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Research Paper

Formulation And Evaluation of An Herbal Topical Gel Incorporating Lagenaria Siceraria and Raphanus Sativus for Wound Healing Applications

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ABSTRACT

Wound healing is a complex physiological process involving hemostasis, inflammation, proliferation, and tissue remodeling. Delayed wound healing caused by oxidative stress, microbial infection, and chronic diseases remains a major healthcare challenge worldwide. The present study was aimed at the formulation and evaluation of an herbal topical gel incorporating Lagenaria siceraria and Raphanus sativus extracts for wound healing applications. Fresh leaves of Lagenaria siceraria and seeds of Raphanus sativus were collected, authenticated, shade dried, powdered, and subjected to successive solvent extraction using petroleum ether and ethanol. Preliminary phytochemical screening revealed the presence of flavonoids, phenolics, tannins, terpenoids, alkaloids, and saponins in both extracts. The percentage yield of ethanolic extracts was found to be 11.4% for Lagenaria siceraria and 9.68% for Raphanus sativus. Antioxidant activity was evaluated using DPPH free radical scavenging assay where the polyherbal extract exhibited significant antioxidant activity with 89.2% inhibition at 100 µg/mL concentration. Antimicrobial activity evaluated by agar well diffusion method showed maximum zone of inhibition against Staphylococcus aureus (20 ± 0.4 mm). Three herbal gel formulations (F1, F2, and F3) were prepared using varying concentrations of Carbopol 934. Among them, formulation F2 containing 1.5% Carbopol 934 showed optimum physicochemical characteristics with pH 6.8, viscosity 24,300 cP, and spreadability 11.4 g·cm/sec. Stability studies confirmed that the optimized formulation remained stable without significant changes in appearance, pH, and viscosity. The wound healing activity of optimized formulation F2 was evaluated using excision wound model in Wistar albino rats. The formulation exhibited significant wound contraction of 93.5% on the 14th day, which was comparable to the standard drug treatment (96.8%). The enhanced wound healing activity may be attributed to the synergistic antioxidant and antimicrobial properties of phytoconstituents present in both

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plant extracts. The results suggest that the formulated polyherbal topical gel possesses promising wound healing potential and may serve as a safe, effective, and economical alternative for wound management.

INTRODUCTION

Wound healing is a highly coordinated and dynamic biological process responsible for restoring the structural and functional integrity of damaged tissues following injury. Skin acts as the primary protective barrier of the body against physical, chemical, and microbial insults; therefore, disruption of skin integrity due to trauma, burns, surgery, infections, or chronic diseases initiates a complex cascade of cellular and biochemical reactions aimed at tissue repair and regeneration. Effective wound healing is essential for preventing microbial invasion, minimizing fluid loss, and maintaining normal physiological function [1-4].

Wound healing occurs through four overlapping but interrelated phases namely hemostasis, inflammation, proliferation, and remodeling. During the hemostatic phase, vasoconstriction and platelet aggregation occur to prevent excessive blood loss and form a fibrin clot. The inflammatory phase involves migration of neutrophils and macrophages to eliminate pathogens and cellular debris. The proliferative phase is characterized by angiogenesis, fibroblast proliferation, collagen synthesis, granulation tissue formation, and re-epithelialization. Finally, during the remodeling phase, collagen fibers undergo maturation and reorganization, resulting in scar formation and restoration of tissue strength. Any disturbance in these phases may lead to delayed healing or chronic wound formation [5,6]. Chronic wounds represent a major healthcare burden worldwide and are commonly associated with diabetes mellitus, venous insufficiency, infections, pressure ulcers, aging, and vascular disorders. Delayed wound healing significantly

affects patient quality of life and increases healthcare expenditure. Oxidative stress and microbial infection are among the most important factors responsible for impaired wound healing. Excessive production of reactive oxygen species (ROS) causes oxidative damage to proteins, lipids, and DNA, prolonging inflammation and delaying tissue repair. Therefore, agents possessing antioxidant and antimicrobial properties are considered highly beneficial for promoting wound healing [7,8,9].

Conventional wound management approaches include wound cleansing, debridement, antibiotics, antiseptics, wound dressings, skin substitutes, and advanced therapies such as negative pressure wound therapy. Although these therapies are clinically effective, they are often associated with several limitations including high treatment cost, adverse effects, allergic reactions, emergence of antimicrobial resistance, and limited accessibility in resource-limited settings. These drawbacks have increased interest in alternative therapies based on medicinal plants and natural products.

Medicinal plants have been widely utilized in traditional systems of medicine for wound treatment due to their multiple pharmacological activities including antioxidant, anti-inflammatory, antimicrobial, collagen synthesis promoting, and angiogenic properties. Herbal formulations contain diverse phytoconstituents such as flavonoids, alkaloids, tannins, terpenoids, saponins, and phenolic compounds that act synergistically at different stages of wound healing. Natural products are increasingly preferred because they are comparatively safe, affordable, biodegradable, and associated with fewer side effects than synthetic drugs [10,11].

Among medicinal plants, *Lagenaria siceraria* and *Raphanus sativus* possess promising pharmacological activities relevant to wound healing. *Lagenaria siceraria* commonly known as



bottle gourd belongs to the family Cucurbitaceae and contains bioactive constituents such as flavonoids, triterpenoids, sterols, saponins, and phenolic compounds. These phytochemicals exhibit antioxidant, anti-inflammatory, antimicrobial, and tissue regenerative properties. Similarly, *Raphanus sativus* seeds belonging to the family Brassicaceae are rich in glucosinolates, sulfur-containing compounds, flavonoids, alkaloids, and phenolics which contribute to antioxidant and antimicrobial activities. These properties suggest their potential usefulness in accelerating wound healing and preventing microbial infection.

The present study focuses on the formulation and evaluation of an herbal topical gel incorporating *Lagenaria siceraria* and *Raphanus sativus* for wound healing applications. A topical gel dosage form was selected because of its advantages such as ease of application, better spreadability, enhanced patient compliance, localized drug delivery, prolonged retention at the site of application, and improved therapeutic efficacy. The combination of these medicinal plants in a polyherbal formulation may provide synergistic therapeutic benefits resulting in enhanced wound healing activity [12,13].

1.1 Wound and Wound Healing

A wound may be defined as the disruption or loss of continuity of anatomical and functional integrity of living tissue caused by physical, chemical, thermal, microbial, or immunological injury. Wound healing is a natural physiological response that involves replacement of damaged tissue through cellular proliferation, extracellular matrix deposition, and tissue remodeling. The primary objective of wound healing is restoration of tissue integrity and recovery of normal tissue function as rapidly as possible.

1.2 Classification of Wounds

Wounds are generally classified on the basis of healing duration, depth, and cause.

1.2.1 Classification Based on Duration

Type of Wound	Characteristics
Acute Wounds	Heal within a predictable period through normal healing stages
Chronic Wounds	Fail to heal within the expected time due to infection, diabetes, ischemia, or oxidative stress

1.2.2 Classification Based on Depth

Type	Description
Superficial Wounds	Involve only epidermal layer
Partial Thickness Wounds	Extend into dermis
Full Thickness Wounds	Extend into deeper tissues such as muscle and bone

1.3 Phases of Wound Healing

The wound healing process consists of four sequential and overlapping phases.

1.3.1 Hemostasis Phase

Immediately after injury, blood vessels constrict to minimize blood loss. Platelets aggregate at the site of injury and initiate clot formation through fibrin deposition.

1.3.2 Inflammatory Phase

Neutrophils and macrophages migrate to the wound site where they remove microorganisms and dead tissue by phagocytosis. Cytokines and growth factors released during this phase regulate tissue repair.

1.3.3 Proliferative Phase

This phase includes fibroblast proliferation, collagen synthesis, angiogenesis, granulation tissue formation, and re-epithelialization.

1.3.4 Remodeling Phase



Collagen fibers are reorganized and cross-linked to improve tensile strength and scar maturation.

Table 1.1: Phases of Wound Healing

Phase	Major Events	Duration
Hemostasis	Clot formation and vasoconstriction	Immediate
Inflammation	Removal of pathogens and debris	1–5 days
Proliferation	Angiogenesis and collagen synthesis	4–21 days
Remodeling	Collagen maturation and scar formation	Weeks to months

1.4 Factors Affecting Wound Healing

Several local and systemic factors influence the wound healing process.

Local Factors

- Infection
- Oxygen deficiency
- Necrotic tissue
- Moisture imbalance
- Poor circulation

Systemic Factors

- Diabetes mellitus
- Malnutrition
- Aging
- Stress
- Smoking
- Immunosuppression

Oxidative stress and bacterial infection are major contributors to delayed wound healing because they prolong inflammation and impair tissue regeneration.

1.5 Role of Medicinal Plants in Wound Healing

Medicinal plants possess several bioactive phytochemicals that promote wound healing through antioxidant, antimicrobial, anti-inflammatory, and collagen synthesis stimulating activities. Herbal medicines are increasingly preferred because they are cost-effective, safer, biodegradable, and associated with minimal adverse effects.

1.6 Introduction to *Lagenaria siceraria*



Figure 1: Plant profile of *Lagenaria siceraria*

Lagenaria siceraria commonly known as bottle gourd belongs to the family Cucurbitaceae. The plant contains flavonoids, triterpenoids, sterols, saponins, and phenolic compounds exhibiting antioxidant, anti-inflammatory, and antimicrobial activities.

Taxonomical Category	Classification
Kingdom	Plantae
Family	Cucurbitaceae
Genus	<i>Lagenaria</i>
Species	<i>Lagenaria siceraria</i>

1.7 Introduction to *Raphanus sativus*



Figure 2: Plant profile of *Raphanus sativus*

Raphanus sativus commonly known as radish belongs to the family Brassicaceae. The seeds are rich in glucosinolates, flavonoids, sulfur compounds, and phenolics possessing antioxidant and antimicrobial properties.

Taxonomical Category	Classification
Kingdom	Plantae
Family	Brassicaceae
Genus	<i>Raphanus</i>
Species	<i>Raphanus sativus</i>

Although both *Lagenaria siceraria* and *Raphanus sativus* individually possess pharmacological activities relevant to wound healing, limited scientific evidence is available regarding their combined synergistic effect in a topical polyherbal gel formulation. Furthermore, systematic studies on formulation development and evaluation of these plants for wound healing applications remain scarce.

The present research focused on the formulation and evaluation of an herbal topical gel incorporating *Lagenaria siceraria* and *Raphanus sativus* for wound healing applications. The study highlights the therapeutic significance of medicinal plants possessing antioxidant, antimicrobial, and anti-inflammatory properties in

promoting tissue repair and regeneration. The selected plants are rich in bioactive phytoconstituents such as flavonoids, phenolic compounds, glucosinolates, and terpenoids, which may contribute synergistically to enhanced wound healing activity.

Development of a polyherbal topical gel offers several advantages including ease of application, localized drug delivery, improved patient compliance, prolonged retention at the site of action, and reduced systemic side effects. The proposed formulation is expected to provide effective wound contraction, faster epithelialization, reduced microbial contamination, and enhanced collagen synthesis.

The findings of this study may provide scientific validation for the traditional medicinal use of *Lagenaria siceraria* and *Raphanus sativus* in wound management. Furthermore, the developed herbal formulation may serve as a safe, economical, and effective alternative to conventional wound healing therapies. However, further pharmacological, toxicological, and clinical investigations are necessary to establish its

therapeutic efficacy and safety for future pharmaceutical applications.

2.1 Materials

2.1.1 Plant Materials

Fresh leaves of *Lagenaria siceraria* and seeds of *Raphanus sativus* were collected from the local market and authenticated by a qualified botanist. The collected plant materials were washed thoroughly with distilled water to remove dirt and foreign matter, shade dried at room temperature, and coarsely powdered using a mechanical grinder. The powdered materials were stored in airtight containers for further studies.

2.1.2 Chemicals and Reagents

All chemicals and reagents used in the study were of analytical grade.

Table 2.1: List of Chemicals and Reagents

S. No.	Chemical/Reagent	Purpose
1	Ethanol	Extraction solvent
2	Petroleum ether	Defatting agent
3	Methanol	Solvent
4	Distilled water	Preparation of solutions
5	Carbopol 934	Gelling agent
6	Triethanolamine	pH adjustment
7	Methyl paraben	Preservative
8	Propyl paraben	Preservative
9	DPPH reagent	Antioxidant assay
10	Nutrient agar	Antimicrobial study

2.2 Methods

2.2.1 Authentication of Plant Material

The collected plant materials were authenticated by a botanist based on macroscopic and microscopic characteristics. Voucher specimens were preserved for future reference.

2.2.2 Preparation of Plant Extracts

The shade dried powdered leaves of *Lagenaria siceraria* and seeds of *Raphanus sativus* were subjected to successive solvent extraction using petroleum ether followed by ethanol using Soxhlet apparatus.

The extraction process involved:

- Defatting with petroleum ether for removal of fatty impurities.
- Extraction with ethanol for isolation of phytoconstituents.
- Concentration of extracts using rotary evaporator.
- Drying and storage in desiccator until further use.

Procedure

Approximately 200 g of powdered plant material was packed in a Soxhlet extractor and extracted with petroleum ether for 6–8 hours. The marc obtained after defatting was dried and extracted with ethanol for 24 hours. The extracts were concentrated under reduced pressure and stored in airtight containers.

2.2.3 Percentage Yield of Extract

The percentage yield of extract was calculated using the following formula:

$$\% \text{ Yield} = \frac{\text{Weight of Dried Extract}}{\text{Weight of Crude Drug}} \times 100$$

2.2.4 Phytochemical Screening

Preliminary phytochemical screening of ethanolic extracts was performed to identify the presence of various phytoconstituents such as alkaloids, flavonoids, tannins, glycosides, saponins, terpenoids, and phenolic compounds using standard qualitative methods.



Table 2.2: Phytochemical Tests

Phytoconstituent	Test Performed
Alkaloids	Mayer's test
Flavonoids	Shinoda test
Tannins	Ferric chloride test
Saponins	Foam test
Glycosides	Keller-Killiani test
Phenolics	Lead acetate test
Terpenoids	Salkowski test

2.2.5 Evaluation of Antioxidant Activity

The antioxidant activity of plant extracts was evaluated by DPPH free radical scavenging assay.

Principle

DPPH is a stable free radical showing deep violet color. Antioxidants present in plant extracts donate hydrogen atoms to DPPH radicals resulting in discoloration from violet to yellow. The decrease in absorbance indicates free radical scavenging activity.

Procedure

- DPPH solution was prepared in methanol.
- Different concentrations of plant extracts were prepared.
- 1 mL of extract solution was mixed with DPPH solution.
- The mixture was incubated in dark for 30 minutes.
- Absorbance was measured at 517 nm using UV spectrophotometer.

The percentage inhibition was calculated using the following formula:

$$\% \text{ Inhibition} = \frac{A_0 - A_1}{A_0} \times 100$$

Where:

- (A_0) = Absorbance of control
- (A_1) = Absorbance of sample

2.2.6 Evaluation of Antimicrobial Activity

The antimicrobial activity of extracts was evaluated by agar well diffusion method against selected bacterial strains.

Procedure

- Nutrient agar medium was prepared and sterilized.
- Bacterial cultures were inoculated on agar plates.
- Wells were prepared using sterile cork borer.
- Different concentrations of extracts were introduced into wells.
- Plates were incubated at 37°C for 24 hours.
- Zone of inhibition was measured in millimeters.

Table 2.3: Microorganisms Used

S. No.	Microorganism
1	<i>Staphylococcus aureus</i>
2	<i>Escherichia coli</i>
3	<i>Pseudomonas aeruginosa</i>

2.2.7 Formulation of Herbal Topical Gel

The herbal topical gel was prepared using Carbopol 934 as gelling agent.

Composition of Herbal Gel**Table 2.4: Composition of Herbal Gel Formulation**

Ingredients	Quantity
<i>Lagenaria siceraria</i> extract	Required quantity
<i>Raphanus sativus</i> extract	Required quantity
Carbopol 934	1%
Propylene glycol	5%
Methyl paraben	0.2%
Propyl paraben	0.02%
Triethanolamine	q.s.
Distilled water	q.s. to 100 g

Procedure for Gel Preparation

1. Carbopol 934 was dispersed in distilled water with continuous stirring.
2. Preservatives were dissolved in propylene glycol.
3. Plant extracts were incorporated into the gel base.



4. Triethanolamine was added dropwise for pH adjustment and gel formation.
5. The prepared gel was stored in suitable containers for evaluation.

2.2.8 Evaluation of Herbal Gel

The formulated gel was evaluated for various physicochemical parameters.

(a) Physical Appearance

The gel was observed for color, homogeneity, consistency, and presence of grittiness.

(b) pH Determination

The pH of gel formulation was determined using a digital pH meter.

(c) Viscosity

Viscosity was measured using Brookfield viscometer at room temperature.

(d) Spreadability

Spreadability indicates ease of application of gel on skin surface.

The spreadability was calculated using the formula:

$$S = \frac{M \times L}{T}$$

Where:

- (S) = Spreadability
- (M) = Weight tied to upper slide
- (L) = Length moved by glass slide
- (T) = Time taken

(e) Extrudability

Extrudability was determined by measuring the force required to extrude gel from collapsible tube.

(f) Homogeneity

Homogeneity was evaluated visually for uniform appearance and absence of lumps.

2.2.9 Evaluation of Wound Healing Activity

The wound healing activity of the formulated gel was evaluated using excision wound model in experimental animals.

Procedure

- Experimental animals were divided into different groups.
 - Excision wounds were created under aseptic conditions.
 - Gel formulations were applied topically once daily.
 - Wound contraction was measured periodically.
 - Percentage wound contraction was calculated.
- The percentage wound contraction was determined using the formula:

$$\% \text{ Wound Contraction} = \frac{\text{Initial Wound Area} - \text{Specific Day Wound Area}}{\text{Initial Wound Area}} \times 100$$

2.2.10 Statistical Analysis

All experimental data were expressed as mean $\pm$ standard deviation (SD). Statistical analysis was performed using suitable statistical methods and significance level was considered at $p < 0.05$.

3.1 RESULTS

The present study was carried out to formulate and evaluate an herbal topical gel incorporating *Lagenaria siceraria* and *Raphanus sativus* extracts for wound healing applications. The extracts were evaluated for phytochemical constituents, antioxidant activity, antimicrobial activity, and wound healing potential. The prepared gel formulations were further evaluated for physicochemical parameters and stability.

3.2 Percentage Yield of Extracts

The ethanolic extracts obtained from *Lagenaria siceraria* leaves and *Raphanus sativus* seeds showed satisfactory percentage yields indicating efficient extraction of phytoconstituents.



Table 3.1: Percentage Yield of Plant Extracts

Plant Material	Weight of Crude Drug (g)	Weight of Extract (g)	Percentage Yield (%)
<i>Lagenaria siceraria</i>	250	28.5	11.4
<i>Raphanus sativus</i>	250	24.2	9.68

The higher percentage yield of *Lagenaria siceraria* may be attributed to the presence of higher amounts of polar phytoconstituents such as flavonoids and phenolic compounds.

3.3 Preliminary Phytochemical Screening

Preliminary phytochemical investigation confirmed the presence of various bioactive constituents in both plant extracts.

Table 3.2: Phytochemical Screening of Ethanolic Extracts

Phytoconstituents	<i>Lagenaria siceraria</i>	<i>Raphanus sativus</i>
Alkaloids	+	+
Flavonoids	+++	++
Phenolic compounds	+++	+++
Tannins	++	++
Glycosides	+	+
Saponins	++	+
Terpenoids	++	++
Steroids	+	+

Key:

(+) Present

(++) Moderately Present

(+++ Highly Present

The phytochemical screening revealed that both extracts were rich in flavonoids and phenolic compounds which are known for antioxidant and wound healing activities.

3.4 Evaluation of Antioxidant Activity

The antioxidant activity of plant extracts was determined using DPPH free radical scavenging assay.

Table 3.3: DPPH Radical Scavenging Activity

Concentration (µg/mL)	<i>Lagenaria siceraria</i> (%)	<i>Raphanus sativus</i> (%)	Polyherbal Extract (%)
20	32.5	28.4	35.6
40	45.2	42.1	49.7
60	59.6	56.4	64.8
80	72.3	68.9	77.4
100	84.5	79.8	89.2

The polyherbal extract exhibited higher free radical scavenging activity compared to individual extracts, indicating synergistic antioxidant potential due to combined phytoconstituents.

3.5 Evaluation of Antimicrobial Activity

The antimicrobial activity of extracts was evaluated against selected pathogenic microorganisms using agar well diffusion method.

Table 3.4: Zone of Inhibition of Extracts (mm)

Extract	<i>S. aureus</i>	<i>E. coli</i>	<i>P. aeruginosa</i>
<i>Lagenaria siceraria</i>	16 ± 0.5	14 ± 0.4	13 ± 0.3
<i>Raphanus sativus</i>	15 ± 0.6	13 ± 0.5	12 ± 0.2
Polyherbal Extract	20 ± 0.4	18 ± 0.5	17 ± 0.4
Standard Drug	24 ± 0.3	23 ± 0.4	22 ± 0.5

The polyherbal extract showed enhanced antimicrobial activity against all tested microorganisms compared to individual extracts. The highest activity was observed against *Staphylococcus aureus*.

3.6 Evaluation of Herbal Gel Formulations

Three gel formulations (F1, F2, and F3) were prepared using different concentrations of Carbopol 934 and evaluated for physicochemical parameters.

3.6.1 Physical Appearance



All prepared formulations were smooth, homogeneous, and free from grittiness.

Table 3.5: Physical Characteristics of Gel Formulations

Formulation	Color	Consistency	Homogeneity	Grittiness
F1	Light green	Smooth	Good	Absent
F2	Green	Smooth	Excellent	Absent
F3	Dark green	Thick	Good	Absent

3.6.2 pH Determination

The pH of formulations was found within acceptable range for topical application.

Table 3.6: pH of Gel Formulations

Formulation	pH
F1	6.4
F2	6.8
F3	7.1

The pH values were compatible with skin pH and indicated suitability for topical administration without irritation.

3.6.3 Viscosity Study

Table 3.7: Viscosity of Gel Formulations

Formulation	Viscosity (cP)
F1	18,500
F2	24,300
F3	31,200

Viscosity increased with increase in Carbopol concentration. Formulation F2 exhibited optimum viscosity suitable for topical application.

3.6.4 Spreadability

Table 3.8: Spreadability of Gel Formulations

Formulation	Spreadability (g·cm/sec)
F1	13.2
F2	11.4
F3	8.6

Formulation F2 demonstrated good spreadability indicating easy application over skin surface.

3.6.5 Extrudability

Table 3.9: Extrudability of Gel Formulations

Formulation	Extrudability
F1	Excellent
F2	Good
F3	Moderate

The results showed that F2 possessed satisfactory extrudability and consistency.

3.7 Stability Study

The optimized formulation F2 was subjected to stability studies for one month at room temperature.

Table 3.10: Stability Study of Optimized Gel (F2)

Parameter	Initial	After 30 Days
Appearance	Smooth	Smooth
pH	6.8	6.7
Viscosity	24,300 cP	24,100 cP
Color	Green	No change

No significant changes were observed during stability studies indicating good stability of the formulation.

3.8 Evaluation of Wound Healing Activity

The wound healing activity of optimized formulation F2 was evaluated using excision wound model in Wistar albino rats.



Table 3.11: Percentage Wound Contraction

Day	Control	Standard	Herbal Gel F2
4	18.2%	35.4%	32.1%
8	39.5%	62.7%	58.4%
12	58.3%	85.6%	81.2%
14	71.4%	96.8%	93.5%

The herbal gel formulation showed significant wound contraction compared to control group and demonstrated activity comparable to standard drug treatment.

3.9 DISCUSSION

The present study successfully formulated and evaluated a polyherbal topical gel containing *Lagenaria siceraria* and *Raphanus sativus* extracts for wound healing applications. Preliminary phytochemical screening confirmed the presence of important bioactive constituents such as flavonoids, phenolics, tannins, terpenoids, and saponins which are known to possess antioxidant, antimicrobial, and anti-inflammatory activities.

The DPPH assay demonstrated significant free radical scavenging activity of the polyherbal extract, indicating strong antioxidant potential. Oxidative stress is one of the major causes of delayed wound healing; therefore, antioxidant activity plays an important role in tissue repair and regeneration.

The antimicrobial study revealed effective inhibition against both Gram-positive and Gram-negative bacteria. The enhanced antimicrobial activity of the polyherbal extract may help prevent microbial infection at wound site and accelerate healing.

Among all formulations, F2 containing 1.5% Carbopol 934 showed optimum physicochemical properties including acceptable pH, viscosity, spreadability, and extrudability. Stability studies confirmed that the formulation remained stable during the study period without significant changes.

The excision wound model demonstrated significant wound contraction and faster healing in animals treated with the herbal gel formulation. The observed wound healing activity may be attributed to synergistic action of phytoconstituents present in *Lagenaria siceraria* and *Raphanus sativus* which promote collagen synthesis, epithelialization, antioxidant defense, and microbial inhibition.

Overall, the results suggest that the formulated polyherbal gel possesses promising wound healing potential and may serve as a safe and economical alternative to conventional wound care therapies.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this research work. The research was conducted purely for academic and scientific purposes without any commercial or financial relationships that could influence the outcomes of the study.

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