

Formulation and Evaluation of Hemoglobin Booster Herbal Chocolate

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Abstract- The present study focuses on the formulation and evaluation of a haemoglobin booster herbal chocolate aimed at combating iron deficiency anaemia through a palatable and natural approach. Anaemia, primarily caused by iron deficiency, is a prevalent nutritional disorder affecting a significant portion of the global population, particularly women and children. The herbal chocolate was developed using iron-rich and hematinic herbs such as *Beta vulgaris L* (Beet root), *Punica granatum* (pomegranate), *Lycopersicon esculentum* (Tomato), and *Moringa oleifera* (Moringa) and *Ocimum tenuiflorum* (Tulsi) combined with dark chocolate to enhance patient compliance and acceptability. The formulation process involved mixing finely powdered herbal ingredients with melted dark chocolate base, followed by molding and cooling to obtain uniform doses. The prepared chocolates were subjected to various evaluation parameters including organoleptic properties, weight variation, hardness, disintegration time, and stability studies. Additionally, preliminary phytochemical screening confirmed the presence of iron, flavonoids, tannins, and other beneficial constituents. Results demonstrated that the herbal chocolate was stable, organoleptically acceptable, and showed promising potential as a natural supplement to boost haemoglobin levels. This formulation offers a novel and effective method of delivering essential nutrients, particularly iron, in a form that is both enjoyable and therapeutic. Further in vivo studies are recommended to substantiate its efficacy in clinical settings.

Keywords: Gastro Intestinal Tract, Haemoglobin, Erythropoietin, Red Blood Cells, Herbal Chocolate, Anaemia, Hematinic Herbs.

I. INTRODUCTION

Oral administration is route of administration where a substance is taken through the mouth. Per os abbreviated to P.O. is sometimes used as a direction for medication to be taken orally. Many medications are taken orally because they are intended to have a systemic effect, reaching different parts of the body as like bloodstream. The oral route typically stands out as the most convenient and economical method of drug administration. Nevertheless, certain

medication may provoke irritation within the gastrointestinal tract. Breaking tablets or capsules of drug available in delayed release or time release formulation might result in a quicker drug delivery than intended. The oral route is restricted to formulations comprising small molecules exclusively, whereas biopharmaceuticals risk being rendered ineffective by digestion in the stomach. Therefore, biopharmaceutical necessitate administration via injection or infusion for efficacy. The bioavailability of oral administration is affected by the amount of drug that is absorbed across the intestinal epithelium and first-pass metabolism. The per os is a term adverbial phrase meaning literally from latin through the mouth or by mouth. The expression is used in medicine to describe a treatment that is taken orally.



Fig No.1.Gastrointestinal Tract

II. SCOPE

1.Formulation Development:

This involves developing formulations where pharmaceutical compound is incorporated into chocolate matrix. The formulation needs to ensure compatibility between the drug and chocolate components, as well as stability of the drug during processing and storage.

2.Chocolate Matrix:

Understanding the properties of chocolate is crucial,

including its composition (cocoa solids, cocoa butter, sugar, etc.). Rheology and texture. This factor influences the release profile and bioavailability of the drug from the chocolate matrix.

3. Drug Encapsulation:

Methods for encapsulating drugs within chocolates may include techniques such as solid dispersion, coacervation or microencapsulation. This technique helps to ensure uniform distribution of the drug within the chocolate matrix and control the release of the drug upon consumption.

4. Bioavailability Enhancement:

Strategies for enhancing the bioavailability of drugs delivered through chocolate may involve optimizing the chocolate formulation to promote drug absorption in the gastrointestinal tract. This could include adding excipient or modifying the chocolate matrix to improve solubility and permeability of the drug.

5. Taste Masking and Palatability:

Chocolate can serve as an effective medium for masking the taste of bitter or Unpleasant-testing drugs, thereby improving patient acceptance and compliance. Formulation strategies may involve selecting chocolate varieties with specific flavor profiles or incorporating flavoring agents to enhance palatability.

6. Packing And Stability:

Packing plays a crucial role in maintaining the stability of chocolate-based oral drug delivery system. Consideration such as moisture barrier properties and protection from light and temperature fluctuations are important to prevent degradation of both of the chocolate and the incorporated drug.

7. Regulatory Consideration:

Developing chocolate based oral drug delivery system involves navigating regulatory requirements for food product as well as pharmaceuticals.

Compliance with food safety regulations as well as regulations governing the incorporation of drugs into food products must be addressed.

8. Consumer Acceptance and Marketing:

Consumer acceptance is a key factor in the chocolate based oral drug delivery system. Marketing efforts may focus on highlighting the convenience, palatability and novel delivery format of this product to attract consumers.

9. Application And Targeted Delivery:

Chocolate based oral drug delivery system may find application in various therapeutic areas, depending on the compatibility of the drug with chocolate and the desired route of administration. Targeted delivery to specific region of the gastrointestinal tract or controlled released formulation could be explored.

1.4. VARIOUS SCOPE FOR ORAL DRUG DELIVERY SYSTEM

TYPE OF CHOCOLATE

1. Chocolate bars or Chocolate with Herbal Fillings
2. Herbal Chocolate Coated Tablets or Capsule
3. Chocolate Infused Herbal Beverages
4. Herbal Chocolate Chews or Gummies

MERITS

1. Compliance: Enhances patient adherence due to the palatability of chocolate.
2. Taste-Masking: Masks the taste of drugs, making them more pleasant to consume.
3. Convenience: Provide a familiar and convenient dosage form for patient.
4. Bioavailability Enhancement: Chocolate's components may enhance absorption.
5. Acceptance in Different Population: Suitable for children and older adults.
6. Market Appeal: Combines therapeutic benefits with consumer appeal.
7. Flexible Dosing: Allows for flexibility in drug dosing.
8. Targeted Delivery: Can be engineered for targeted drug release within the body.
9. Longer Shelf Life: Chocolate's stability prolongs the shelf life of formulations

DEMERITS

- A. Interference with Absorption: Chocolate components may affect drug absorption.
- B. Allergenicity: Potential for allergic reactions due to common allergens in chocolate.
- C. Storage Challenges: Specific storage conditions needed to maintain chocolate quality.
- D. Limited Stability: Chocolate and drug stability may be compromised over time.
- E. Dose Standardization: Difficulty ensuring consistent drug dosing in chocolate.
- F. Regulatory Complexity: Compliance with both pharmaceutical and food regulations.
- G. Overconsumption Risk: Potential for

- unintentional overconsumption of medications.
- H. Compatibility Issues: Not all drugs may be compatible with chocolate formulation.
 - I. Market Segmentation: Not suitable for all populations due to dietary restrictions or preferences.

1.7. APPLICATION

1. CONVENIENCE: Oral drug delivery is easy and convenient for patient, as it not requires special equipment or training.
2. PATIENT COMPLIANCE: It enhances patient compliance since it is a non-invasive and painless method of drug administration.
3. TASTE MASKING: Chocolate can mask the unpleasant taste of drug, improving patient acceptability, especially for pediatric or geriatric population.
4. ENCAPSULATION: Drugs can encapsulated within chocolate matrices, offering protection from degradation in the stomach and enhancing drug stability.
5. CONTROL RELEASE: Chocolate-based formulations can be designed for controlled release of drugs, allowing for sustained therapeutic effect.
6. ENHANCED BIOAVAILABILITY: The fatty content of chocolate can enhance the solubility and absorption of lipophilic drugs, improving drug bioavailability.

ANEMIA DISEASE.

A) PATHOLOGY

What is anemia?

Anemia is a decrease in the RBC count, hemoglobin and or hematocrit value resulting in a lower ability for the blood to carry oxygen to body tissues also called as Anemia.

Detailed description of the pathology of anemia:

Erythropoiesis: The process of red blood cell production, known as erythropoiesis, occurs primarily in the bone marrow. Stem cells differentiate into erythrocyte precursor cells under the influence of various growth factors, primarily erythropoietin (EPO), which is produced by the kidneys in response to low oxygen levels in the blood.

Red blood cell formation: Erythrocyte precursor cells mature into red blood cells through several stages.

During this process, the cell synthesizes hemoglobin, which gives them their characteristic red color and enables them to carry oxygen.

Cause of Anemia: Anemia can result from various factors, including

Iron Deficiency: The Most common cause of anemia worldwide, characterized by inadequate iron intake, absorption, or utilization.

Vitamin Deficiency: Deficiencies in vitamins essential for red blood cells production, such as vitamin B12 (cobalamin) and folate (folic acid).

Chronic Disease: Condition such as chronic kidney disease, inflammatory disorders, or certain cancers can interfere with erythropoiesis.

Hemolysis: Premature destruction of red blood cells, either due to intrinsic factors (e.g., genetic disorder like sickle cell disease) or extrinsic factors (e.g., autoimmune haemolytic anaemia)

Bone Marrow Disorders: Condition affecting the bone marrow's ability to produce red blood cells, such as aplastic anaemia or myelodysplastic syndromes.

Symptoms: The symptoms of anaemia vary depending on its severity and underlying cause but may include fatigue, weakness, and shortness of breath, pale skin, dizziness, and palpitations. In severe cases, anaemia can lead to complications such as heart failure or impaired cognitive function.

Diagnosis: Anaemia is typically diagnosed through a combination of medical history, physical examination, and laboratory tests. Common diagnostic tests include complete blood count (CBC), peripheral blood smear, serum ferritin levels, vitamins B12 and folate levels, and additional tests based on suspected underlying causes.

Iron Supplementation: For iron deficiency anaemia, oral or intravenous iron supplements may be prescribed.

Vitamin Supplementation: Vitamin B12 or folate supplementation may be necessary for deficiencies.

Erythropoiesis-Stimulating Agents (ESAs): In

certain cases, synthetic forms of erythropoietin may be necessary to stimulate red blood cell production.

Blood Transfusion: In severe cases of anaemia or acute blood loss, transfusion of packed red blood cells may be necessary to restore haemoglobin levels.

Prognosis: The prognosis for anaemia depends on its underlying cause severity, and promptness of treatment. In many cases, anaemia can be effectively managed with appropriate interventions, leading to improvement in symptoms and overall health.

a.1.1. Anemia Symptoms

- Dizziness, light headiness, or feeling like about to pass out
- A fast unusual heartbeat
- A headache
- Pain, including in our bones, chest, belly and joints
- Problem with growth, for children’s and teens
- Shortness of breath
- Skin that’s pale or yellow
- Cold hands and feet
- Tiredness or weakness

a.1.2. Anemia Diet

- Meats
- Eggs
- Leafy green veggies
- Iron-fortified foods like cereals
- Beans
- Seafood
- Peas
- Nuts and dried fruit
- Lentils

1.1.4. TYPES OF ANAEMIA

- A) Microcytic anemias (MVC<80)
- B) Normocytic anemias (MVC<80-100)
- C) Macrocytic anemias (MVC<100)

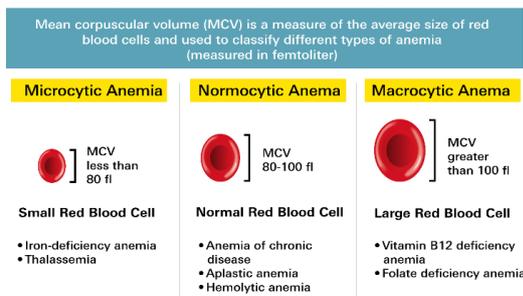


Fig.No.2 Classification of Anemia

Hemoglobin Herbal Chocolate

INTRODUCTION

This special chocolate mixes herbal extracts with the deliciousness of chocolate to help improve health.

Anemia, which is a big problem worldwide, especially for pregnant women and kids, can be helped by this chocolate.

It could be a great way to tackle health problems while enjoying a tasty treat.

This study explores how this unique chocolate could be a yummy solution for boosting hemoglobin levels and fighting Anemia.

Chocolate is adaptable food that can be combined to create completely different taste and texture sensations.

Medicated chocolate is prepared by using chocolate base and the drug is incorporated into prepared chocolate base. As the drug is incorporated within the chocolate and the drug is released from the chocolate. Chocolate drug delivery system is a best drug delivery system specifically for children. The aim of the present study was to prepare Pediatric Herbal Chocolate.

1.2.1 TYPES OF CHOCOLATE

- a. Dark chocolate
- b. Raw chocolate
- c. Ark milk chocolate
- d. Milk chocolate
- e. White chocolate
- f. Ruby chocolate
- g. Choc chips
- h. Candy melts
- i. Compound chocolate

1.2.2 MERITS OF CHOCOLATE

Antioxidant Power: Chocolate has antioxidants that shield cells, lessening damage and inflammation.

Healthy Heart: Eating dark chocolate can lower blood pressure and cut heart disease risk.

Mood Boost: Chocolate triggers "feel-good" chemicals in the brain, lifting spirits.

Brain Protection: Dark chocolate might defend the brain, sharpening memory and thinking

Skin Glow: It boosts blood flow and moisture, giving skin a healthy glow.

Nutrient Boost: Chocolate packs Iron, Magnesium, Copper, and Manganese, key for the body.

Weight Control: Though high-calorie, dark chocolate can tame cravings and keep you feeling full, helping with weight management.

1.2.3 DEMITS OF CHOCOLATE

Chocolate's Sugar Rush: Chocolate, especially milk chocolate and candies, is full of sugar and calories, which can gain weight and increase the risk of health problems like diabetes.

Tooth Troubles: The sugar in chocolate can rot your teeth and give cavities if you don't brush and floss well.

Watch out for Allergies: Ingredients like milk, soy, and nuts in chocolate can cause allergic reactions in some people.

Buzz from Caffeine: Chocolate has caffeine and theobromine, which can make you feel jittery and mess with sleep.

Struggles: Eating chocolate with caffeine close to bed time can make it.

1.2.4 USES

- Customization and Variation
- Consumer Acceptance
- Convenient Delivery Format Improved Bioavailability
- Sensory Appeal
- Stability and Shelf Life
- Dose Control
- Market Potential

1.2.5 APPLICATIONS

- Prevent heart disease
- Antidepressant
- Ani-Diabetic and anti-obesity effect
- Chocolate may prevent memory decline
- Chocolate may prevent stroke
- Increase blood flow to the brain
- Boost mood

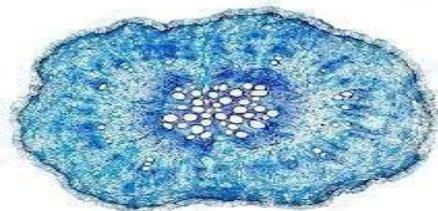
Materials: - *Beta vulgaris rubra*, Plum, Tree tomato, Drum stick tree, *Ocimum sanctum*.

1.Name of plant: - Beet root

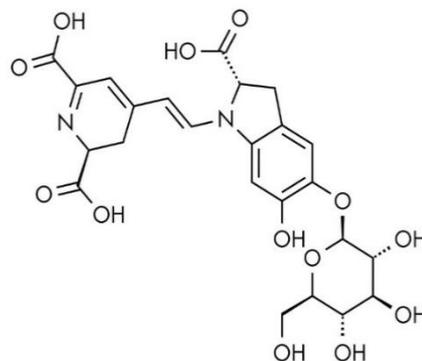


- Synonym: - *Beta vulgaris rubra*
- Vernacular name: - Beet
- Botanical name: - *Beta vulgaris L.*

- Biological source: - It consist of fresh root of *Beta Vulgaris*.
- Family: - *Marantaceae*
- Geographical source: - The coast of western Europe and mediterranean sea to the near and middle east.
- Morphological character: - The taproot ranges in shape from globular to long and tapered.
- Microscopical character:



- Chemical constituents: Betanin-



Use: - Increase hb level, reducing inflammation, promoting cardiovascular health, improving blood flow, managing glucose level

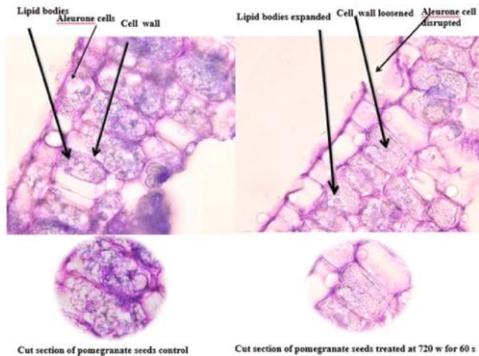
2.Name of plant: - Pomegranates



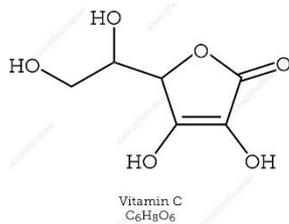
- Synonym: - Plum
- Vernacular name: - Dalima
- Botanical name: - *Punica granatum*
- Biological source: - pomegranate, is widely distributed shrub and cultivated for fruits.
- Family: - *Lythraceae*
- Geographical source: - Native to a region from modern day iran to northern india
- Morphological character: - pomegranate genotype vary for identification, consumer

preference, preferred use, and marketing, the most important of which are fruit size, exocarp colour (ranging from yellow to purple, with pink and red most common)

➤ Microscopical character: -



➤ Chemical constituents: - Vitamin C



➤ Use: - Protect Heart health, support exercise performance and recovery, and promote brain function.

3.Name of Plant: Tomato

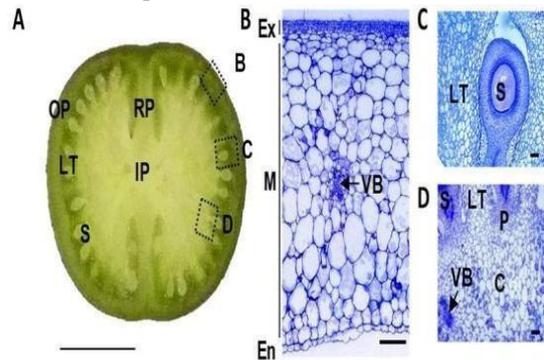


- Synonym- Tree tomato
- Vernacular name: - Tomato
- Botanical name: - *Lycopersicon esculentum*
- Biological source: - Tomato (*Solanum lycopersicum*) is derived from two wild ancestor species, *Solanum pimpinellifolium* and *Solanum cerasiforme*. Other wild species are useful for breeding disease resistance, colour improvement and desirable quality traits.
- Family: - *Solanaceae*

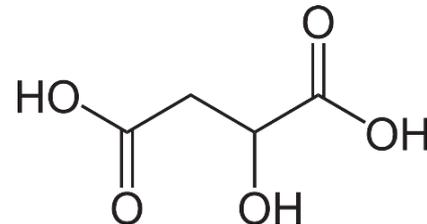
➤ Geographical Source: - The species originated in western South America, Mexico, and Central America.

➤ Morphological Character:- Fruit of tomato (*Solanum Lycopersicum*) are diverse in size and shape, ranging from small and round to large and variably shaped. A prevalent morphological feature distinguishing many cultivated varieties from undomesticated accessions is an elongated fruit shape.

➤ Microscopical character:



➤ Chemical constituent: Malic Acid



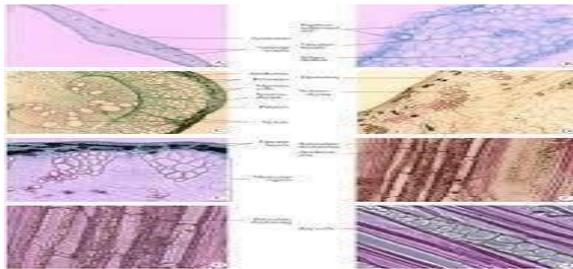
➤ Uses: Cancer prevention, diabetes, high blood pressure, heart disease, osteoarthritis.

4.Name of Plant: - Moringa

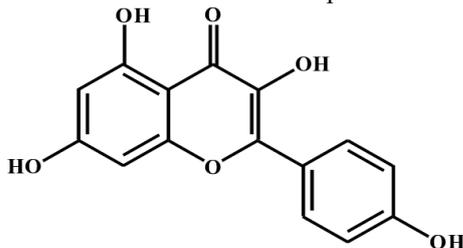


- Synonym: - Drum stick tree.
- Vernacular name: - Shevaga
- Botanical name: - *Moringa oleifera*
- Biological source: - *Moringa oleifera* (munga) plant belonging to family *moringaceae* and it is native to sub-himalayan tracts of India, Pakistan, Bangladesh and Afghanistan.
- Family: - *Moringaceae*

- Geographical Source: - Moringa, a native plant from Africa and Asia, and the most widely cultivated species in Northwestern India, is the sole genus in the family Moringaceae.
- Morphological character: - The tree usually grows to 10 or 12 m in height, with a spreading, open crown of drooping, brittle branches, feathery foliage of tripinnate leaves, and thick, corky, deeply fissured whitish bark.
- Microscopical character: -



- Chemical Constituent: - Kaempferol



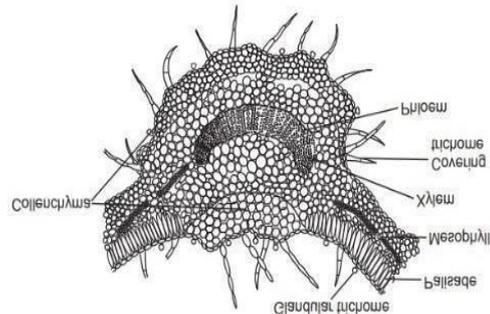
Uses: - Rich in vitamins and minerals, lower blood sugar level.

4.Name of plant: - Tulsi

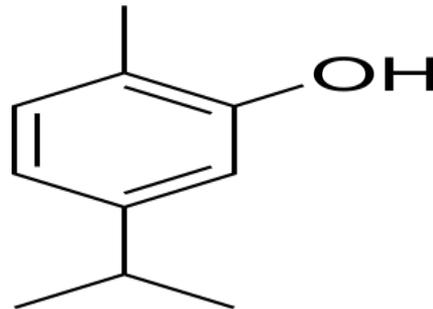


- Synonym:- Ocimum sanctum, Ocimum tomentosum
- Vernacular name: - Tulsi
- Botanical name: - Ocimum tenuiflorum
- Biological source: - Tulsi is an aromatic shrub in the basil family Lamiaceae (tribe ecimeae) that is thought to have originated in north central India and now grows native throughout the eastern world tropics.
- Family:- *Lamiaceae*.

- Geographical Source: - Tulsi is an aromatic shrub in the basil family Lamiaceae (tribe ecimeae) that is thought to have originated in north central India and now grows native through out the eastern world tropics.
- Morphological character: - It has an erect growth form which is highly branched. Leaves are broadly elliptical with a slightly toothed leaf margin (1.5-6 cm long, 1-2.5 cm wide).
- Microscopical character: -



- Chemical Constituent: - Carvacol



- Uses: - Treat respiratory problems, treat insect bites, treat heart disease and fever.

Method Of Preparation:

Step 1: Extraction Of Beet Root

1.Sample Preparation:

Wash and peel fresh beetroot then cut into small pieces and dry them in a hot air oven at 40–50°C until fully dehydrated after that grind the dried beetroot to a coarse powder using a blender or mortar and pestle.

Filling the Thimble:

Place 10–20 grams of beetroot powder in a cellulose thimble or wrap in filter paper.

2.Assembly of Soxhlet Apparatus:

Place the thimble containing beetroot powder into the main chamber of the Soxhlet extractor and fill the round-bottom flask with 150–250 mL of the chosen solvent (e.g., ethanol: water 70:30) then attach the Soxhlet extractor to the round-bottom flask and connect it to a condenser at the top.

3.Extraction:

Heat the solvent using a heating mantle after that the solvent evaporates, condenses in the condenser, and drips onto the sample in the thimble then once the chamber fills to the siphon level, the solvent with extracted compounds is siphoned back into the boiling flask and continue extraction for 4–6 hours or until the solvent in the siphon tube appears clear.

4.Concentration of Extract:

After extraction, allow the setup to cool and filter the extract and concentrate it using a rotary evaporator or water bath at ~40–50°C to remove excess solvent and then store the concentrated extract in a dark bottle at 4°C for further analysis.

Notes:

Use food-grade ethanol for extracts intended for nutritional or pharmacological studies.

Betalains are heat-sensitive, so maintain mild temperatures throughout the process.

Materials:

Sr. No	Material	Collection
01	Beet root	Collected from Jamgoan, market
02	Pomegranates	Collected from my farm house, Jamgoan
03	Tomato	Collected form Jamgoan, market
04	Honey	Collected form my farm house, Jamgoan
05	Tulsi	Collected from my farm house, Jamgoan
06	Moringa	Collected from my farm house, Jamgoan

Table No.01: - Material and Collection

Equipment's:

Sr. No	Equipment name	Company
01	Weighing Balance	Wesner
02	Grinder mixer	Bajaj

Table No.02: - List of Equipment's

Formulation Table:

Sr. No	Ingredient	F1(ml)	F2(ml)	F3(ml)	F4(ml)	F5(ml)
01	Beet root	4	3	2	1.5	1
02	Pomegranates	3	2	1.5	1	2
03	Tomato	1	1	1	2	2
04	Honey	1	1.5	1.5	2	3
05	Tulsi	1	1.5	2	1	2
06	Moringa	2	1.5	1	1	0.5
07	Vanillin	q. s				
08	Cocoa Butter	q. s				
09	Chocolate base	q. s				

Table No.03: - Formulation Batches.

Formulation Method:

- Weigh accurately all the ingredients.
- In one beaker, take cocoa powder and honey and mix properly.
- In another beaker, melt dark chocolates coca butter and add this melted buyer are added in a powder mixture and mix it properly to get fine consistency.
- Finally measure accurately the herbal drug extracts and add in above prepared chocolate.
- Then add vanillin as a flavouring agent before setting in moulds.
- Then the prepared chocolate containing herbal drug extract was poured in moulds and kept in freeze to set overnight.

- Total 5 formulation were prepared by varying the concentration of herbal drug extract used, while the concentration of excipients was kept constant.

Evaluation Test:

1.Organoleptic characters: -

These are sensory properties. Those that can be detected by sense organs, for foods it is used particularly of the combination of taste, texture, astringency and aroma (Perceived in the nose).

2.pH Test: -

2gm of prepared chocolate was dissolved in 100 ml of phosphate buffer solution and pH of the resulted solution was studied by digital pH meter with glass electrodes.

3.Hardness test: -

Hardness of chocolate was measured by Monsanto Hardness Tester. Monsanto Hardness Tester or Pfizer Hardness Tester are used to determine how much force is required to break the tablet. Kg/cm² is the unit of measurement. To accomplish so, we must randomly select a number of medicated chocolate from each batch, determine their hardness, and calculate the mean.

4.Blooming Test: -

i)Fat Bloom: -

Bloom is a test to measure the strength of a chocolate. The test determines the weight in grams needed by a specified plunger to depress the surface of chocolate is stable when exposed to various temperatures. When the thin layer of fat crystals form on the surface of chocolate formulation. This will cause the

chocolate to lose its gloss and a soft white layer will appear, giving the finished article an unappetizing look. Fat bloom is caused by the recrystallization of fat and or a migration of a filling fat to the chocolate layer. Storage at a constant temperature will delay the appearance of fat bloom.

ii)Sugar bloom: -

This is rough and irregular layer on top of chocolate formulation. This is caused by the condensation (when chocolate is taken out of the refrigerator). This moisture will dissolve the sugar in the chocolate. When the water evaporates, sugar recrystallizes into rough, irregular crystals on surface. This results into unpleasant look.

III. RESULT

Parameter	F1	F2	F3	F4	F5
Colour	Light brown	Light brown	Brown	Dark brown	Brown
Odour	Sweet woody	Sweet chocolate	Sweet honey	Slightly sweet	Chocolaty
Taste	Slightly sweet	Slightly sweet, acrid	Slightly sweet, bitter	Slightly sweet	Sweet
Mouth Feel	Smooth & pleasant	Smooth & pleasant	Smooth & pleasant	Smooth & pleasant	Smooth & pleasant
Appearance	Glossy	Dull	Dull	Dull	Glossy

Table No.04: - Result of Organoleptic character

pH of chocolate Formulation: -

Formulation code	F1	F2	F3	F4	F5
pH	6.9	6.7	6.8	6.4	6.5

Table No.05: - Result of pH Test

Hardness Test: -

Formulation Code	F1	F2	F3	F4	F5
Hardness	0.6Kg/cm ²	0.5 Kg/cm ²	0.4 Kg/cm ²	0.3 Kg/cm ²	0.3Kg/cm ² .

Table No.06:- Result of Hardness Test

Blooming Test: - No blooming was observed in formulation.

Future Prospects:

Health Awareness: Haemoglobin booster chocolate taps into the rising demand for functional foods addressing health concerns like iron deficiency.

Target Audience: It caters to various groups like pregnant women, athletes, and vegetarians who struggle to meet iron needs through diet alone.

Convenience: Offering a tasty and convenient way to boost iron intake, it appeals to those averse to traditional iron supplements.

Innovation in Food Technology: Advancements in food tech could lead to better formulations, enhancing iron absorption and fortification methods.

Marketing and Education: Effective marketing and collaborations with healthcare professionals and influencers are crucial for raising awareness.

Regulatory Considerations: Compliance with health regulations ensures consumer trust and market acceptance.

Taste and Palatability: Haemoglobin booster chocolate must taste good while offering health benefits to appeal to consumers.

Price Point: Affordability is crucial; the price should

be competitive yet reflect the product's value.

Distribution Channels: Access through various channels like supermarkets and online platforms enhances consumer reach.

Brand Reputation and Trust: Building trust through transparency about ingredients and production processes is vital.

Consumer Feedback: Continuous improvement based on consumer feedback ensures long-term success.

Competition and Market Dynamics: Staying updated on competitors and market trends essential for maintaining relevance.

IV. CONCLUSION

It Focused on formulation of herbal chocolate having haemoglobin booster activity with natural ingredients. This chocolate was formulated with herbal ingredients like Beet root, Pomegranates, Tomato, Honey, Tulsi, Moringa leaves and contain the active Constituents of betaxanthin, calcium and iron along with protein, carbohydrates and fibre, vitamin-C, Lycopene vitamin A, vitamin C, iron (Fe), and vitamin B12, vitamins A, C and K and Minerals like Calcium, Magnesium, Phosphorus, Iron and Potassium, myricetin, quercetin, kaempferol, isorhamnetin, or rutin, as well as phenolic acids. They are used to treat Anaemia disease, Diabetes, etc. These chocolates are easily chewable and palatable. The evaluation studies were satisfactory, out of five formulations; F5 formulation has shown better results when compared with other 3 formulations.

Herbal chocolate to boost haemoglobin levels. Is used Natural ingredients like beetroot, pomegranates, tomato, honey, Tulsi, and moringa leaves. These ingredients are rich in stuff like calcium, iron, and vitamins. Also added bioactive compounds like myricetin and quercetin. These herbs are known for treating conditions like Anaemia and Diabetes. By mixing them together, we aimed to not only boost haemoglobin but also provide other health benefits are achieved. Herbal chocolates are easy to eat and taste good. They're a convenient way to get important nutrients.

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