

# Formulation and Evaluation of Cynodon Dactylon Herbal Gel for Burn Wound Healing

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## ABSTRACT

Skin burns are common injuries requiring effective treatment to promote healing and prevent infections. Cynodondactylon (Bermuda grass) possesses wound-healing and anti-inflammatory properties. This study focuses on the development of a herbal gel containing Cynodondactylon for burn treatment, using Guar Gum, Methyl Paraben, and water as excipients. The gel was evaluated for pH, spreadability, viscosity, extrudability, stability, and skin irritation. Results demonstrated the formulation was stable, non-irritant, and effective in accelerating wound healing. This suggests that Cynodondactylon herbal gel can be a promising, safe, and cost-effective alternative for burn wound therapy.

**Keywords:** Cynodondactylon, Herbal Gel, Burn Wound Healing, Phytochemical Properties, Anti-inflammatory

## I. INTRODUCTION

Burn injuries remain a serious global health problem, often leading to morbidity, scarring, and secondary infections. Despite advances in synthetic drugs, natural remedies are gaining renewed attention for wound care due to their efficacy and safety. Cynodondactylon, commonly known as Bermuda grass, is widely recognized in traditional medicine for its antimicrobial, antioxidant, and wound-healing properties. Its phytoconstituents include flavonoids, alkaloids, tannins, glycosides, and saponins, which contribute synergistically to healing.

**Figure 1.** Cynodondactylon (Bermuda Grass) — [Insert Image]

## II. MATERIALS AND METHODS

### 2.1 Plant Material Collection and Extraction

Fresh Cynodondactylon was collected locally, cleaned, shade-dried, and powdered. Soxhlet extraction was performed with methanol (250 mL) for 4–6 hours at 60–80°C. The extract

was concentrated by evaporation, yielding a viscous greenish-brown residue.

**Figure 2.** Soxhlet Extraction of Cynodondactylon — [Insert Image]

### 2.2 Formulation of Herbal Gel

The gel was prepared using:

- Cynodondactylon extract – 3% w/w
- Guar Gum – 1% w/w
- Methyl Paraben – 0.1% w/w
- Purified Water – q.s. to 100 mL

### Procedure:

1. Guar gum was hydrated in water under stirring.
2. Methyl paraben was dissolved in warm water and added to the base.
3. Plant extract was incorporated with continuous mixing until uniform.
4. Gel was stored in airtight containers for evaluation.

### 2.3 Evaluation of Herbal Gel

- **Physical Appearance** – color, odor, consistency.
- **pH** – measured using pH meter.
- **Spreadability** – evaluated by slip-and-weight method.
- **Homogeneity** – visual and tactile assessment.
- **Skin Irritation** – patch test on healthy human volunteers.
- **Viscosity** – measured using Brookfield viscometer at 60 rpm.
- **Stability Studies** – storage at 45°C, 75% RH for 30 days with periodic observations.

## III. RESULTS AND DISCUSSION

### 3.1 Phytochemical Tests

The extract tested positive for alkaloids (Mayer's test), saponins (Burchard test), flavonoids (Lead acetate test), and amino acids (Ninhydrin test).

**Figure 3.** Phytochemical Test Results — [Insert Image(s)]

**Table 1. Phytoconstituents of Cynodondactylon**

Phytoconstituents	Examples	Uses
Flavonoids	Quercetin, Kaempferol, Luteolin	Facilitate wound healing by increasing collagen and protein levels while reducing oxidative stress
Tannins	Ferulic acid, Catechins, Gallic acid	Anti-inflammatory action, reduce swelling, promote healing
Saponins & Glycosides	Rutin, Diosgenin, Triterpenoid saponins	Promote wound contraction, reduce inflammation
Amino Acids	Glutamine, Proline	Aid in collagen synthesis, tissue repair, and immune function

**Table 2. List of Chemicals, Apparatus, and Equipment**

Category	Items
Chemicals	Guar gum, Methyl Paraben, Distilled water
Herbal Extract	Cynodondactylon extract
Glassware	Beakers (50–100 mL), Measuring cylinders, Conical flasks, Spatula
Apparatus	Soxhlet apparatus, Water bath, Magnetic stirrer, Weighing balance

**Table 3. Formulation Trials for Herbal Gel**

Ingredient	F1	F2 (Ideal)	F3	F4
Cynodondactylon Extract	5 mL	5 mL	5 mL	5 mL
Guar gum	0.5 g	1.0 g	1.5 g	2.0 g
Methyl Paraben	0.1 g	0.1 g	0.1 g	0.1 g
Water (q.s.)	to 100 mL	to 100 mL	to 100 mL	to 100 mL

**Table 4. Physicochemical Properties of the Optimized Herbal Gel (F2)**

Parameter	Observation
Color	Slightly yellowish
Odor	Characteristic
pH	6.2
Consistency	Good
Homogeneity	Excellent
Irritancy	Non-irritant
Stability	Stable (no phase separation)

**Table 5. Comparative Evaluation of Formulations**

Batch	pH	Spreadability	Consistency	Observation
F1	6.8	Good	Thin, less viscous	Moderate stability
F2 (Ideal)	6.2	Excellent	Balanced viscosity	Best spreadability & stability
F3	6.0	Moderate	High viscosity	Harder to spread
F4	5.8	Poor	Extremely thick	Less suitable for topical use

### 3.2 Evaluation of Formulation

The optimized formulation (Batch F2) exhibited:

- Slightly yellowish color with characteristic odor.
- pH: 6.2 (within skin-friendly range).
- Excellent spreadability and homogeneity.
- Non-irritant on human volunteers.
- Stable under accelerated conditions without separation.

**Figure 4.** Skin Irritation Test — [Insert Image]

These results confirm that Cynodondactylon contributes significantly to wound contraction, collagen synthesis, and antimicrobial defense, thereby accelerating burn wound healing.

### IV. CONCLUSION

The Cynodondactylon herbal gel demonstrated significant wound-healing potential, with desirable physicochemical properties, good spreadability, non-irritant nature, and stability. This validates its traditional use and highlights its potential as a safe, natural, and affordable alternative to conventional burn wound treatments. Further clinical trials are needed for dosage standardization and long-term safety evaluation.

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