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(REVIEW ARTICLE)

A review on: Development and formulation and evaluation of herbal gel for the treatment of hemorrhoids

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Abstract

Hemorrhoids are swollen and inflamed veins in the rectal and anal region that cause pain, bleeding, itching, and discomfort. The condition is commonly associated with chronic constipation, pregnancy, prolonged sitting, and increased intra-abdominal pressure. Conventional treatments provide symptomatic relief but may produce side effects on prolonged use. Therefore, the development of a safe and effective herbal formulation is of significant interest.

The present study focuses on the formulation and evaluation of a herbal gel for the treatment of hemorrhoids using plant-based ingredients such as Aegle marmelos, Aloe vera, and Azadirachta indica, known for their anti-inflammatory, wound healing, antimicrobial, and soothing properties. The extracts were incorporated into a Carbopol 934 gel base to prepare a topical formulation suitable for rectal application.

The prepared herbal gel was evaluated for various physicochemical parameters including pH, viscosity, spreadability, homogeneity, drug content, extrudability, and in-vitro diffusion study. Stability studies were also conducted to ensure formulation integrity. The results indicated that the gel possessed acceptable physical characteristics, good spreadability, skin-compatible pH, and satisfactory drug release profile.

The developed herbal gel may serve as a safe, effective, and economical alternative for the management of hemorrhoids with minimal side effects and improved patient compliance. Further clinical studies are recommended to confirm its therapeutic efficacy.

Keywords: Polyherbal gel; Hemorrhoids; Hemorrhoids; Topical drug delivery; Anti-inflammatory activity; Wound healing; Analgesic effect; Phytochemical screening

1. Introduction

Hemorrhoids, commonly known as piles, are swollen and inflamed veins in the lower rectum and anus that cause pain, itching, irritation, bleeding, and discomfort during defecation. They are classified as internal or external depending on their location. The condition is commonly associated with chronic constipation, prolonged straining, sedentary lifestyle, pregnancy, obesity, and low-fiber diet. Although not life-threatening, hemorrhoids significantly affect the quality of life.

Conventional treatment options include topical corticosteroids, anesthetics, vasoconstrictors, and surgical procedures in severe cases. However, long-term use of synthetic drugs may lead to side effects such as skin thinning, irritation, and recurrence of symptoms. Therefore, there is growing interest in herbal formulations due to their safety, effectiveness, and minimal adverse effects.

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Medicinal plants such as Aegle marmelos, Aloe vera, and Azadirachta indica possess anti-inflammatory, antimicrobial, wound healing, and soothing properties that make them suitable for hemorrhoidal management. Herbal extracts can reduce inflammation, promote tissue repair, relieve pain, and prevent infection in the affected area.

Topical gel formulations are widely preferred for anorectal conditions because they provide localized action, easy application, rapid absorption, and improved patient compliance. Gels are non-greasy, easily washable, and capable of delivering active constituents directly to the site of action.

The present study focuses on the development, formulation, and evaluation of a herbal gel for the treatment of hemorrhoids. The formulation is designed to ensure optimal consistency, stability, spreadability, and therapeutic effectiveness. Various physicochemical and performance parameters are evaluated to determine the quality and efficacy of the developed herbal gel.Materials and methods.

1.1. Rationale for herbal Gel

- Advantages
  - Low side effects and safe.
  - Improved feel and texture.
  - Fit for skin that is sensitive.
  - Antimicrobial and anti-inflammatory qualities.
  - increased stability.
- Disadvantages
  - A delayed start to action
  - The possibility of allergic responses or discomfort.
  - The possibility of contamination
  - Quality assurance and standardization
  - A problem with stability

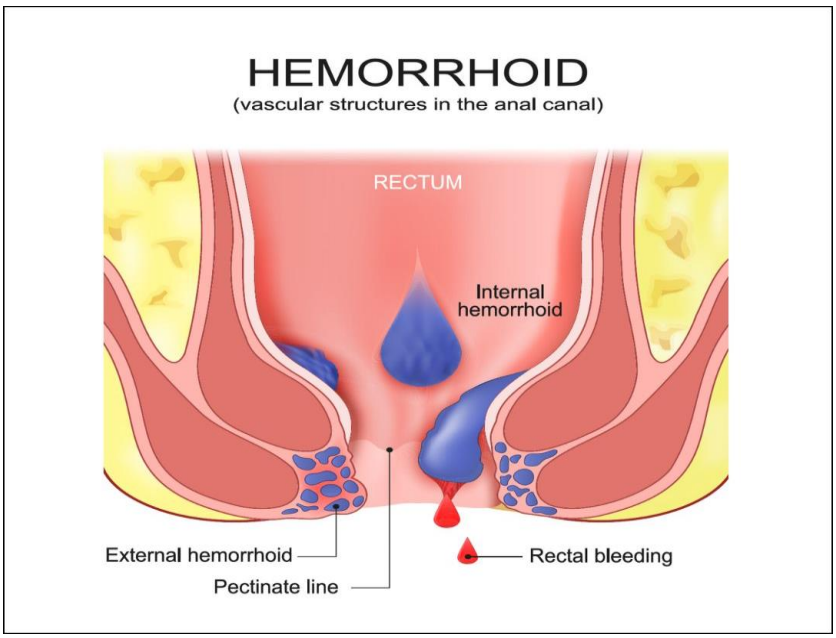

Figure 1 Vascular structure in the anal canal

1.2. Plant materials

- Dried fruits of Bael
- Fresh leaves of Neem
- Fresh aloe vera gel

1.3. Excipients

- Carbapol 934

- Triethanolamine
- Propylene glycol
- Methyl Paraben
- Distilled water
- Ethanol

Table 1 Formulation table

Sr. No	Ingredient	Quantity (% w/w)	Quantity (g)	Category
1	Extract of Aegle marmelos	2%	2g	Anti-inflammatory
2	Edxtract of Azadirachta indica	2%	2g	Antimicrobial agent
3	Fresh gel of aloe vera	5%	5g	Soothing and Wound healing
4	Carbapol 934	1%	1g	Gelling agent
5	Propylene glycol	10%	10g	Humectant
6	Methyl Paraben	0.2%	0.2g	Preservatives
7	Triethanolamine	q.s	q.s	pH adjuster
8	Distilled Water	q.s to 100%	Up to 100 g	Vehicle

2. Preparation method

2.1. Step 1: Preparation of Herbal Extracts

2.1.1. Collection and Cleaning

Collect dried fruit of Aegle marmelos and fresh leaves of Azadirachta indica. Wash thoroughly to remove impurities.

2.1.2. Drying and Powdering:

Shade dry the plant materials and grind into coarse powder.

Extraction

- Weigh required quantity of powdered material.
- Perform hydroalcoholic extraction by maceration for 72 hours.
- Filter through muslin cloth and Whatman filter paper.
- Concentrate the filtrate using a water bath.

2.1.3. Aloe Vera Gel Preparation

Collect fresh gel from leaves of Aloe vera and filter to remove fibers.

2.2. Step 2: Preparation of Gel Base

- Weigh required quantity of Carbopol 934.
- Disperse it slowly in distilled water with continuous stirring to avoid lump formation.
- Allow it to swell for 24 hours.
- Add propylene glycol and dissolve methyl paraben in it.
- Mix thoroughly to obtain uniform dispersion.

2.3. Step 3: Incorporation of Herbal Extract

- Mix bael extract, neem extract, and aloe vera gel uniformly.
- Add this mixture slowly into the prepared gel base with continuous stirring.
- Add triethanolamine dropwise to adjust pH (5.5–6.5).
- Stir until a clear, homogeneous gel is formed.

2.4. Step 4: Final Adjustment and Packaging

- Make up the final weight with distilled water (if required).
- Check pH and homogeneity.
- Transfer the gel into collapsible aluminum tubes or airtight containers.
- Store at room temperature.

3. Results and discussion

The formulated herbal gel showed smooth texture, uniform consistency, and good homogeneity. The pH was found within the range of 5.5–6.5, which is suitable for skin application. Viscosity and spreadability were satisfactory, ensuring easy application. In-vitro diffusion studies demonstrated sustained release of active constituents. Stability studies indicated no significant change in physical characteristics, confirming formulation stability.

The presence of anti-inflammatory and wound-healing phytoconstituents supports its potential therapeutic effectiveness in hemorrhoidal treatment.

4. Conclusion

The herbal gel formulated with bael, aloe vera, and neem extracts exhibited satisfactory physicochemical properties and drug release characteristics. The formulation appears to be safe, stable, and effective for the topical management of hemorrhoids. Further clinical evaluation is recommended to confirm its therapeutic efficacy.

Compliance with ethical standards

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