

## EVALUATION AND FORMULATION OF HERB VITA CHOCOLATE AS AN IMMUNITY BOOSTER AND VITAMIN ENRICHED PRODUCT

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### ABSTRACT

The demand for nutraceutical and functional foods with health-promoting properties has increased significantly in recent years. Herbal formulations combined with food products can provide both nutritional and therapeutic benefits. The present research focuses on the formulation and evaluation of Herb-Vita Chocolate, a herbal nutraceutical designed to enhance immunity and provide essential vitamins. The objective of this study was to develop a palatable chocolate formulation incorporating selected herbal ingredients known for their immunomodulatory and antioxidant properties. The formulation was prepared using a chocolate base consisting of moringa powder, tulsi powder and natural sweeteners, combined with herbal extracts rich in vitamins and bioactive phytoconstituents such as flavonoids, polyphenols, and natural antioxidants. Herbs with potential immune-boosting activity and vitamin sources were incorporated in appropriate concentrations to improve nutritional value and therapeutic potential. The preparation involved melting, homogenization, and molding techniques to ensure uniform distribution of herbal components within the chocolate matrix. The prepared formulation was evaluated for organoleptic characteristics, weight variation, texture, hardness, and stability to determine product quality and acceptability. The results indicated that the formulated Herb-Vita Chocolate possessed acceptable taste, uniform texture, and good stability, suggesting its suitability as a functional nutraceutical product. In conclusion, Herb-Vita Chocolate represents a novel herbal dosage form that combines the health benefits of medicinal herbs with the consumer acceptability of chocolate, providing potential benefits for immunity enhancement and vitamin supplementation. Further studies including phytochemical analysis, antioxidant activity, and stability studies are recommended to establish its efficacy and shelf life.

**KEYWORDS:** Herbal chocolate, Nutraceutical formulation, Immunity booster, Vitamins, Herbal drug delivery system.

### 1. INTRODUCTION

In recent years, there has been a growing interest in functional foods that provide health benefits beyond basic nutrition. Functional foods are designed to improve health, reduce the risk of diseases, and enhance the body's natural defense mechanisms. Among these, herbal and nutraceutical products have gained significant attention due to their natural origin and therapeutic properties. The incorporation of medicinal herbs into commonly consumed food products has become an innovative approach to improve nutritional value and promote overall well-being.

Chocolate is one of the most popular confectionery products consumed worldwide by people of all age groups. Traditionally, chocolate is prepared from cocoa solids, cocoa butter, sugar, and milk solids. Cocoa itself contains bioactive compounds such as flavonoids and polyphenols, which possess antioxidant properties that help protect the body against oxidative stress. Due to its pleasant taste, smooth texture, and high consumer acceptability, chocolate can act as an excellent delivery system for herbal extracts, vitamins, and other nutraceutical ingredients.

The concept of HerbVita Chocolate involves the incorporation of herbal ingredients and nutritional supplements into chocolate to enhance its functional and therapeutic value. Herbs such as moringa, tulsi, and beetroot are known for their high content of vitamins, minerals, and antioxidants. These herbal ingredients are widely recognized for their potential to support immune function, improve metabolism, and protect the body from various health disorders. Additionally, ingredients like almond and cardamom contribute nutritional and sensory benefits, while natural

sweeteners such as jaggery or stevia can be used as healthier alternatives to refined sugar.

Formulation of herbal chocolate requires careful selection and optimization of ingredients to maintain the balance between nutritional benefits and sensory acceptability. The addition of herbal powders and extracts must be carried out in appropriate quantities to ensure that the final product maintains desirable taste, texture, and appearance. Improper formulation may affect the quality of chocolate by altering its flavor, consistency, or melting characteristics.

## 2. Ingredients

Sr. No	Ingredients	Roll of Ingredients
1	Moringa Powder	Multivitamins
2	Beetroot Powder	Antioxidant
3	Thyme Powder	Antioxidant
4	Almond Powder	Rich of vitamin and minerals
5	Tulsi Powder	Improve immunity
6	Cardamom Powder	Improve blood circulation
7	Stevia	Sweetening agent
8	Dark Chocolate	Base

### 2.1 Moringa powder

**Synonym:** Drumstick tree, Ben tree, Subhanjana, Saguna, Sanjana, Shevga

**Biological source:** It consist of dried, long slender triangular seed pod of *Moringa oleifera*

**Family:** Moringaceae

#### Chemical constituents

Phytosterols – Stigmasterol, Sitosterol and Campesterol (hormone precursors).

Vitamins – Vitamin A ( $\beta$ -carotene), Vitamin B complex (folic acid, pyridoxine, nicotinic acid), Vitamin C, D and E.

Minerals – Calcium, Potassium, Zinc, Magnesium, Iron and Copper.

Proteins and other nutrients – High protein content and various essential phytochemicals present in leaves, pods and seeds.



### 2.2 Beetroot powder

**Synonyms:** Chukandar, Sugar beets, Mangel, Spinach beet

**Biological source:** Beetroot is the edible taproot of the plant *Beta vulgaris L.* (specifically *B. vulgaris* subsp. *vulgaris* Conditiva Group),

**Family:** Amaranthaceae

#### Chemical Constituents

Phytosterols – Stigmasterol, Sitosterol and Campesterol (hormone precursors).

Vitamins – Vitamin A ( $\beta$ -carotene), Vitamin B complex (folic acid, pyridoxine, nicotinic acid), Vitamin C, D and E.

Minerals – Calcium, Potassium, Zinc, Magnesium, Iron and Copper.

Proteins and other nutrients – High protein content and various essential phytochemicals present in leaves, pods and seeds.



### 2.3 Thyme Powder

**Synonyms:** Indian Pennywort, Mangosteen

**Biological Source:** Thyme powder is derived from the dried leaves and flowering tops of the *Thymus vulgaris* plant.

**Family:** Lemnaceae

#### Chemical Constituents

Betalains – Betanin and Vulgaxanthin (responsible for red colour; antioxidant and anti-inflammatory).

Vitamin C – Powerful antioxidant; supports immunity and collagen synthesis.

Manganese – Mineral cofactor for antioxidant enzymes like superoxide dismutase.



### 2.4 Almond Powder (Dry Fruit)

**Synonyms:** Almond kernal, Thumberscrew, Hazelnut.

**Biological source:** Almond consists of the dried ripe seeds of *Prunus amygdalus* Batsch

**Family:** Rosaceae

**Chemical Constituents:** Fixed oils (45–55%) – Mainly oleic acid and linoleic acid with small amounts of palmitic and stearic acid.

Proteins (20–25%) – Rich source of plant proteins and essential amino acids.

Carbohydrates – Contains sugars and dietary fiber.

Vitamins – Especially Vitamin E (tocopherol) and Vitamin B-complex (riboflavin, niacin, thiamine).

Minerals – Calcium, magnesium, phosphorus, potassium, copper, and manganese.

Phenolic compounds – Flavonoids and phenolic acids with antioxidant activity.

Phytosterols and antioxidants – Help in cholesterol control and anti-inflammatory effects.



### 2.5 Tulsi Powder

**Synonym Name:** *Ocimum sanctum*,  
*Ocimum tomentosum*

**Biological source:** Tulsi (Holy Basil) consists of the fresh and dried leaves of *Ocimum sanctum* Linn

**Family:** Lamiaceae (formerly Labiatae)

**Chemical Constituents:** Eugenol – Major component of essential oil; gives aroma and medicinal activity.

Carvacrol – Volatile oil component with antimicrobial properties.

Linalool – Aromatic compound with calming and relaxing effects.

Ursolic acid – Triterpene compound with anti-inflammatory and antioxidant activity.

Rosmarinic acid – Phenolic compound with antioxidant and anti-inflammatory effects.

Flavonoids – Includes apigenin, luteolin and orientin (antioxidant compounds).

Volatile oils – Responsible for the characteristic smell and therapeutic properties.



### 2.6 Cardamom Powder

**Synonyms:** Cardamom fruit, Cardamon seed, Elachi

**Biological source:** Cardamom (specifically Green or True Cardamom) consists of the dried, nearly ripe fruits (capsules/seeds) of *Elettaria cardamomum* (L.) Maton

**Family:** Zingiberaceae.

#### Chemical Compositions

Volatile (essential) oil – Main active constituent (about 2.8–6.2%).

Major oil components –  $\alpha$ -Terpinyl acetate and 1,8-cineole responsible for aroma and flavour.

Starch – Major constituent in seeds (up to about 50%).

Fixed (fatty) oil and proteins – Contains about 1–10% fixed oil and ~10% protein.

Carbohydrates and fibre – Sugars, starch, pentosans and crude fibre (especially in fruit husk).



### 2.7 Stevia

**Synonym:** Sugar leaf

**Biological source:** Stevia is a natural, zero-calorie sweetener derived from the dried leaves of the *Stevia rebaudiana* Bertoni plant.

**Family:** Asteraceae

**Chemical constituents:** steviol glycosides, which contribute to its therapeutic effects.

Stevia is 200 to 300 times sweeter than sucrose.

Stevia is widely used in pharmaceutical formulations, including diabetic-friendly medications, herbal supplements, and functional foods. Its non-toxic and non-carcinogenic nature makes it a promising ingredient in health-related products



### 2.8 Dark Chocolate

Dark chocolate is a form of chocolate made of cocoa solids, cocoa butter and sugar. Dark chocolate has a higher cocoa percentage than white chocolate, milk chocolate, and semisweet chocolate. Dark chocolate is valued for claimed though unsupported - health benefits, and for being a sophisticated choice of chocolate. Similarly to milk and white chocolate, dark chocolate is used to make chocolate bars and as a coating for confectionery.

Dark chocolate has a more bitter and intense flavor than other types of chocolate, and compared to other types of chocolate is reliant on the quality of the cocoa beans and cocoa butter used as ingredients.



### 3. Method of Preparation

All ingredients were weighed accurately according to formulation.



Chocolate base was melted using a double boiler method.



Herbal powders were added slowly into the melted chocolate.



The mixture was stirred continuously until a homogeneous mixture was obtained.



The prepared mixture was poured into chocolate moulds.



The moulds were kept in a refrigerator for 30 minutes to allow solidification.



The formed chocolates were removed from moulds and stored in airtight containers.

### 3. Formulation Table

SR NO.	INGREDIENTS	QTY. TAKEN (GM)
1	Moringa powder	2
2	Beetroot powder	6
3	Almond powder	5
4	Tulsi powder	2
5	Cardamom powder	0.015
6	Thyme powder	2
7	Dark Chocolate	75
8	Stevia powder	0.005

#### 4. Evaluation Tests

##### 4.1 Organoleptic Evaluation

- Organoleptic characteristics are properties of a substance detected by human senses.
- They include color, odor, taste, texture, and appearance. Used for identification and quality evaluation of crude drugs in pharmacognosy.
- It is a simple and preliminary method of drug analysis.

##### 4.2 Weight Variation Test

- It is used to check uniformity of weight of chocolate in a batch. 20 chocolates are randomly selected and weighed individually.
- The average weight of the tablets is calculated.
- Each tablet weight is compared with the average weight.
- The difference should be within the official pharmacopoeial limits.
- This test ensures uniform distribution of the drug in tablets.

%Deviation =

**Individual weight of chocolates/Average weight of chocolateX100**

##### 4.3 pH Test

- The pH test is used to determine the acidity or alkalinity of herbal chocolate. It helps ensure the product is safe, stable, and suitable for consumption.
- To perform the test, a small amount of herbal chocolate is dissolved in distilled water to make a sample solution. The pH of this solution is then measured using a calibrated **pH meter** or pH indicator strips.
- The pH value indicates whether the chocolate is acidic, neutral, or slightly alkaline. Maintaining an appropriate pH is important for product quality, taste, and shelf life. This test is commonly performed during quality control in herbal and food product analysis.

##### 4.4 Melting Point

- Determining the melting point of chocolate requires precision, as chocolate doesn't have a sharp melting point but rather a melting range due to its complex composition.
- Procedure: -In this prepared chocolate was melted by double boiler method using water bath and measures the temperature using thermometer at which chocolate melt.
- Also check the melting point of chocolate at room temperature or normal temperature.

##### 4.5 Stability Test

- To check the stability of the chocolate is evaluated by studying it with appropriate storage conditions of nearly 2-8°C at time of preparation and chocolate

was kept in closed container for one month interval, Test sample of chocolate was observed for physical appearance and drug degradation.

## 5. RESULTS AND DISCUSSION

### 5.1 organoleptic characterization

Sr No.	Characterization	F1	F2
1.	Colour	Brown	Brown
2.	Odour	Chocolaty	Chocolaty
3.	Taste	Sweet and slightly bitter	Sweet and chocolaty
4.	Mouth feel	Slightly rough and pleasant	Smooth and pleasant
5.	Appearance	Slight Glossy	Glossy

### 5.2 weight variation.

Sr No.	Sample	Result (gm)
1	Dark chocolate (F1)	2.80
2	Dark chocolate (F2)	2.92

### 5.3 pH Test.

Sr. No.	Sample	pH of sample
1	Dark chocolate (F1)	6.68
2	Dark chocolate (F2)	6.75

### 5.4 Melting Point

- The melting point for dark chocolate generally ranges between 40°C to 45°C.
- The melting point for white chocolate generally ranges between 30°C to 35°C

### 5.5 Stability Test

- Both the chocolates are found to be stable at 2-8°C after 1 month.

## 6. CONCLUSION

The development of Herb-Vita Chocolate successfully incorporated functional herbal ingredients into a chocolate base, creating a product that offers both indulgence and potential health benefits. The final formulation F1 & F2 balanced taste, texture, and the herbal properties, ensuring that the herbal elements did not overpower the natural flavours of the chocolate. Herb-Vita Chocolate offers a unique niche in the growing health-conscious snacking market. The product's differentiation lies in its combination of luxury chocolate with functional herbs that appeal to health-conscious consumers, wellness enthusiasts, and those seeking stress-relief or immune-boosting snacks. The development and evaluation suggest that Herb-Vita Chocolate is ready for market testing, but additional efforts in educating consumers on the product's health benefits could enhance its appeal. Given current health trends, the product has the potential to be a strong player in the premium and functional snack markets.

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