves, are used traditionally for managing malnutrition, infections, and chronic diseases.

In recent years, there has been a growing interest in combining Moringa oleifera with other medicinal plants to develop effective polyherbal formulations that target multiple health conditions. Such combinations may offer improved therapeutic outcomes through additive or synergistic actions of their bioactive compounds.

This study aims to formulate and evaluate a polyherbal capsule containing Moringa oleifera along with selected complementary herbs. The formulation will be assessed for its physical properties, drug content, disintegration time, and other quality parameters to ensure its efficacy, safety, and stability.

**Benefits of Moringa Capsules**

1. Rich in Nutrients: Contains vitamins A, C, E, calcium, potassium, and iron, supporting overall health and immunity.
2. Antioxidant Properties: Helps protect cells from oxidative stress and slows aging by neutralizing free radicals.
3. Anti-Inflammatory Effects: Reduces inflammation in the body, beneficial for conditions like arthritis.
4. Supports Blood Sugar Control: May help regulate blood glucose levels, useful for diabetics.
5. Cholesterol Management: Can help lower LDL (bad cholesterol) and improve heart health. [8:12 pm, 18/05/2025] Education:
6. Improves Digestion: Aids in digestion and helps relieve constipation due to its fiber content.
7. Enhances Immunity: Strengthens the immune system, helping the body fight infections.

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8. Supports Brain Health: Contains neuroprotective compounds that may improve memory and brain function.
9. Antimicrobial Action: Exhibits antibacterial and antifungal activity against various pathogens.
10. Energy Boosting: Increases vitality and reduces fatigue naturally.

**Future benefits**

Polyherbal capsules made from Moringa oleifera (drumstick tree) powder, combined with other synergistic herbs, offer numerous potential health benefits in the future due to their rich nutritional and bioactive compounds. Here are some key future benefits:

1. Enhanced Nutritional Supplementation

• Moringa is packed with vitamins (A, C, E, B-complex), minerals (calcium, iron, potassium, magnesium), and essential amino acids.

• Future formulations may optimize bioavailability, making these capsules a powerful dietary supplement for malnutrition, vegan diets, and immune support.

2. Chronic Disease Prevention & Management

Antioxidant & Anti-inflammatory Effects: Moringa contains quercetin, chlorogenic acid, and kaempferol, which may help combat oxidative stress, reducing risks of diabetes, heart disease, and cancer.

• Blood Sugar Regulation: Studies suggest Moringa can improve insulin sensitivity, making it a future adjunct therapy for diabetes management.

• Cholesterol & Heart Health: May help lower LDL cholesterol and support cardiovascular health.

3. Immune System Boost & Antimicrobial Protection

Moringa has antibacterial, antiviral, and antifungal properties, which could be enhanced in polyherbal capsules to fight infections.

• Future research may explore its role in preventing viral outbreaks (like flu or COVID-19 variants) by strengthening immunity.

4. Anti-Aging & Skin Health

• High levels of vitamin E, zinc, and collagen-boosting compounds may promote skin repair, anti-wrinkle effects, and wound healing.

• Future cosmeceutical applications could include anti-aging capsules for longevity.

5. Cognitive & Neurological Benefits

• Moringa's neuroprotective antioxidants may help prevent Alzheimer's and Parkinson's diseases.

• Future formulations might combine it with Brahmi or Ashwagandha for enhanced brain function.

6. Digestive & Gut Health

• The high fiber and anti-inflammatory properties may improve digestion and prevent ulcers, IBS, and leaky gut syndrome.

• Future probiotic-enriched polyhebal capsules could optimize gut micro biota.

7. Energy, Stamina & Muscle Recovery

• Athletes may benefit from natural energy-boosting and muscle-repairing effects without synthetic supplements.

• Future sports nutrition may include Moringa-based capsules for endurance and recovery.

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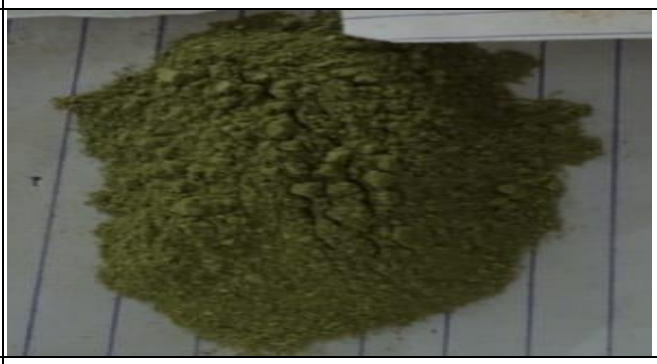
8. Sustainable & Eco-Friendly Health Solution
• Moringa is drought-resistant and fast-growing, making it a future-proof super food in climate-challenged regions.
• Polyherbal capsules could reduce reliance on synthetic drugs, promoting natural, sustainable

**Literature review**

Brand-Williams, W., et al. (1995). Use of a free radical method to evaluate antioxidant activity. LWT - Food Science and Technology, 28(1), 25-30.
Anwar, F., et al. (2007). Moringa oleifera: A food plant with multiple medicinal uses. Phytotherapy Research, 21(1), 17-25.
According to Anwar et al. (2007), various parts of the Moringa plant possess antioxidant, anti- inflammatory, antidiabetic, and antimicrobial activities. Its leaves are particularly rich in vitamins, minerals, amino acids, and bioactive compounds such as quercetin, kaempferol, and chlorogenic acid.
Bafna, A., & Mishra, S. (2010). Polyherbal formulations: An overview. Journal of Pharmacognosy, 2(1), 10-15.
Several studies have formulated polyherbal preparations using Moringa oleifera. For instance, Patel et al. (2012) developed a polyherbal capsule combining Moringa oleifera, Triphala, and Ashwagandha to evaluate its antioxidant and hepatoprotective potential. The study reported improved therapeutic activity due to the synergistic interaction of t
Sharma, P., et al. (2019). Evaluation of polyherbal capsules for physicochemical and microbial parameters. International Journal of Ayurveda and Pharma Research, 7(4), 32-36

**Drug Profile**

| DRUG | IMAGE |
|---|---|
| **1. MORINGA POWDER** |  |
| **PROFILE** | **Chemical constituents:-**<br>cardiac glycosides, steroids, glycosides, anthraquinones, tannins saponins, alkaloids: marumoside A marumoside B. pyrrolemarumine-4"-o- a-l-rhamnopyranoside<br>**flavonoids**:-rutin, quercetin apigenin,<br>**phenolic acids**:- gallic acids caffeic acid, o-coumaric acids, chlorogenic acids<br>terpenes: lutein 15-z-ß- carotenes.<br>**Scientific classification**:-<br>**Synonyms**:- Hyperanthera moringa, moringa pterygosperma gareth.<br>**Scientific name**:- moringa oleifera.<br>**Genus**:- moringa. **Species**:- M. Oleifera. **Family**: |

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| | |
|---|---|
| | moringaceae. **Colour:** green.<br>**Odour**: delicate fresh smell. **Taste**: pungent, slightly bitter. **Property**: warm in nature.<br>**Size**:- height 10 to 12 m and diameter 45m<br>**Nature**:- slightly dry |
| **2. TURMERIC POWDER** |  |
| | **Turmeric Spire derived from the shizome of curcuma longa boasts cological properties including C wide range of phored antioxidant & antimicrobial activitia. anti-inflammatory**<br>**chemical constituents: Curcuminoids,**<br>**< other phenolic compound**<br>**Synonyms: haldi, Curcuma. Scientific Name: Curcuma Tonga Genus: Curcuma**<br>**Species: Curcuma longa**<br>**Family: Zingiberaceae.**<br>**Odour: earthy and spicy**<br>**Taste: smoky & bitter.**<br>**Colour: Bright yellow**<br>**Property: antioxidant & antimflammatory**<br>**Nature: acidic** |
| **3. GINGER POWDER** |  |
| **PROFILE** | **GINGER :-**<br>**it commonly used spice 4 herbal medication that is picade from the roots. of Creeping Perennial plant native to southeast asia.** |

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| | |
|---|---|
| | **Chemical Constituents**<br>**Carbohydrates, lipids, & variou phenolic compounds like gingerols, shogaols & Paradols-**<br>**Scientific Name: Zingiber officinale**<br>**Genus: Ingiber**<br>**Species zingiber officinale**<br>**FamilyZeingiberaceae**<br>**Properties Pain relief, Anti-oxidant , Anti-Imflammatory**<br>**Family: Zingiberaceae.**<br>**Odour: earthy and spicy**<br>**Taste: smoky & bitter.**<br>**Colour slightly orange**<br>**Use: . .Anti-imflammatory** |
| **4. ASHWAGANDHA** |  |
| **PROFILE** | **Ashwagandha-**<br>**Ashwagandha is on Shrub found in parts of & the middle east. evergreen india Japtrica**<br>**Chemical contain: alkaloids steroidal lactones.**<br>**Scientific Name: withania som nifera.**<br>**Species: Night shode**<br>**Family: Solanacae**<br>**Genus: withanya**<br>**Use: Anxiety, Imflammation improves immunity**<br>**Scientific Name: Zingiber officinale**<br>**Genus: Ingiber**<br>**Species zingiber officinale**<br>**FamilyZeingiberaceae** |

**Plan of work:**

- Selection of topic
- Selection of polyherb
- Selection of excipient
- Material and instruments

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Performulation Study

- Organoleptic property
- General appearance
- Colour
- Odour
- Bulk density
- Tapped density
- % ash value
- Angle of repose
- Solubility

**Material and Apparatus**

Material

- Drumstick leaves powder
- Binding agent
- Thickening agent
  - (Starch)
- Diluent
- Ginger
- Turmeric
  - (Lactose Powder)
- Ashwagandha
- Lubricant
  - (Magnesium Stearate)

Apparatus

- Weighing balance
- Capsule filling machine
- Disintegration apparatus
- Dissolution apparatus

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| Sr. | Ingredients | Image | Uses |
|---|---|---|---|
| 1 | Moringa Powder |  | Anti-Oxidant, Anti-cancer |
| 2 | Turmeric |  | Boost immune system |
| 3 | Ginger |  | Reduce Inflammation |
| 4 | Ashwagandha |  | Reduce Inflammation |
| 5 | Starch |  | Thickening Agent |
| 6 | Magnesium stearate |  | Lubricant |
| 7 | Talc Powder |  | Diluent Lubricant |


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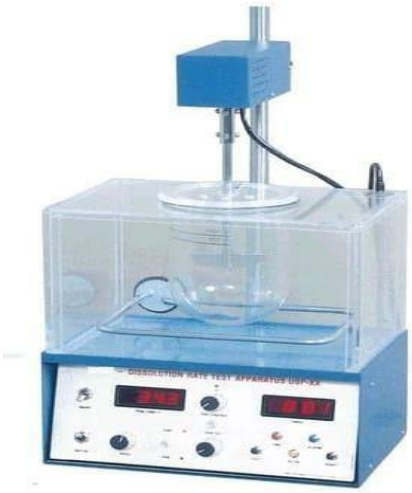
Apparatus used in Formulation

1. Disintegration test Appratus


2. Dissolution test Appratus



3. Weighing balance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4. Capsule filling machine

Pre-formulation
1. Bulk density
2. Tapped density
4. Angle of repose
5. % ash value
6. Solubility

1. Bulk density
The bulk density of a powder is the ratio of the mass of an untapped powder sample and its volume including the contribution of the inter-particulate void volume.
Formula: Bulk density Mass Bulk volume

2. Tapped density
The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample.
Formula: Tapped density. Mass Tapped volume

3. Angle of repose
Angle of repose powder poured from a vessel forms a cone-like pile. The angle of repose the angle between the slope of the pile and the horizontal correlates with the strength of particle- particle interactions and, therefore, is 1156 measured to infer flow ability.
Formula: $\tan^{-1}(h/r)$

4. % Ash value
The ash values usually represent the inorganic residues such as phosphates, carbonates and silicates present in herbal drugs
Formula: % ASH = x 100 W2: weight of crucible ash WO: weight of crucible W1: weight of sample

5. Solubility
Solubility is the ability of a solid, liquid, or gaseous chemical substance (referred to as the solute) to dissolve in solvent (usually a liquidi and form a solution We are going to check solubility of alkaline solution.


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Formulation Table

| Ingradients | F1 | F2 | F3 |
|---|---|---|---|
| Moringa Powder | 2gm | 3gm | 4gm |
| Turmeric powder | 1gm | 1gm | 2gm |
| Ashwagandha Powder | 0.5gm | 0.5gm | 1.0gm |
| Ginger powder | 0.5gm | 0.5gm | 1.0gm |
| Talc | 0.1gm | 0.1gm | 0.1gm |
| Starch | 1gm | 1gm | 1gm |
| Magnesium Stearate | 0.2gm | 0.2gm | 0.2gm |

Selection of capsule

Capsule:

A capsule is a type of container that is commonly used in the medical and pharmaceutical industries. It is usually made of two parts: a shell and a cap. Capsules are used to hold medications, supplements, or other substances in a convenient and easy-to-swallow form. They come in different sizes and can be made from various materials, such as gelatin or vegetarian alternatives. Capsules are designed to dissolve or break down in the body, releasing the contents for absorption

Size of Capsule:

| Size of capsule | Size of capsule | Size of capsule |
|---|---|---|
| 000 | 800-1600 | 1.37ml |
| 00 | 600-1100 | 1.00ml |
| 0 | 400-800 | 0.68ml |
| 1 | 300-600 | 0.48ml |
| 2 | 200-400 | 0.36ml |
| 3 | 162-324 | 0.27ml |
| 4 | 120-240 | 0.20ml |

Preparation of powder and capsule filling :-

1. Firstly taken moringa leaves powder with adding turmeric powder + ginger powder + ashwagandha powder + talcum powder + magnesium stearate
2. Then add binder used as starch
3. Mix all ingredients
4. Then pass through the seive no 40
5. Fine powder are formed

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6. Capsule Preparation:
The process begins with separating the caps from the bodies of the empty capsules, ensuring proper orientation for filling. This can be done manually or with the help of a capsule sorting machine.

7. Filling Station Setup:
The capsule bodies are then loaded into the feeding system of the machine, and the machine is configured with specific parameters like fill weight and speed.

8. Filling Method:
Various methods can be used to fill the capsules, including:
Powder Dispensing: Precise amounts of powder or granules are dispensed into each capsule body.
Tamping and Compression: After filling, a tamping pin can be used to compress the powder inside the body, ensuring uniformity and removing air pockets.

9. Cap Placement:
Once the bodies are filled, the caps are reattached using a mechanical system or vacuum technology.

10. Cleaning and Polishing:
Any excess powder around the edges is removed using methods like vacuum suction or brushes. Some machines also include polishing stations for a smoother finish.

11. Capsule Ejection:
Finally, the filled capsules are ejected from the machine

Evaluation table
Organoleptic character:

| Parameter | Observation |
|---|---|
| Size | 0 |
| Shape | Cylindrical |
| Colour | Light green colour |
| Odour | Slightly bitter and earthy odour |

Evaluation test

| Test | F1 | F2 | F3 |
|---|---|---|---|
| Disintegration time | 9.35 | 8.85 | 8.79 |
| Weight variation test | Fail | Fail | Pass |
| Moisture content | 8.57% | 9.74% | 7.90% |

Result and discussion:
A. Preformulation Table :

| BATCH | F1 | F2 | F3 |
|---|---|---|---|
| 1.BULK DENSITY | 0.30gm/ml | 0.31gm/ml | 0.32gm/ml |
| 2.TAPPED DENSITY | 0.40gm/ml | 0.39gm/ml | 0.35gm/ml |
| 3.ANGLE OF REPOSE | 42°75’ | 47°7’ | 47°76’ |
| 4.% ASH VALUE | 18% | 18% | 18% |


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Solubility:

| BATCH | Solubility in water | Solubility in HCL |
|---|---|---|
| A | Slightly soluble | Freely soluble |
| B | Slightly soluble | Moderately soluble |
| C | Slightly soluble | Freely soluble |

## CONCLUSION

The present study focused on the formulation and evaluation of a herbal capsule using Moringa oleifera leaf powder, targeting antioxidant and anti-inflammatory activity.

The capsule was successfully formulated using standard excipients and showed satisfactory results in all physicochemical evaluations, including weight uniformity, disintegration time, and flow properties. The antioxidant and anti-inflammatory properties of Moringa oleifera, attributed to its rich content of polyphenols, flavonoids, and vitamins, were preserved in the capsule form.

The results suggest that Moringa oleifera capsules can serve as an effective natural supplement for managing oxidative stress and inflammation.

Further pharmacological and clinical studies are recommended to confirm its therapeutic efficacy and safety in long-term use.

Polyherbal Moringa capsules have immense potential as a multifunctional, natural supplement for future healthcare, addressing malnutrition, chronic diseases, immunity, and aging. As research advances, they could become a staple in preventive and therapeutic medicine

**Future Research & Innovations**

- Nanotechnology-enhanced absorption for better efficacy.
- Combination with other super herbs (turmeric, ginger, amla) for amplified benefits.
- Personalized medicine where formulations are tailored based on genetic health risks.

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