Development & Evaluation of Polyherbal Anti-Hemorrhoid Tablet

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Abstract:
The formulation and evaluation of polyherbal anti-hemorrhoid tablets involved a systematic approach to creating a botanical medicine aimed at addressing hemorrhoidal symptoms. The process began with a thorough pharmacognostic assessment of selected plants, including pomegranate, turmeric, haritaki, liquorice, and common grape vine. This assessment encompassed macroscopic and microscopic analyses, phytochemical screening, preformulation studies, and post-compression parameters. The macroscopic evaluation revealed distinct characteristics such as shape, size, color, and taste, aiding in plant identification. Microscopic analysis provided insights into internal structures crucial for botanical characterization. Phytochemical screening identified key compounds influencing medicinal properties. Preformulation studies assessed powder characteristics essential for formulation development, while post-compression parameters ensured tablet quality. Stability studies evaluated the long-term efficacy of formulations under varied conditions. Overall, this comprehensive evaluation laid the foundation for standardization, quality control, and validation of the polyherbal anti-hemorrhoid tablet, supporting its safe and effective use in addressing hemorrhoidal conditions.

Keywords:hemorrhoidal ,polyherbal,Microscopic analysis,preformulation studies

Introduction

Hemorrhoids are swollen veins in the rectum or anus, causing discomfort and bleeding. They are classified as internal (inside the rectum) or external (under the skin around the anus).Understanding these types is vital for proper diagnosis and treatment. Hemorrhoids affect millions globally, especially adults aged 45 to 65, with men and women equally at risk. Factors such as pregnancy can increase susceptibility. Given their prevalence and potential impact on quality of life, understanding the causes, symptoms, and treatments is essential for effective management.

Types of Hemorrhoids

Hemorrhoids are classified by location and severity, each type presenting unique symptoms and requiring tailored treatments.

A. Internal Hemorrhoids

Internal hemorrhoids develop inside the rectum and are usually painless, with bleeding during bowel movements being a common symptom.

B. External Hemorrhoids

External hemorrhoids form beneath the skin around the anus and are visible. Symptoms include itching, swelling, pain, and occasional bleeding, often exacerbated by straining or irritation.

C. Prolapsed Hemorrhoids

Prolapsed hemorrhoids occur when internal hemorrhoids extend outside the anus, causing significant pain, irritation, and visible protrusions. These often require medical treatment for symptom relief and management.

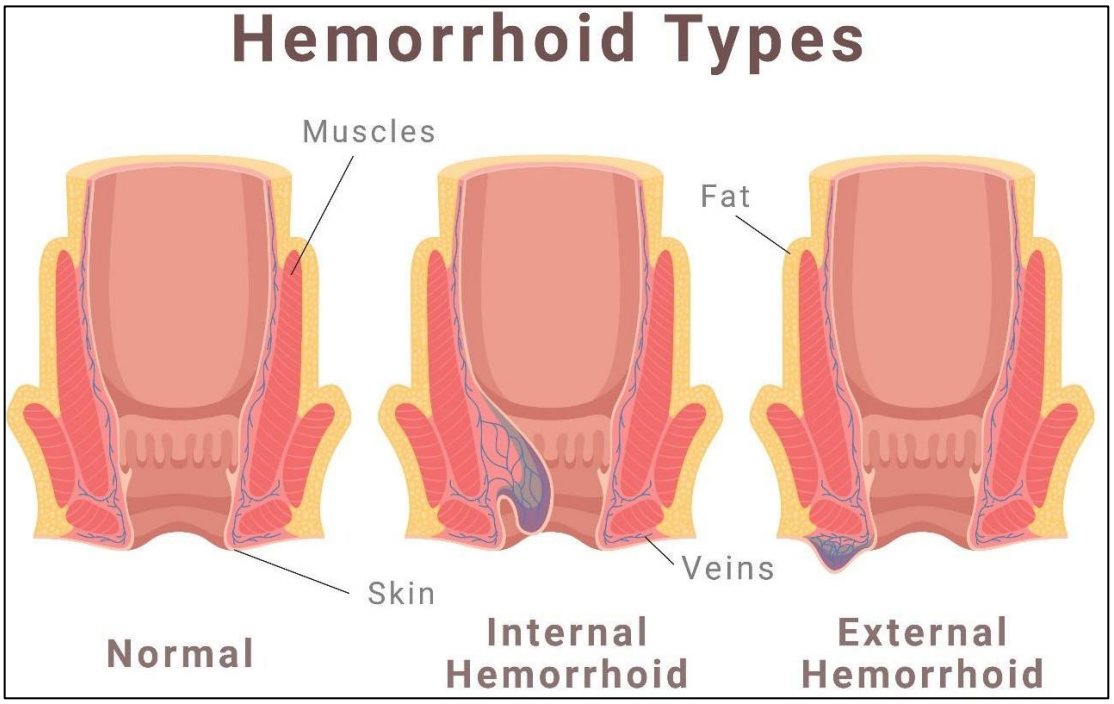

Fig no 1: Types of Hemorrhoid

Plant Material Procurement and authentification of plant material:- The plants Pomegranate (Punicagranatum), Turmeric (Curcuma longa), Haritaki (Terminaliachebula), Liquorice (Glycyrrhizaglabra), and Common Grape Vine (Vitisvinifera were collected from home garden Buldana, Maharashtra. The collected plant material were identified by Taxonomist, Department of Botany. Jalna Education Society's, R. Bezonji Science College, Jalna MS

Pomegranate (Punicagranatum) :

Fig no 2 :Pomegranate (Punicagranatum)

General Description

Pomegranate (*Punicagranatum*) is a deciduous shrub or small tree in the Lythraceae family, valued for its fruit and ornamental beauty.

Taxonomy:

- **Kingdom:** Plantae
- **Clade:** Angiosperms
- **Family:**Lythraceae
- **Genus:**Punica
- **Species:***P. granatum*

Chemical Composition

Pomegranates are rich in bioactive compounds that contribute to their health benefits:

1. **Polyphenols:** Abundant in antioxidants like flavonoids (quercetin, anthocyanins) and tannins (punicalagins, ellagitannins), which reduce oxidative stress and inflammation.
2. **Vitamins:** Contain vitamin C (immune support), vitamin K (bone health and clotting), and B vitamins like B5, B6, and folate.
3. **Minerals:** Provide potassium for heart health, along with trace elements like copper and manganese.
4. **Punicic Acid:** Found in seed oil, it has anti-inflammatory effects and supports cardiovascular health.
5. **Pectin:** A soluble fiber that promotes digestive health and gut microbiota balance.

Medicinal Uses

1. **Antioxidant Protection:** High polyphenol content helps combat chronic diseases by reducing oxidative stress.
2. **Heart Health:** Supports cardiovascular function and enhancing heart performance.
3. **Immune Support:** Vitamin C strengthens the body's defenses against infections.
4. **Cancer Prevention:** Bioactive compounds may inhibit the growth of certain cancers, such as prostate and breast cancer.

Turmeric (Curcuma longa) :

Fig no 3 : Turmeric (Curcuma longa)

General Description

Turmeric (*Curcuma longa*) is a perennial plant in the Zingiberaceae family, valued for its rhizomes, which are used as a spice, medicine, and dye. Known for its yellow-orange hue and earthy flavor, it is widely used in culinary and medicinal applications.

Taxonomy:

- **Kingdom:** Plantae
- **Clade:** Angiosperms
- **Order:**Zingiberales
- **Family:**Zingiberaceae
- **Genus:** Curcuma
- **Species:***C. longa*

Chemical Composition

1. **Curcuminoids:**Polyphenolic compounds, including curcumin, demethoxycurcumin, and bisdemethoxycurcumin, and health benefits like antioxidant and anti-inflammatory effects.
2. **Curcumin:** The main bioactive compound (2-8% of turmeric) with poor bioavailability but known for its antioxidant properties.
3. **Turmerones:** Aromatic compounds, such as α-turmerone and ar-turmerone, with anti-inflammatory and neuroprotective potential.
4. **Essential Oils:** Includes turmerone and cineole, which contribute to aroma and antimicrobial activity.
5. **Carbohydrates:** Starch and dietary fiber support digestion and gut health.
6. **Proteins:** Essential for tissue repair and immune function.
7. **Minerals:** Trace elements like potassium, calcium, iron, magnesium, and zinc are vital for various body functions.

Medicinal Uses

1. **Anti-inflammatory:**Curcumin helps manage inflammation in arthritis, inflammatory bowel disease, and rheumatoid arthritis.
2. **Antioxidant:** Protects against chronic diseases by reducing oxidative stress.
3. **Pain Relief:** Alleviates pain in conditions like osteoarthritis and muscle soreness.
4. **Digestive Health:** Eases indigestion, bloating, and promotes healthy digestion.
5. **Liver Support:** Enhances detoxification and protects against liver damage.
6. **Cardiovascular Health:** Reduces inflammation, LDL cholesterol, and triglycerides, benefiting heart health.
7. **Brain Health:** Improves cognition and reduces risks of Alzheimer's and Parkinson's by preventing amyloid plaque accumulation.
8. **Cancer Prevention:**Curcumin may inhibit cancer cell growth and spread while inducing apoptosis.
9. **Immune Support:** Strengthens immunity through its anti-inflammatory and antioxidant properties.
10. **Skin Health:** Topical use treats acne, eczema, and wounds, promoting healing and preventing infection.

Terminaliachebula :

Fig no 4 Terminaliachebula

General Description:

Terminaliachebula, also known as Haritaki, is a deciduous tree belonging to the Combretaceae family. Widely recognized in Ayurveda, it is valued for its health-promoting properties.

Taxonomy:

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Order**: Myrtales
- **Family**: Combretaceae
- **Genus**: Terminalia
- **Species**: *T. chebula*

Chemical Composition:

- **Tannins**: Key constituents such as chebulinic acid, chebulagic acid, and ellagic acid are known for their pharmacological effects.
- **Flavonoids and Phenolic Compounds**: Includes gallic acid, quercetin, kaempferol, and rutin, contributing to its therapeutic properties.
- **Terpenoids and Alkaloids**: Bioactive compounds supporting various health benefits.

Medicinal Uses:

1. **Digestive Health**:
    - Aids in treating constipation, indigestion, diarrhea, and flatulence.
    - Exhibits laxative and carminative properties, improving overall digestion.
2. **Detoxification**:
    - Acts as a natural detoxifier, promoting liver health and overall body cleansing.
3. **Antioxidant Activity**:
    - Rich in antioxidants, it combats free radicals and prevents cellular damage, aiding in chronic disease prevention.
4. **Cardiovascular Health**:
    - Supports heart health by lowering cholesterol, improving lipid profiles, and reducing risks of atherosclerosis.
5. **Immune Support**:
    - Strengthens the immune system, enhancing the body's defenses against infections.
6. **Anti-inflammatory Effects**:
    - Alleviates symptoms of inflammatory conditions such as arthritis and gout.
7. **Antimicrobial Properties**:
    - Exhibits activity against bacteria, viruses, and fungi, making it useful for treating skin infections, wounds, and ulcers.

This traditional medicinal tree continues to garner interest for its diverse health benefits, supported by ongoing scientific research.

Liquorice (Glycyrrhizaglabra) :

Fig no 5 :Liquorice (Glycyrrhizaglabra)

Liquorice (Glycyrrhizaglabra) is a perennial herb native to regions of Asia and Europe.

Taxonomy:

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Order**: Fabales
- **Family**: Fabaceae
- **Genus**: Glycyrrhiza
- **Species**: *G. glabra*

Chemical Composition

Liquorice is rich in bioactive compounds that contribute to its diverse therapeutic properties.

Glycyrrhizin, the primary sweet-tasting compound in liquorice and hepatoprotective activities. However, prolonged or excessive consumption of glycyrrhizin may lead to side effects such as hypertension and hypokalemia.

Flavonoids present in liquorice, such as liquiritin, liquiritigenin, and isoliquiritigenin, provide potent antioxidant and anti-inflammatory benefits, making them significant contributors to the herb's medicinal value.

Triterpenoidsaponins, including glycyrrhizinic acid and glycyrrhetinic acid, are particularly noted for their liver-protective and anti-inflammatory properties, which have been validated through scientific studies.

Coumarins, such as herniarin and umbelliferone, are another class of compounds in liquorice. These derivatives possess strong antioxidant and anti-inflammatory characteristics, further enhancing the therapeutic potential of the plant.

Medicinal Uses

Gastrointestinal Health

Liquorice is widely used to support gastrointestinal health. It helps soothe the digestive tract and is effective for managing conditions such as indigestion, heartburn, gastritis, and peptic ulcers. Additionally, it reduces inflammation, stimulates mucus production, and inhibits the growth of *Helicobacter pylori*, a bacterium linked to stomach ulcers.

Respiratory Health

The herb is also beneficial for respiratory ailments. It alleviates symptoms such as coughs, sore throats, and bronchitis. Its expectorant properties help loosen and expel mucus and phlegm, while its antiviral effects may combat respiratory infections.

Anti-inflammatory Effects

Liquorice contains bioactive compounds that exhibit significant anti-inflammatory properties. These effects make it useful in managing inflammatory conditions like arthritis, asthma, and inflammatory bowel disease.

Hepatoprotective Activity
Liquorice has shown potential in protecting the liver from damage caused by toxins, oxidative stress, and inflammation. It supports liver function and promotes overall liver health, which has been corroborated by various studies.

Antiviral Activity
Compounds in liquorice exhibit antiviral effects, particularly against HSV and HCV. These compounds can inhibit viral replication and help reduce the severity and duration of infections.

Hormonal Balance
Liquorice demonstrates estrogenic properties, which may help in regulating hormonal imbalances. This makes it useful for addressing menstrual irregularities, menopausal symptoms, and conditions such as polycystic ovary syndrome (PCOS).

Skin Health
In the field of dermatology, liquorice extract is commonly utilized in skincare products for its anti-inflammatory, antioxidant, and skin-lightening properties. It helps reduce skin irritation, soothe inflammation, and lighten dark spots or hyperpigmentation.

Common Grape Vine (Vitisvinifera) :

Fig no 6 :**Common Grape Vine (Vitisvinifera)**

General Description
The common grapevine (*Vitisvinifera*) is a perennial, deciduous vine belonging to the Vitaceae family. It is among the most economically significant fruit crops globally, cultivated primarily for wine production, fresh fruit consumption, and raisin making.

Taxonomy
- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Order**: Vitales

- **Family**: Vitaceae
- **Genus**: Vitis
- **Species**: *V. vinifera*

Chemical Composition

Grapes are rich in bioactive compounds, contributing to their flavor, color, and numerous health benefits.

1. **Polyphenols**
   Grapes are abundant in polyphenolic compounds, including flavonoids, phenolic acids, and stilbenes.
   - **Flavonoids**: Compounds such as quercetin, kaempferol, catechins, and epicatechins provide antioxidant, anti-inflammatory, and anti-cancer properties.
   - **Resveratrol**: A stilbene primarily found in grape skins, resveratrol is recognized for its antioxidant effects. It supports cardiovascular health and longevity.
2. **Anthocyanins**
   Anthocyanins exhibit antioxidant properties, aiding in the protection against oxidative stress and inflammation.
3. **Proanthocyanidins**
   Proanthocyanidins contribute to the astringency of grapes and wine, offering antioxidant and anti-inflammatory benefits.
4. **Phenolic Acids**
   Grapes contain phenolic acids. These compounds possess antioxidant and anti-inflammatory effects, enhancing the health benefits of grapes.
5. **Carbohydrates**
   Grapes contain natural sugars which provide energy and contribute to the sweetness of fresh grapes and processed grape products.

Vitisvinifera continues to be a cornerstone of agricultural and health-related industries due to its rich composition and versatile applications.

Sr.no	Plant	Macroscopic Features
1	Pomegranate (Punicagranatum)	Fruit: Rounded, thick reddish skin, numerous seeds (arils) enclosed in juicy red pulp. Size: 5-12 cm in diameter. Color: Red to deep pink. Texture: Granular, seeds embedded in a white, spongy mesocarp. Taste: Sweet and tangy.
2	Turmeric (Curcuma longa)	Rhizome: Thick, branched, cylindrical, yellow to orange color. Size: 2-5 cm in diameter, up to 8 cm long. Color: Yellowishbrown externally, bright orange internally. Texture: Smooth to slightly rough, fibrous. Aroma: Strong, earthy, and aromatic. Taste: Bitter and pungent.

3	Haritaki (Terminaliachebula)	Fruit: Ovoid to ellipsoid, ridged surface. Size: 2-4 cm long. Color: Yellowish-brown to black when mature. Texture: Hard, ridged, slightly wrinkled. Taste: Astringent, slightly bitter.
4	Liquorice (Glycyrrhizaglabra)	Root: Long, cylindrical, fibrous. Size: 1-2 cm in diameter, up to 1 meter in length. Color: Brown on the outside, yellowish inside. Texture: Smooth to slightly rough externally, fibrous internally. Taste: Characteristically sweet
5	Common Grape Vine (Vitisvinifera)	Fruit: Berries growing in clusters. Size: Varies, 1-3 cm in diameter. Color: Varies (green, red, black, yellow, pink). Texture: Smooth, juicy. Taste: Sweet to slightly tart. Leaves: Large, lobed, 3-5 lobes, toothed margins, dark green.

Table no 1 :Macroscopic Features Evaluation

Sr.no	Plant	Microscopic Features
1	Pomegranate (Punicagranatum)	Epidermis with thick cuticle, parenchyma cells, vascular bundles, sclerenchymatous cells
2	Turmeric (Curcuma longa)	Cork cells, parenchyma cells with starch grains, oil cells, vascular bundles
4	Haritaki (Terminaliachebula)	Epicarp with epidermal cells, sclerenchyma, parenchyma cells, stone cells
5	Liquorice (Glycyrrhizaglabra)	Cork cells, parenchyma with starch grains, laticiferous cells, medullary rays
6	Common Grape Vine (Vitisvinifera)	Epidermal cells, parenchyma with anthocyanin pigments (in colored grapes), vascular bundles

Table 1.2: Microscopic Features

Test Name	Pomegranate (Punicagranatum)	Turmeric (Curcuma longa)	Haritaki (Terminaliachebula)	Haritaki (Terminaliachebula)	Common Grape Vine (Vitisvinifera)
Test for Alkaloids	Dragendorff's reagent Positive:Orange precipitate	Mayer's reagent Negative: No precipitate	Dragendorff's reagent Negative: No precipitate	Mayer's reagent Negative: No precipitate	Dragendorff's reagent Negative: No precipitate
Test for Flavonoids	Shinoda test Positive: Pink to red coloration	Lead acetate test Positive: Yellow precipitate	Shinoda test Positive: Pink to red coloration	Lead acetate test Negative: No precipitate	Shinoda test Negative: No color change
Test for Tannins	Ferric chloride test Positive: Blueblack coloration	Gelatin test Positive: White precipitat	Ferric chloride test Positive: Blue-black coloration	Gelatin test Negative: No precipitate	Ferric chloride test Negative:
Test for Glycosides	Borntrager's test Positive: Formation of colored zone	No change observed	Borntrager's test Negative	Legal's test Positive: Formation of colored zone	Borntrager's test Negative: No change observed

Tab 1.3 :Phytochemical Constituents Evaluation of Selected Plants

FORMULATIONAND PREPARATIONOF POLYHERBAL TABLETS:

The procedure for formulating and preparing polyherbal tablets involves several sequential steps to ensure accuracy, uniformity, and quality throughout the manufacturing process. Initially, the required amounts of each ingredient are weighed meticulously using an electronic balance to adhere to the composition table accurately. Subsequently, a blend comprising the polyherbal extract, along with HPMC, Xanthan Gum, Guar Gum, Ethylcellulose, PVP, Sodium Bicarbonate, MCC, and Magnesium Stearate, is prepared by

thorough mixing in a dry container. Granulation is performed if necessary, with the addition of a suitable granulating agent and continued mixing until the desired granule size and consistency are achieved. The blend is then compressed into tablets of the desired size and shape using a tablet compression machine equipped with appropriate tooling. If the tablets contain moisture-sensitive ingredients, they undergo drying in a controlled environment to achieve the desired moisture content, with close monitoring to prevent degradation. Quality control measures include visual inspection foruniformityand various testingprocedures such as hardness, friability, and disintegration testing to ensure tablet integrity and performance. Following quality assurance, the tablets are packed into suitable packaging material, labeled with essential information, and stored in optimal conditions to maintain their stability and efficacy

Ingredients (mg)	**FI**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**
Polyherbal extract	100	100	100	100	100	100	100	100	100
HPMC	105	132	140	-	-	-	55	50	-
XanthanGum	-	~	-	105	_	_	-	0	50
GuarGum	-	-	-	-	105	-	-	0	55
Ethylcellulose	-	-	-	~	_	115	50	55	-
PVP	145	118	110	145	145	135	145	145	145
Sodium Bicarbonate	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5
MCC	61.5	61.5	61.5	61.5	61.5	61.5	61.5	61.5	61.5
Magnesium Stearate	35	35	35	35	35	35	35	35	35
Total Weight	500 mg	500 mg	500 mg	500 mg	500 mg	500 mg	500 mg	500 mg	500 mg

Table 2 1:COMPOSITIONOF TABLETS

- **PREFORMULATION STUDIES OF POWDERED BLEND**:
- **Bulk Density**

The bulk density of formulations F1 to F9 was determined and recorded as follows

Formulation code	Bulk density (gm/mL)
F1	0.821 ± 0.045
F2	0.810 ± 0.043
F3	0.51 ± 0.045
F4	0.64± 0.045
F5	0.55 ± 0.045
F6	0.64 ± 0.044
F7	0.55 ± 0.035
F8	0.75 ± 0.043
F9	0.58 ± 0.044

Table 3 1:Bulk density of formulations

These values represent the formulation density in grams per milliliter, with uncertainties shown as standard deviations. Bulk density is essential in pharmaceuticals, affecting flow properties, compression, and dosage uniformity. Variations in bulk density across formulations may result from differences in composition, particle size, and processing methods.

Tapped density (gm/mL)

Formulation code	Tapped density (gm / mL)
F1	0.770± 0.02
F2	0.773 ± 0.01
F3	0.583 ± 0.4
F4	0.522 ± 0.02
F5	0.512 ±0.04
F6	0.530 ±0.07
F7	0.563 ± 0.2
F8	0.673 ± 0.4
F9	0.543 ± 0.1

Table no3.2 **Tapped** density of formulations

These values represent the density of the formulations in grams per milliliter, with the reported uncertainties indicated by the standard deviations. Tapped density is a critical parameter in1pharmaceutical formulation development as it reflects the packing and settling characteristics of the powder blend. The observed variations in tapped density among the formulations may be attributed to differences in particle size, shape, and

interparticulate interactions. Further analysis and discussion may explore the implications of tapped density on powder flowability, compaction behavior, and dosage uniformity, ensuring the optimization of formulation processes and pharmaceutical product performance.

Compressibility Index :

The **Compressibilty index** of formulations F1 to F9 was determined and recorded as follows

Formulation code	Compressibility index (%)
F1	16.126 ± 0.6
F2	18.714 ± 0.7
F3	14.113 ± 0.8
F4	16.60 ± 0.2
F5	13.3 ± 0.6
F6	13.27± 04
F7	12.1 ± 0.4
F8	17.2 ± 0.1
F9	15.1 ± 0.6

Table no3.3 **Compressibility Index of formulations**

These values represent the compressibility index, expressed as a percentage, with the reported uncertainties indicated by the standard deviations. The observed variations in compressibility index among the formulations may be attributed to differences in particle size, shape, and interparticulate interactions.

Hausner's ratio:

The Hausner's ratio of formulations F1 to F9 was determined as follows:

Sr.no	Formulation code	Hausner's ratio
1	F1	1.306 ± 0.06
2	F2	1.151 ± 0.04
3	F3	1.128 ± 0.08
4	F4	1.14 ± 0.02
5	F5	1.17 ± 0.04
6	F6	1.17 ± 0.08
7	F7	1.13 ± 0.02
8	F8	1.12 ± 0.08
9	F9	1.11 ± 0.03

Table no3.4 Hausner's ratio of formulations

The variations in Hausner's ratio among formulations are likely due to differences in particle size, shape, and interactions. Further analysis can explore its impact on powder flow, compaction, and tablet quality, helping optimize manufacturing processes for high-quality pharmaceutical products.

Angle of repose (θ) :

Formulation Code	**Angle of repose(θ)**
F1	16.62 ± 0.21
F2	25.46 ± 0.11
F3	27.32 ± 0.31
F4	22.06 ± 0.31
F5	27.58 ± 0.15
F6	25.44 ± 0.11
F7	27.58 ± 0.18
F8	29.58 ± 0.17
F9	24.58 ± 0.25

Table no 3.5 **Angle of repose (θ)**

The observed variations in the angle of repose among the formulations may be attributed to differences in particle size, shape, and surface characteristics. Further analysis and discussion may explore the implications of the angle of repose on powder flow behavior, compaction characteristics, and tablet quality attributes, aiding in the optimization of tablet manufacturing processes and ensuring the production of high-quality pharmaceutical products.

POSTCOMPRESSION PARAMETERS

AvgWeight(Mean ± S.D.)

Formulation No.	**AvgWeight(Mean ±S.D.)**
F1	355.5 ± 0.8
F2	352.5 ± 1.1
F3	349.5 ± 0.5
F4	353.5 ± 0.6
F5	348.5 ± 1.0
F6	356.5 ± 1.0
F7	348.3 ± 1.2
F8	350.4 ± 0.8
F9	352.3 ± 0.7

Table4.1: AvgWeight (Mean S.D.)

Hardness (kg / cm²)

Formulation No.	**Hardness (kg/cm²)**
F1	9.7 ± 0.6
F2	10.0 ± 0.6
F3	9.9 ± 0.8
F4	10.1 ± 0.3
F5	10.2 ± 0.8
F6	9.8 ± 0.6
F7	9.7 ± 0.8
F8	9.5 ± 0.8
F9	9.6 ± 0.8

Table 4.2:Hardness(kg/ cm²)

These values represent the tablets average weight in milligrams, with the reported uncertainties denoted by the standard deviations. The average weight of tablets is an essential parameter in pharmaceutical quality control, ensuring uniformity of dosage. The observed variations in average weight among the formulations may be attributed to differences in the compression process, powder flow properties, and uniformity of mixing. Further analysis and discussion may explore the implications of average weight on dosage uniformity and tablet quality, ensuring the production of consistent and effective pharmaceutical products.

Friability

The friability(mean± standard deviation) for formulations F1 toF9, with as ample size of n =6, is as follows:

Table7.12:Friability

FormulationNo.	**Friability(Mean± S.D)(n = 6)**
F1	0.446
F2	0.512
F3	0.727
F4	0.511
F5	0.425
F6	0.55
F7	0.680
F8	0.710
F9	0.536

Table4.3: Friability

Friability is a crucial parameter in tablet manufacturing, representing the percentage of weight loss due to abrasion or breakage during handling and transportation. The reported values provide insights into the mechanical strength and integrity of the tablets. Higher friability values may in dictate greater propensity for tablet damage and reduced product quality. Further analysis and discussion may explore the implications of friability on tablet robustness and suitability for commercial distribution, ensuring the production of durable and high-quality pharmaceutical products.

STABILITYOFTABLETS

Time points	**Initial**	**Cumulative% Drug Release**			
		25 ° C / 60 %RH		**40 ° C / 75 %RH**	
(hr)		**1st Month**	**3rdMonth**	**1st Month**	**3rdMonth**
1	12.4	12.2	11.7	11.2	10.7
2	30.8	30.4	30.1	29.4	29.1
3	42.3	42.1	41.8	39.6	39.2
4	49.4	49.0	48.6	47.8	47.4
5	60.3	58.3	59.4	59.1	58.6
6	76.4	76.1	75.5	75.1	74.9
8	90.2	89.8	89.2	88.7	88.1
10	97.4	97.1	96.5	96.1	95.8
Assay	99.5	99.2	99.1	98.7	98.5

Table 5.1: Stability data of optimized formulation F5

The optimized formula underwent stability studies, with cumulative % drug release kinetics used to assess preparation stability. The mean values were compared to those from the first month, as shown in the table. After three months of storage, there was minimal change in % entrapment efficiency at storage temperatures, indicating stable preparation.

Conclusion:

In conclusion, the formulation and evaluation of the polyhedral anti-hemorrhoid tablet represent a promising approach for addressing the symptoms of hemorrhoids. Through a comprehensive pharmacy gnostic evaluation of the selected plants, including pomegranate, turmeric, heritage, liquor ice, and common grape vine, valuable insights into their botanical characteristics, phytochemical composition, and pharmaceutical properties were obtained. Macroscopic and microscopic analyses, along with phytochemical screening, facilitated the identification and authentication of these plants, ensuring their quality and efficacy. Reformulation studies provided essential information about the physical properties of powdered blends, guiding the formulation process, while post-compression parameters confirmed the quality and uniformity of the tablet preparations. Stability studies further

validated the long-term efficacy and reliability of the formulations. Overall, this comprehensive evaluation lays the groundwork for the standardization, quality control, and scientific validation of medicinal plants, supporting their safe and effective use in traditional medicine, phototherapy, and pharmaceutical industries.

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