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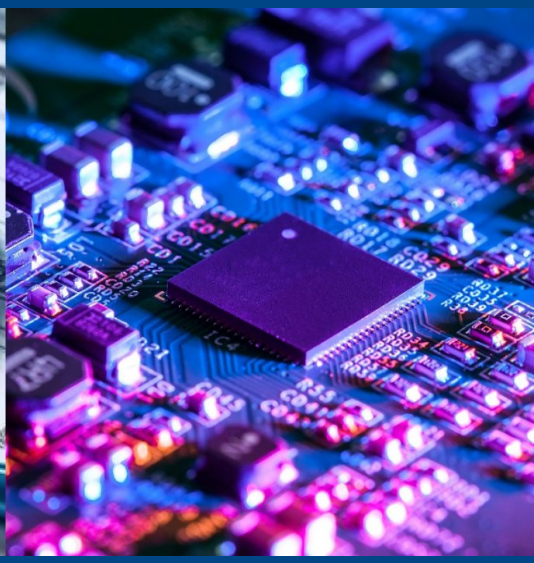

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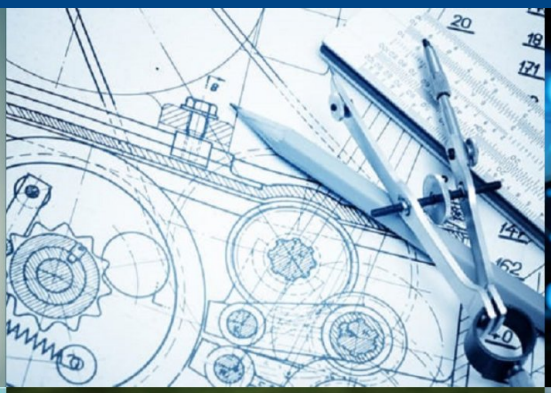

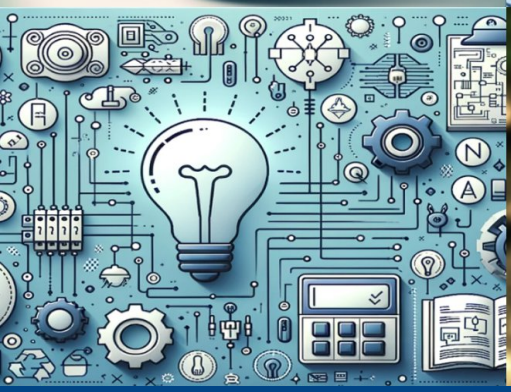

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Formulation and Evaluation of Polyherbal Powder for Iron Deficiency Anemia

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ABSTRACT: The polyherbal hematinic powder was prepared using standard compounding procedures and evaluated for various parameters including physical characteristics, organoleptic properties, micromeritics, bulk density, and flow properties. Additionally, the formulation was assessed for its potential anti-anemic activity based on its known pharmacological effects, such as providing elemental iron, enhancing iron absorption via Vitamin C, and preventing gastrointestinal discomfort. The results indicated that the prepared formulation possesses excellent physicochemical properties and may be highly effective in managing iron deficiency anemia. Being completely herbal in nature, it is expected to have zero to minimal side effects (like constipation or nausea) compared to conventional synthetic iron supplements. Thus, the polyherbal powder can be considered a safe, bioavailable, and effective alternative for anemia management.

KEYWORDS: Polyherbal powder, Iron Deficiency Anemia, Hematinic, Moringa, Beetroot, Amla, Ginger, Physicochemical evaluation, Natural iron supplement.

I. INTRODUCTION

Iron Deficiency Anemia (IDA) is a widespread global health problem characterized by a decrease in the total amount of red blood cells (RBCs) or hemoglobin in the blood, leading to fatigue, weakness, and impaired cognitive function. It is commonly caused by inadequate dietary iron intake, poor iron absorption, or chronic blood loss. While conventional synthetic iron therapies (such as ferrous sulfate) are standardly prescribed, they are notoriously associated with severe gastrointestinal side effects, including constipation, metallic taste, and gastric irritation, which often lead to therapy failure due to poor patient compliance.

In recent years, there has been increasing interest in the use of herbal medicines for the management of anemia due to their safety, effectiveness, and minimal side effects. Polyherbal formulations are considered more beneficial as they provide a synergistic effect. Various herbs like Moringa oleifera (Sahjan), Beta vulgaris (Beetroot), Emblica officinalis (Amla), and Zingiber officinale (Ginger) have been traditionally used to improve iron levels, enhance Vitamin C-mediated iron absorption, and maintain healthy digestion.

II. MATERIAL & METHOD

The present study was carried out to formulate and evaluate a polyherbal powder for the management of anemia. The selected herbal ingredients, namely Moringa leaves, Beetroot, Amla fruits, and Ginger rhizomes, were procured from a reliable local supplier and authenticated based on standard pharmacognostic characteristics. All raw materials were cleaned, shade-dried to remove moisture content, and then powdered separately using a mechanical grinder. The powders were passed through Sieve No. 80 to obtain a uniform particle size and were stored in airtight containers. The individual powdered drugs were weighed accurately and mixed in appropriate proportions along with Sodium Benzoate as a preservative.

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Moringa leaf:

Synonym: Drumstick
Biological Source: It is obtained from dried leaves of Moringa oleifera Lam.
Family: Moringaceae
Chemical Constituents: Vitamin, mineral, Proteins and Amino acid, Phenolic Compounds, alkaloids and Tannins, potassium, magnesium, Iron, calcium, Glucosinolates and Isothiocyanates.
Pharmacological Activity: including anti-anemic, antioxidant, anti-inflammatory, antimicrobial and immunomodulatory activities. Because moringa leaves are rich in iron and essential nutrients, moringa leaf powder is commonly used in anemia formulations to increase hemoglobin levels and support the production of red blood cells, thereby helping in the management of iron- deficiency anemia.

Amla:

Synonyms: such as Amalaki, Amlika, and Emblic myrobalan.
Family: Phyllanthaceae.
Biological source: the dried or fresh fruit of Phyllanthus emblica Linn. (syn. Emblica officinalis).
Chemical constituents: such as vitamin C (ascorbic acid), tannins (emblicanin A and B), gallic acid, ellagic acid, flavonoids, polyphenols, pectin, and minerals like iron and calcium.
Pharmacological activities; including antioxidant, anti-inflammatory, immunomodulatory, antimicrobial, and anti-anemic activities

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Beetroot:

Synonym: Red Garden beet
Family: Amarnathaceae
Biological Source: It is obtained from fresh or dried root of Beta vulgaris Linn.
Chemical Constituent: Betalains, vitamins, minerals, nitrates, sugars and phenolic compounds.
Pharmacological Activity: Beetroot is rich in inorganic nitrates, which are converted in the body to nitric oxide. It relaxes blood vessels improving blood flow to tissues.

Ginger:

Synonym: Zingiber
Family: Zingiberaceae
Biological source: The ginger is the rhizomes of Zingiber officinale Roscose.
Chemical Constituents: such as gingerol, shogaol, zingerone, essential oils (zingiberene, bisabolene), flavonoids, phenolic compounds, vitamins, and minerals like iron and magnesium.
Pharmacological activities: including antioxidant, anti-inflammatory, antimicrobial, digestive stimulant, and immunomodulatory activities.

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Method of Preparation

1. All crude drugs (Moringa, Beetroot, Amla, and Ginger) were collected and cleaned properly to remove dust and impurities.
2. The plant materials were dried under shade to remove moisture completely.
3. After drying, all drugs were ground separately with the help of a mechanical grinder to obtain a fine powder.
4. The individual powders were passed through Sieve No. 80 to get a uniform particle size.
5. Required quantities of each powder, along with Sodium Benzoate, were weighed accurately using an analytical balance.
6. A small quantity of Amla powder and Sodium Benzoate were mixed first using the geometric dilution method in a mortar and pestle. Then, all remaining weighed powders were mixed thoroughly for 15 minutes to obtain a uniform polyherbal powder mixture.
7. The prepared polyherbal powder was stored in an airtight amber glass container and kept in a cool and dry place.

Formulation :

S.no	Formulation	Beetroot	Moringa	Alma	Ginger
1.	F1	15gm	15gm	15gm	4.50gm
2.	F2	17gm	12gm	15gm	2.50gm
3.	F3	12gm	12gm	22gm	3.50gm

Evaluation Parameters
Ash values:

s.no	**Ingredients**	**Sample wt. (in gm)**	**Ash wt. (in gm)**
1.	Moringa	1gm	9%
2.	Beetroot	1gm	11%
3.	Amla	1gm	15%
4.	Ginger	1gm	13%

Moisture content:

s.no	**Formulation**	**Sample**	**Moisture content**
1.	F1	1gm	9.09%
2.	F2	1gm	9%
3.	F3	1gm	8%

PH Determination:

s.no	**Formulation**	**PH**
1.	F1	5
2.	F2	4.5
3.	F3	5

III. RESULT AND DISCUSSION

The formulated polyherbal powder was evaluated using various physicochemical, micromeritic, and organoleptic parameters to ensure its quality, effectiveness, and stability. The results obtained from the evaluation studies indicated that all three formulations (F1, F2, F3) met the acceptable standard pharmacopoeial limits. The organoleptic properties were found to be most satisfactory for F1 and F3, exhibiting a pleasant reddish-brown color, aromatic ginger odor, and palatable taste, effectively masking the grassy flavor of Moringa. The physicochemical parameters, including bulk

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density, tapped density, and angle of repose (all under 30°), showed excellent flow properties for the powder, indicating ease of handling, packaging, and uniform dosing. The pH was slightly acidic (~4.8), which is highly beneficial as it aids in the reduction of ferric iron to the absorbable ferrous state in the stomach. The moisture content was found to be well below 5%, which ensures long-term physical stability and prevents microbial growth.

IV. CONCLUSION

The present study successfully focused on the formulation and evaluation of a polyherbal powder Iron Deficiency Anemia. The selected herbal ingredients— Moringa, Beetroot, Amla, and Ginger—are scientifically well-documented for their therapeutic benefits in hematopoiesis and enhancing iron bioavailability. The formulation process was carried out using standard compounding and geometric dilution methods to ensure uniform mixing and consistency. All evaluation parameters, such as organoleptic properties, physicochemical characteristics, and flow properties, were found to be within optimal limits. Based on the results, it can be concluded that the developed polyherbal hematinic powder (specifically batch F1) is safe, stable, and highly suitable as a natural remedy. The synergistic effect of the herbal components provides iron, enhances absorption via Vitamin C, and prevents gastric irritation. Therefore, this formulation holds significant potential as an alternative to synthetic iron drugs, and further clinical studies can be conducted to establish its absolute in-vivo efficacy.

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