

## FORMULATION AND EVALUATION OF HERBAL CAPSULE

\*<sup>1</sup>More Vaibhav Kantilal and <sup>2</sup>Mujmule Akshada Vitthal

<sup>1</sup>Pharmacists and <sup>2</sup>B. Pharmacy

<sup>1</sup>Dr. N. J. Paulbudhe College of Pharmacy, Ahemadnagar<sup>1st</sup>, Ahemadnagar, India.



\*Corresponding Author: More Vaibhav Kantilal

Pharmacists, Dr. N. J. Paulbudhe College of Pharmacy, Ahemadnagar<sup>1st</sup>, Ahemadnagar, India.

Article Received on 05/04/2024

Article Revised on 26/04/2024

Article Accepted on 16/05/2024

### ABSTRACT

Herbal capsules are dietary supplements containing concentrated extracts from various plants and herbs, enclosed in a convenient form for ingestion. These capsules capitalize on the therapeutic properties of botanicals utilized for centuries in traditional medicine systems globally. They enjoy popularity owing to their simplicity, consistent dosages, and claimed health advantages. Herbal capsules address diverse health needs such as immune enhancement, digestive support, cognitive enhancement, stress reduction, and overall wellness promotion. Manufacturers typically extract active constituents from herbs and plants, encapsulating them in gelatin or vegetarian capsules for oral intake. Rigorous quality control procedures ensure the extracts' potency and purity. Nonetheless, it's crucial to seek advice from a healthcare professional before initiating any new supplement regimen, particularly if you have existing health conditions or are under medication. Moringa leaves are a nutritious dietary supplement rich in vitamins, minerals, and protein. Strawberries, on the other hand, are rich in natural sugars and antioxidants like vitamin C, flavonoids, and phenolic compounds. Herbal capsules, encapsulated in plant-derived ingredients, are designed to promote health and well-being. Both fruits are rich in essential nutrients, making them a valuable addition to any diet.

**KEYWORDS:** Moringa leaves are a nutritious dietary supplement rich in vitamins, minerals, and protein.

### 1. INTRODUCTION

Herbal capsules, natural supplements encapsulating plant-derived ingredients, are improve to health and wellness.

These capsules leverage the therapeutic benefits of diverse herbs, offering a convenient and easily digestible form for consumption.

Rooted in traditional medicine, they are increasingly favored as either an alternative or complementary approach to bolster overall health, tackling issues ranging from immunity to stress management. However, it's essential to consult with a healthcare professional before integrating them into your regimen.

In today's world, medicinal plants hold significant importance. Herbal medicinal preparations, comprising whole herbs, their extracts, or parts thereof, containing active compounds, are instrumental.

These formulations come in various forms like tablets, capsules, suppositories, and ophthalmic solutions. Herbal capsules, categorized as monoherbal and polyherbal,

each possess distinct advantages and drawbacks.

Their composition involves a blend of animal proteins and plant polysaccharides, with the manufacturing processes differing for hard and soft capsules. Evaluation encompasses criteria such as weight uniformity, content, disintegration, dissolution, etc.

Due to the complex nature of phytopharmaceuticals, chromatographic techniques are employed for estimation and standardization, often establishing marker substances for analysis. Clinical trials ascertain efficacy and safety, contributing to the understanding of herbal capsule formulation and standardization methods.

Dietary supplements, herbal capsules contain concentrated extracts from various plants, typically encased in gelatin or vegetarian capsules. They encapsulate the medicinal essence of herbs, ensuring consistent dosage and effectiveness through processing and concentration.

Standardization may be employed to maintain specific compound levels.

These capsules are utilized to bolster health and tackle concerns like immune support and stress reduction, offering a measured and convenient means of oral consumption with water.<sup>[1, 2, 3]</sup>

Before commencing any herbal supplement regimen, it's advisable to seek guidance from a healthcare professional, as potential interactions with medications or individual health conditions may arise.

A plethora of herbal capsules is available, each tailored to specific health needs. For instance, echinacea bolsters immune function, valerian promotes relaxation, and turmeric exhibits anti-inflammatory properties. Always adhere to recommended dosage instructions and remain vigilant about potential side effects or allergies associated with specific herbs.

Medicinal plants hold significant sway in contemporary society. Herbal medicinal preparations, derived from whole herbs, their extracts, or components thereof, containing active compounds, manifest in various forms like tablets, capsules, and suppositories. The composition of herbal capsule shells involves a blend of animal proteins and plant polysaccharides, with manufacturing processes differing for hard and soft capsules. Evaluation encompasses criteria such as weight uniformity, content, disintegration, and dissolution.

Given the intricate nature of phytopharmaceuticals, chromatographic techniques facilitate estimation and standardization, often establishing marker substances for analysis. The primary challenges confronting herbal formulations stem from their incomplete evaluation, underscoring the importance of rigorous assessment to ensure product quality and purity.

Establishing a robust evaluation system for every plant medicine in the market is imperative.

Herbal medicines, derived from plant materials prone to contamination, deterioration, and compositional variation, pose challenges in quality control. Consequently, herbal drugs manifest in various dosage forms such as tablets, capsules, and syrups, catering to patient ease and acceptability in treating various ailments.

Recognizing the pivotal role of medicinal plants in public healthcare, the World Health Organization (WHO) has devised guidelines to aid member states in formulating national policies on traditional medicine. These guidelines emphasize the significance of studying potential usefulness, including evaluation of quality, safety, and efficacy.

Continuing research into the antidiabetic activity of the ethanol extract of *Gnetum gnemon* fruits, the present study endeavors to formulate herbal capsules utilizing the dried ethanol extract of *Gnetum gnemon* fruits and evaluate the pharmaceutical quality of the formulated

capsules.<sup>[4,5,6]</sup>

## 2. MATERIALS AND METHOD

### Materials

#### HERBAL DRUGS

##### 2.1 Moringa

**Synonym:** *Guilandina moringa* L. *Hyperanthera moringa* (L.), *Vahl Moringa pterygosperma* Gaertn, drumstick tree.

**Family:** Moringaceae.

#### Biological Source

*Moringa oleifera* (MO) is an indigenous tree from the north of India, Pakistan, and Nepal, of which all its components (leaves, seeds, flowers, and bark) are considered medicinal.

#### Chemical Constituents

Chemical constituents of moringa powder

Moringa powder is rich in various nutrients and bioactive compounds, including: Chemical Composition.

Moringa powder is abundant in a diverse array of nutrients and bioactive compounds, comprising.

- **Vitamins:** Moringa boasts significant levels of vitamins A, C, and E, along with various B vitamins like folate, thiamine, riboflavin, and niacin.
- **Minerals:** It serves as a rich reservoir of essential minerals including calcium, potassium, iron, magnesium, phosphorus, and zinc.
- **Antioxidants:** The powder harbors potent antioxidants such as flavonoids, polyphenols, and ascorbic acid, pivotal in shielding cells against free radical-induced damage.
- **Amino Acids:** Moringa provides all nine indispensable amino acids, rendering it a complete protein source.
- **Phytochemicals:** Moringa encompasses diverse phytochemicals like quercetin, chlorogenic acid, and beta-sitosterol, renowned for their antioxidant and anti-inflammatory attributes.
- **Fiber:** Abundant in dietary fiber, it promotes digestive well-being and aids in stabilizing blood sugar levels.

In essence, moringa powder is prized for its nutritional richness and the potential health advantages it offers.<sup>[6,7,8]</sup>

#### Clinical Applications

Moringa, scientifically known as *Moringa oleifera*, has garnered attention for its potential health benefits. Some clinical applications of moringa include.

- **Nutritional Supplement:** Moringa leaves are packed with vitamins, minerals, and antioxidants, making them a promising nutritional supplement, especially in regions grappling with malnutrition.
- **Anti-inflammatory Properties:** Several studies propose that moringa exhibits anti-inflammatory effects, which could be advantageous in managing conditions like arthritis or inflammatory bowel

diseases.

- **Antioxidant Activity:** Moringa harbors antioxidants that combat free radicals in the body, potentially mitigating the risk of chronic ailments such as heart disease and cancer.
- **Blood Sugar Regulation:** Research suggests that moringa may aid in stabilizing blood sugar levels, offering potential benefits for individuals with diabetes or those predisposed to the condition.
- **Cholesterol Management:** Some research indicates that moringa might aid in lowering cholesterol levels, thereby diminishing the risk of heart disease and stroke.

**Wound Healing:** Traditionally, moringa leaves have been utilized topically to accelerate wound healing. Emerging research supports this traditional usage, indicating that moringa extracts could enhance the healing process.<sup>[9,10]</sup>

## 2.2 STRAWBERRY

**Family-** Rosaceae.

**Synonym** - Berry, red berry, fragaria, and garden strawberry.

### Biological Source

Strawberry, (genus *Fragaria*), genus of more than 20 species of flowering plants in the rose family (Rosaceae) and their edible fruit. Strawberries are native to the temperate regions of the Northern Hemisphere, and cultivated varieties are widely grown throughout the world.

### Chemical Composition of Strawberries

- Strawberries encompass a variety of chemical components, including:
- **Vitamins:** Abundant in vitamin C, strawberries also contain vitamin K, folate, and traces of other B vitamins.
- **Minerals:** Potassium, manganese, and magnesium are among the minerals found in strawberries.
- **Antioxidants:** Strawberries boast high levels of antioxidants, such as anthocyanins, flavonoids, and ellagic acid, which aid in neutralizing free radicals within the body.
- **Dietary Fiber:** Serving as a valuable source of dietary fiber, strawberries promoted digestive health.
- **Phytochemicals:** Quercetin, kaempferol, and resveratrol are among the phytochemicals present in strawberries, studied for their potential health benefits including anti-inflammatory and anti-cancer properties.
- **Carbohydrates:** Predominantly in the form of natural sugars like fructose and glucose.
- **Water:** With a high water content, strawberries provide hydration and refreshment. These constituents collectively contribute to the nutritional value and health advantages associated with strawberries.<sup>[11,12]</sup>

### Clinical Uses of strawberry

While strawberries are primarily enjoyed as a delicious fruit, they also have some potential clinical uses, primarily due to their nutritional content and certain compounds they contain. Here are a few clinical uses or benefits associated with strawberries.

- **Antioxidant Properties:** Strawberries contain antioxidants such as vitamin C, flavonoids, and phenolic compounds, which can help neutralize free radicals in the body and reduce oxidative stress, potentially lowering the risk of chronic diseases like cancer and heart disease.
- **Anti-inflammatory Effects:** Some research suggests that the anti-inflammatory properties of strawberries may help reduce inflammation in the body, which is associated with various health conditions, including arthritis and cardiovascular disease.
- **Heart Health:** The high levels of antioxidants and other nutrients in strawberries may contribute to heart health by reducing the risk of cardiovascular disease. Additionally, strawberries contain fiber and potassium, which are beneficial for heart health.<sup>[23]</sup>
- **Blood Sugar Regulation:** Although strawberries contain natural sugars, they also have a low glycemic index, meaning they are less likely to cause spikes in blood sugar levels. This characteristic makes strawberries a suitable fruit choice for individuals with diabetes or those looking to manage their blood sugar levels.
- **Eye Health:** Strawberries contain vitamin C and other antioxidants that are beneficial for eye health. Consuming strawberries regularly may help reduce the risk of age-related macular degeneration and cataracts.
- **Skin Health:** The antioxidants in strawberries, particularly vitamin C, may help protect the skin from damage caused by UV radiation and environmental pollutants. Additionally, vitamin C is involved in collagen synthesis, which is essential for maintaining skin elasticity and preventing premature aging.

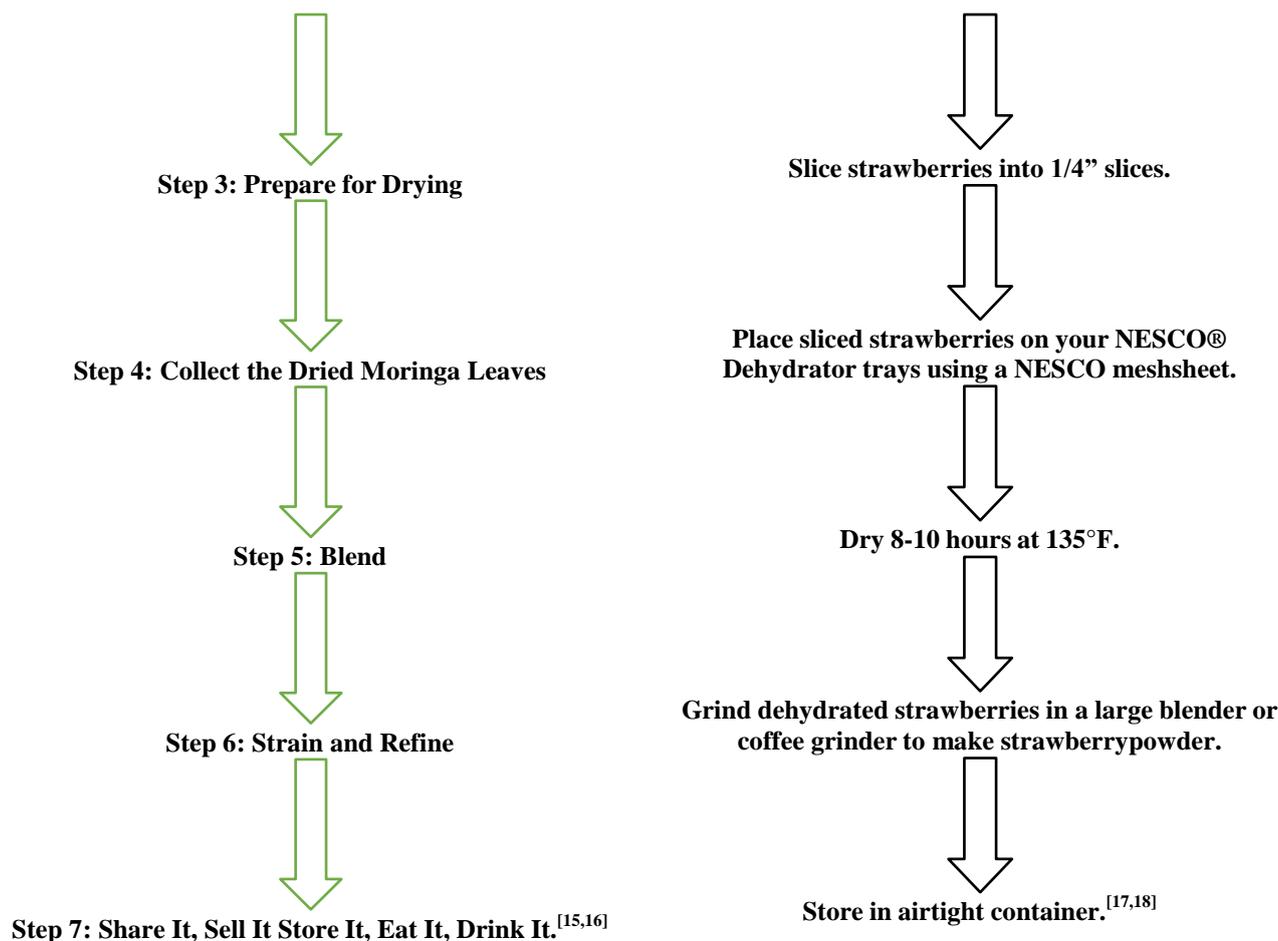
**Cognitive Function:** Some studies suggest that the antioxidants and phytochemicals found in strawberries may have neuroprotective effects, potentially reducing the risk of cognitive decline and Alzheimer's disease.<sup>[13,14]</sup>

## 2.3 PREPARATION OF MORINGA POWDER

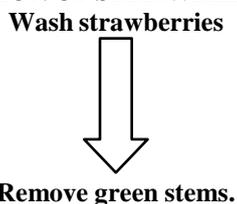
### Step 1: Cutting Your Moringa Tree Down to Size



### Step 2: Collecting the Moringa



**2.4 PREPARATION OF STRAWBERRY POWDER**



**3. FORMULATION TABLE FOR HERBAL CAPSULE.**

**Table No 1: Formulation Table.**

SR. NO	NAME OF INGREDIENT	QUANTITY FOR 500 Mg	USES
1	300mg of formulated moringapowder	300mg	Anti inflammatory
2.	200mg of formulatedstrawberry powder	200mg	Antioxidant activity

**3.1 Nutritional information**

300MG MORINGA POWDER + 200MG STRAWBERRY POWDER

**Table No 2: Nutritional Information.**<sup>[20,21,22,23,24,25,26]</sup>

NUTRIENT	MORINGA EACH 300MG CONTAINS	STRAWBERRY EACH 200MG CONTAINS	TOTAL
	MG	MG	MG
PROTEIN	0.270	1.48	1.841
CARBOHYDRATE	-	16.42	16.42
DIETARY FIBER	0.192	4.28	4.472
FAT	0.030	0.36	0.39

CALCIUM	20.70		20.70
SODIUM	-	7	7
IRON	0.376		0.376
ZINK	0.043		0.043
COPPER	0.007		0.007
MAGNESIUM	3.66		3.66
POTASSIUM	0.017		0.017
VIT A	18.9		18.9
VIT C	17.1		17.1
VIT E	0.182		1.82
THIAMINE	0.10		0.10
RIBOFALAVIN	0.043		0.043
NIACINE	0.325		0.325
CALORIES	20.03		20.03
ENERGY		0.07	0.07
SUGAR		10.76	10.76

### 3.3 METHOD OF PREPARATION FORMULATION

1. In our formulation we select the active ingredient moringa powder and strawberry powder. The moringa powder is used as medicine in multiple way. It can help to treat and prevent inflammatory diseases, diabetes and cancer.
2. Strawberry powder is help to boost our immune system.
3. we were formulated a nutritional supplement for women.
4. Take 300mg of formulated moringa powder
5. Take 200mg of formulated strawberry powder.
6. Mix both the powder in mortar pestle.
7. Take empty herbal capsule, fill the whole mixture into capsule and then measure the weight of the capsule.
8. The moringa and strawberry powder mixture Filed in the capsule with the help handfilling machine.

### 4. EVALUATION

Physical parameter.

#### A) Organoleptic evaluation parameters-) Appearance and homogeneity

##### 1) STRAWBERRY POWDER

**COLOR** - Pale pink

**AROMA** - Citric

**TEXTURE** -Powdery

##### 2) MORINGA POWDER

**COLOR** - Vibrant green.

**AROMA** -Earthy and slightly grassy, with a slightly bitter aroma.

**TEXTURE** - Fine and powdery.

#### A) Organoleptic evaluation parameters-) Appearance and homogeneity

Appearance and homogeneity was evaluated by visual inspection.

#### B) Loss of drying

Loss of drying is about 5%.<sup>[27,28,29,30]</sup>

### 4.1 EVALUATION TEST –1. DISCRPTION

**Size of capsule** – 00. **Shape** – cylindrical. **Colour** – lightly green.

2) **Weight variation test** – Weigh 20 intact capsules individually, and determine the average weight. The requirements are met if each of the individual weights is within the limits of 90%and 110% of the average weight.

$$\text{Average weight of 20 formulation} = \frac{W1 + W2 + W3 + W4 + W5... W20}{20}$$

$$0.54+0.55+0.53+0.53+0.54+0.54+0.53+0.56+0.54+0.54+0.52+0.53+0.54+0.54+0.55+0.54+0.55+0.56+0.55+0.56 = 10.81$$

$$\frac{10.81}{20} = 0.5405$$

#### 3) Weight of each individual capsule is

0.54, 0.53,0.54,0.52,0.53,0.53,

#### 4. Weight uniformity test -

1) **Average wt of capsule** – 0.53 mg

2) **Weight of empty capsules** – 0.9 mg

3) **Weight of drug content** – 0.50 mg

$$0.48+0.47+0.48+0.46+0.47+0.45+0.48+0.47+0.45+0.47+0.48+0.49+0.48. \quad 0.46+0.47$$

$$+0.46+0.48+0.47+0.46+0.47 = 9.42$$

$$\frac{9.42}{20} = 0.471$$

5) **Disintegration test** - Disintegration tester vessel is an acidic mixture, designed to replicate the inside of the human stomach. 14 min.

#### 6) Capsule lock length and width

Length – 2.3 cm, 2.4cm, 2.3cm

Width – 0.8,0.8,0.9 cm.<sup>[31,32,33,34,35]</sup>

## 5. HAND FILLING MECHINE

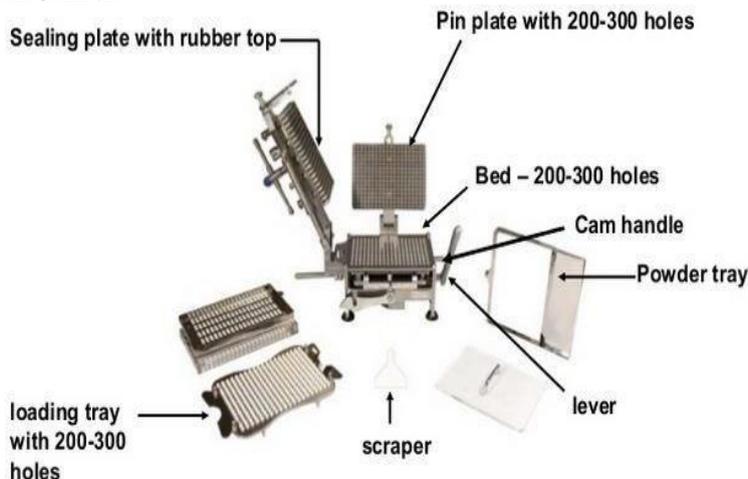


Figure No. 1: Hand Filling Mechine.

### 5.1 Process Operation

- The process involves several components: a bed with 100-200 holes, a loading tray with 100-200holes, a powder tray, a pin plate with 100-200 pins, a sealing plate with a rubber top,a lever, and a cam handle.
- Begin by placing empty capsules onto the loading tray and then onto the machine. Ensurethat the front knob is turned to the right.
- Pull the locking lever forward, then push down the long handle to lift the caps off all the bodies. Set aside the tray containing all the caps.
- Push the locking lever back to allow capsule bodies to drop down and become level with the filling surface.
- Place the powder tray on the filler to prevent powder spillage.
- Pour and spread the pre-measured powder into the tray, moving any extra powder onto thepowder tray's shelf. Lower the tamper and lock it.
- Turn the handle to compress the powder, enabling you to fill more powder into eachcapsule.
- Raise the tamper and spread any extra powder from the shelf into the capsules to ensure uniform fill weights.
- Return the tray containing caps to the filler. Turn the front knob to the left and lower the locking plate. Engage the lock for the locking plate.<sup>[36,37,38]</sup>
- Hold the tamper handle and push down on the long handle.
- Disengage the lock for the locking plate, lift the locking plate, and turn the front knob to theright.
- Push down the long handle and remove the tray of completed capsules.
- The capsules are now filled. You can turn the tray, and all the capsules will come out from the tray.<sup>[39,40,41]</sup>

### Method of Preparation

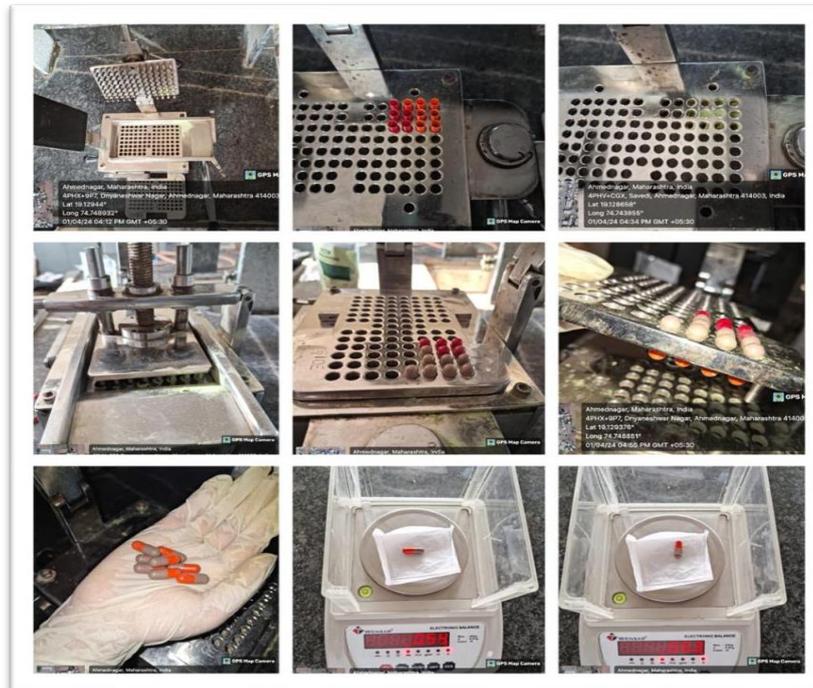




**Figure No. 2: Method Of Preparation.**

1. Weight a 300mg Moringa Powder.
2. Weight a 300mg Strawberry Powder.
3. Add both Powder In Mortal Pistal.
4. weight Empty shells of Capsule.

## 5.2 Manufacturing Processes



**Figure 3: Manufacturing Processes.**

1. Hand Filling Mechine.
2. Place empty capsules onto the loading tray and place tray.
3. Place powder tray on filler.
4. spread a powder on capsule.
5. handle to compress powder.
6. Return the tray containing caps to filler. Turn front knob to the left and lower locking plate. Engage lock for locking plate.
7. capsules are filled now.
8. Filled capsule with strawberry and moringa powder
9. Weight A Capsule.

## 5.3 Benefits of Herbal Capsules Moringa and Strawberry

### 1. Reduced Risk of Side Effects

Herbal supplements pose minimal risk of side effects, making them suitable for individuals allergic to components in prescription drugs. With fewer side effects, even during extended use, they contribute to overall wellness.

### 2. Symptomatic Relief

Herbal supplements offer effective symptomatic relief, particularly in combating allergies, while simultaneously enhancing immunity without adverse reactions.

### 3. Cost-Effectiveness

Enjoying affordability, herbal supplements are economically viable options. They are pocket-friendly and accessible without the need for a prescription.

### 4. Accessibility

Herbal supplements are readily available as over-the-counter medicines, eliminating the necessity for prescriptions. Popular supplements like peppermint, chamomile, basil, turmeric, honey, garlic, ginseng, amla, and licorice efficiently address various ailments such as cough, cold, flu, inflammation, and pain.

### 5. Management of Chronic Conditions

Herbal supplements play a vital role in managing chronic conditions. For instance, Shatavari-based supplements

are widely endorsed for addressing infertility issues, while pepper and fenugreek tablets help regulate blood sugar levels. Additionally, consuming lotus stem promotes cardiovascular health, and opting for Garcinia Cambogia aids in combating obesity.

**6. Prevention of Fatigue and Enhancement of Cognitive Functions:**

Herbal supplements contribute to preventing fatigue and enhancing cognitive functions, promoting overall vitality and mental clarity.

**7. Support for Bone Health**

These supplements also assist in maintaining bone health, reducing the risk of osteoporosis, diabetes, heart disease, and cancer.<sup>[42,43]</sup>

**5.4 ADVANTAGES OF HERBAL CAPSULES OF MORINGA AND STRAWBERRY**

**Moringa**

- High Nutritional Value: Dried Moringa leaves are rich in protein, iron, vitamin A, and vitamin C, making them highly effective in treating iron deficiency anemia.
- Antidiabetic and Wound Healing Properties: Moringa plays a crucial role in controlling diabetes and promoting wound healing, as evidenced by its ability to reduce blood glucose levels and exhibit significant prohealing actions.

**Strawberry**

1. Heart Health: Strawberries contain anthocyanin and quercetin, which may protect against heart disease. Anthocyanin is associated with a lower risk of heart attacks, while quercetin's anti-inflammatory properties reduce the risk of atherosclerosis. Additionally, potassium in strawberries supports heart health by offsetting the negative effects of sodium.
2. Stroke Prevention: Dietary flavonoid intake, including those found in strawberries, may reduce the risk of stroke.
3. Cancer Prevention: Nutritious compounds in

strawberries may help protect against certain cancers, particularly gastrointestinal and breast cancers. Although primarily studied in animals, they may also offer protection against lung, prostate, liver, and pancreatic cancers.

4. Blood Pressure Management: Potassium in strawberries helps lower blood pressure by counteracting the effects of sodium, thereby reducing the risk of heart attacks and strokes.

5. Digestive Health: High fiber content in strawberries promotes regular bowel movements, preventing constipation.

These herbal capsules offer a combination of nutritional benefits and therapeutic properties, making them valuable additions to a healthy lifestyle.<sup>[43]</sup>

**5.5 Disadvantages**

- For pregnant women: though Moringa leaves alone are enough to satisfy the daily iron and calcium need it may possess antifertility characteristics in some cases
- For thyroid treatment: though Moringa leaves aid thyroid function, it may create problems during the treatment with any other thyroid medication
- For diabetic medications: though Moringa leaves effectively reduce blood sugar, it may cause too low blood sugar levels in some cases.

For blood pressure medication: though Moringa is used in lowering blood pressure, Moringa with drugs that reduce blood pressure may result in a too low blood pressure.<sup>[44]</sup>

**6. RESULT**

**Formulation**

Formulation of herbal capsule contain moringa and strawberry powder.

The herbal capsule was formulated using the pharmacologically active dried moringa and strawberry powder extract.

**COMPOSITION OF FOR HERBAL CAPSULE**

SR.NO	NAME OF INGREDIENT	QUANTITY FOR 500 Mg	USES
1	300mg of formulated moringa powder	300mg	Anti inflammatory
2.	200mg of formulated strawberry powder	200mg	Antioxidant activity

**EVALUATION**

2) **Weight variation test** – Weigh 20 intact capsules individually, and determine the average weight. The requirements are met if each of the individual weights is within the limits of 90% and 110% of the average weight.

$$\text{Average weight of 20 formulation} = \frac{W1 + W2 + W3 + W4 + W5 \dots W20}{20}$$

$$0.54+0.55+0.53+0.53+0.54+0.54+0.53+0.56+0.54+0.54+0.52+0.53+0.54+0.54+0.55+0.54+0$$

$$.55+0.56+0.55+0.56+ = 10.81$$

$$\frac{10.81}{20} = 0.5405$$

3) **Weight of each individual capsule is**

$$0.54, 0.53, 0.54, 0.52, 0.53, 0.53,$$

4. **Weight uniformity test**

1) **Average wt of capsule** – 0.53 mg

2) **Weight of empty capsules** – 0.9 mg

3) **Weight of drug content** – 0.50 mg

4) **Disintegration test** - Disintegration tester vessel is an acidic mixture, designed to replicate the inside of the human stomach. **14min.**

## 7. CONCLUSION

- Herbal capsules offer a convenient and natural solution for various health concerns, providing users with the benefits of traditional herbal remedies in a convenient form.
- However, it's essential to consult with a healthcare professional before starting any new supplement regimen to ensure safety and efficacy.
- Ultimately, the goal is to promote the appropriate use of herbs for public health benefits and disease treatment.
- In conclusion, herbal capsules provide a convenient and accessible way to natural remedies into daily health routines. While they offer potential benefits.

## REFERANCE

1. Ijppr international journal of pharmacy & pharmaceutical research.
2. Nahin LR, Straus ES. Research into complementary and alternative medicine: problems and potential. *Br Med J*, 2001; 322: 161–4.
3. Wells KB. Treatment research at the crossroads: the scientific interface of clinical trials and effectiveness research. *Am J Psychiatry*, 1999; 156: 5–10.
4. Allen JJB, Schnyer RH, Hitt SK. The efficacy of acupuncture in the treatment of major depression in women. *Psychol Sci*, 1998; 9: 397–401.
5. Medical Research Council (MRC). A framework for development and evaluation of RCTs for complex interventions to improve health. April 2000. Available at: <http://www.mrc.ac.uk/Utilities/Documentrecord/index.htm?d=MRC003372htt> (accessed on 23rd August 2007).
6. Herbal medicine today: clinical and research issues *ncbi.nlm.nih.gov* P.M. Aja, N. Nwachukwu, A. U. Ibiam, I. O.
7. Igwenyi and P.N. Onu (2014). Comparative Evaluation of Transaminases and Alkaline Phosphatase Activities in Albino Rats Administered Aqueous, Ethanolic and Methanolic Extracts of *Moringa oleifera* Seeds Locally Grown in Abakaliki, Nigeria, *Journal of Biological and Chemical Research*, 31(1): 164-181.
8. Akinmoladum, A. C., Ibukun, E.O., Akinsinlola, B. L., Onibon, T. R., Rinboboye, A. O., Obuofor, E. M. and Farombi, E. O. (2007). Chemical Constituents and Antioxidant Activity of *Alstonia boonei*, *African Journal of Biotechnology*, 6(10): 1197-1201.
9. (2002) Anti-hypertensive activity of the total alkaloids from the leaves of *Moringa oleifera*. *Journal of Pharmaceutent Biology*, 2: 144-148.
10. Ghosi, S., Nwobodo, E and Ofili, J. O., (2000). Hypocholesterolemic effect of crude extract of leaf of *Moringa oleifera* in high fat diet fed wistar rats. *Journal of Ethno pharmacology*, 69(1): 21-25.
11. Naik, G. H., Priyadarsini, K.I., Satav, J.G., Banavalikar, M. M., Sohani, D. P., Biyani, M. K. and Mohan, H. (2003). Comparative antioxidant activity of individual herbal components used in ayurvedic medicine. *Phytochemistry*, 63: 97-104.
12. <https://www.nutritionaloutlook.com/view/recent-study-finds-that-supplementation-with-strawberry-powder-may-support-cognitive-health-and-mood>.
13. Fruit and vegetable intake and risk of major chronic disease.
14. *J Natl Cancer Inst*, 2004; 96: 1577-1584. View at publisher View in Scopus Google Scholar.
15. [https://www.sci.news/medicine/strawberry-cognitive-function-cardiovascular-health-older-adults-12133.html#google\\_vignette](https://www.sci.news/medicine/strawberry-cognitive-function-cardiovascular-health-older-adults-12133.html#google_vignette)
16. Lakshmi Priya Gopalakrishnan et al. *Moringa oleifera*: a review on nutritive importance and its medicinal application *Food Sci. Human Wellness*, 2016.
17. Bhandari, B. R.; Howes, T. Relating the Stickiness Property of Foods Undergoing Drying and Dried Products to Their Surface Energetics. *Drying Technology*, 2005; 23(4): 781–797. DOI: 10.1081/DRT-200054194.
18. Muzaffar, K.; Kumar, P. Effect of Soya Protein Isolate as a Complementary Drying Aid of Maltodextrin on Spray Drying of Tamarind Pulp. *Drying Technology*, 2016; 1: 142–148. DOI: 10.1080/07373937.2015.1042586.
19. Širola, I.; Lukšić, J.; Simunić, B.; Kujundžić, N. Effect of Crystal Size and Shape on Bulk Density of Pharmaceutical Powders. *Journal of Crystal Growth*, 1997; 181(4): 403–409. DOI: 10.1016/S0022-0248(97)00299-6.
20. Wu, W.; Liu, W.; Gengenbach, T.; Woo, M. W.; Selomulya, C.; Chen, X. D.; Weeks, M. Towards Spray Drying of High Solids Dairy Liquid: Effects of Feed Solid Content on Particle Structure and Functionality. *Journal of Food Engineering*, 2014; 123: 130–135. DOI: 10.1016/j.jfoodeng.2013.05.013.
21. Fang, Z.; Bhandari, B. Comparing the Efficiency of Protein and Maltodextrin on Spray Drying of Bayberry Juice. *Food Research International*, 2012; 48: 478–483. DOI: 10.1016/j.foodres.2012.05.025.
22. "Nutrition labelling - Table of daily values". Health Canada, Government of Canada. October 20, 2022. Retrieved March 20, 2024.
23. "Daily Value on the Nutrition and Supplement Facts Labels". US Food and Drug Administration. March 5, 2024. Retrieved March 20, 2024.
24. "Nutrient content claims for 'good source', 'high', 'more', and 'high potency', Specific Requirements for Nutrient Content Claims. Food Labeling, Code of Federal Regulations, Title 21, Chapter I, Subchapter B, Part 101, Subpart D, Section 101.54". Food and Drug Administration. April 1, 2017. Retrieved August 25, 2018.
25. "Major Changes Coming to Nutrition Facts and Supplement Facts Labels Near You | Insights | Venable LLP". [www.venable.com](http://www.venable.com). Retrieved May

- 11, 2023.
26. "Changes to the Nutrition Facts Label". FDA Labeling and Nutrition. United States Food and Drug Administration. May 20, 2016. Retrieved May 20, 2016.
  27. "Federal Register May 27, 2016 Food Labeling: Revision of the Nutrition and Supplement Facts Labels" (PDF).
  28. "FDA provides information about dual columns on Nutrition Facts label". U.S. Food and Drug Administration (FDA). December 30, 2019. Retrieved May 16, 2020. This article incorporates text from this source which is in the.
  29. Fahad Pervaiz, Sana Ali Zahra, Fariah Qaiser, Syeda Komal Fatima and Rabbia Mazhar Khan 18 Global Pharmaceutical Studies Review (GESR) References Banker, G. S., Siepmann, J., & Rhodes, C., 2002.
  30. Modern pharmaceuticals: CRC Press. Brody, M. S., Schalley, C. A., Rudkevich, D. M., & Rebeck, J., Julius %J Angewandte Chemie International Edition, 1999.
  31. Synthesis and characterization of a unimolecular capsule, 38(11): 1640-1644.
  32. Chang, R. K., Raghavan, K. S., & Hussain, M. A. J. J. o. p. s. (1998). A study on gelatin capsule brittleness: moisture transfer between the capsule shell and its content, 87(5): 556-558.
  33. Chiwele, I., Jones, B. E., Podczek, F. J. C., & Bulletin, 2000.
  34. The shell dissolution of various empty hard capsules, 48(7): 951-956.
  35. Fatohy, H. A. Course Book Industrial Pharmacy. Galia, E., Nicolaidis, E., Hörter, D., Löbenberg, R., Reppas, C., & Dressman, J. J. P. r., 1998.
  36. Taylor, M. K., Ginsburg, J., Hickey, A. J., & Gheyas, F. J. A. P. (2000). Composite method to quantify powder flow as a screening method in early tablet or capsule formulation development, 1(3): 20-30.
  37. Withey, R., & Mainville, C. J. J. o. p. s. (1969). A critical analysis of a capsule dissolution test, 58(9): 1120-1126.
  38. Pharmaceuticals – The Science of Dosage form Design by M.E. Aulton, 2nd Edition, Page no: 515-538.
  39. Remington – The Science and Practice of Pharmacy, 20th Edition, Volume – 1, Page no: (918-922).
  40. The Theory and Practice of Industrial Pharmacy by Leon Lachman, Page no: (374-411).
  41. Encyclopedia of Pharmaceutical Technology, Volume – 2, Page no: (406-430).
  42. Textbook of Pharmaceutics by Bentley, 8th Edition, Page no: (310-314).
  43. Modern Pharmaceutics by Gilbert S. Bankers, 4th Edition, Dekker series, (335-380).
  44. <http://www.capsugel.com>.
  45. Indian pharmacopeia, 2007 Edition. International Research Journal of Pharmacy, 2013; 4(4): 91-95.
  46. International Journal of pharmaceutical sciences and Research, 2011; 2(6): 1337-1355.
  47. Indian Journal of Pharmaceutical Education and Research, 2016; 50(3): 146-160 25.
  48. Pharmaceuticals – The Science of Dosage form Design by M.E. Aulton, 2nd Edition, Page no: (515-538)
  49. Naznin, A, Mamunur, R and Amran M. S, (2008). Comparison of leaves extract with atenolol on serum triglyceride, serum cholesterol, blood glucose, heart weight, body weight in adrenaline induced rats. Saudi Journal of Biological Sciences, 15(2): 253-258.
  50. Oyenuka, V.A. and Fetuga, B. L., (2003). Medical nutrient. Dietary important vegetables. 5th edition, Ibadan press. Nigeria, 122-129.
  51. ahey, JW (2005). Moringa oleifera: A review of the medicinal evidence for its nutritional, therapeutic, and prophylactic properties.
  52. Potential uses of Moringa oleifera and an examination of antibiotic efficacy conferred by
  53. M. oleifera seed and leaf extracts using crude extraction techniques available to underserved indigenous populations Int. J. Phytotherapy Res, 2013; 3: 61-71
  54. The Impact of *Moringa oleifera* Supplementation on Anemia and other Variables during Pregnancy and Breastfeeding: A Narrative Review: Rosita Rotella, Jose M. Soriano, Agustín Llopis-González and María Morales-Suarez-Varel.