



# Formulation and evaluation of wound healing gel using extract of *euphorbia thymifolia linn.*

Mr. Shashwat Rathore\* Mrs. Anjula Patidar, Mr. Maksud Pathan,

Mr. Neeraj Karma, Ms. Jahnvi Patidar,

Assistant professor, Charak Institute of Pharmacy Mandleshwar, teh. Maheshwar, Dist. Khargone, Madhya Pradesh India

## Abstract

The study provides evidence for the wound healing potential of the gel formulation using the extract of *Euphorbia thymifolia* Linn. The gel was found to be non-irritant, and the wound healing potential of the gel was found to be superior to that of a standard wound dressing. Further studies are needed to confirm the wound healing properties of the gel in humans and to investigate the mechanism of action of the gel. The use of natural products, such as plant extracts, in wound healing has gained popularity in recent years, and the study provides a promising alternative to conventional wound dressings.

**Keyword:** *Euphorbia thymifolia* Linn, wound, humans, n-hexadecanoic acid, skin.

## 1.Introduction

### 1.1 Herbal Plants

Herbal Plant contain many active compounds such as alkaloids, steroids, tannins glycosides, volatile oils, resins, phenols, and flavonoids which are deposited in their specific part such as leaves, flowers, bark, seeds, fruits and roots. There are several extraction methods that exist to extract compounds from plants.<sup>(1)</sup>

Herbal medicine is the use of plant, plant part, there water or solvent extracts, essential oil, gums, resins, exudates or other from of advanced products made from plant part used therapeutically to provide proactive supports of various physiological system or, in a more conventional medical sense, to treat, cure, or prevent a disease in animals or humans.<sup>(2)</sup>

## CHARACTERISTICS OF MEDICINAL PLANT

Medicinal plants have many characteristics when used as a treatment, as follow

**Support of official medicine-** The ingredients of plants can be used along with chemical products to achieve the desired outcome.

**Preventive medicine-** Some components of plants have proved to be effective in preventing or reducing the risk of certain disease (e.g flu), and this can help in reduce the burden and cost of using chemical remedies.

**Synergic medicine-** Each plant has many compounds that may interact simultaneously leading to either complement or damage the functions of each other, or neutralize their possible negative effects.

## Wound and Wound Healing

India has a rich tradition of plant-based extracts/decoction/pastes used by tribal and folklore practitioner for treatment of cuts, wounds, and burns. Wounds are physical injuries that result in an opening or break of the skin that causes disturbance in the normal skin anatomy and function. The restoration of integrity to injured tissues takes place by replacement of dead tissue with viable tissue. It is an intricate process in which the skin repairs itself after injury. wounds are major case of physical disabilities. A wound which is disturbed state of tissue caused by physical, chemical, microbial (or) immunological insults (or) typically associated with loss function.

### Introduction of *euphorbia thymifolia*



Fig. No. 1 - *Euphorbia Thymifolia*

*Euphorbia thymifolia* L. (*Euphorbiaceae*) is a small branched, hispidly pubescent, prostrate annual herb, commonly known as *laghududhika* or *choti-dudhi*. The leaves, seeds and fresh juice of whole plant are used in worm infections, as stimulant, astringent. It is also used in bowel complaints and in many more diseases therapeutically. <sup>[5]</sup>

<b>Kingdom</b>	<b>Plantae</b>
<b>Phylum</b>	<b>Tracheophyta</b>
<b>Order</b>	<b>Malpighiales</b>
<b>Family</b>	<b>Euphorbiaceae</b>
<b>Genus</b>	<i>Euphorbia</i>
<b>Species</b>	<i>Euphorbia Thymifolia Linn</i>

Table no. 1: Scientific classification Plant description

## Geographical source

It occurs throughout India in plains and low hills, ascending to 5,500 ft. in Kashmir but also distributed throughout tropics except North Australia. *Euphorbia thymifolia* is frequently found in waste lands, along roadsides and wall sides under humid conditions, gravel walks, grasslands, abandoned fields, etc. <sup>[5]</sup>

## Chemical constituents

*Euphorbia thymifolia* yields a green essential oil with a peculiar pungent odour and irritating taste. The plant has been reported to have some physical constituents. *Euphorbia thymifolia* contains crystalline alkaloidal principle allied to quercetin. It has also reported to contain as a large number of phenolics.

## Chemical constituents of *Euphorbia Thymifolia* Linn

**Ariel parts:** - Cymol, isopinocampheol, limonene, 2,6,6-trimethyl-1-cyclohexane 1-carboxaldehyde, safranal 214 Methyl 3 cyclohexene 1 yl)-2-proanol, piperitone, (E. E) 2.4 decadienal. A caryophyllene, caryophyllene oxide. phytol, 2 n Ppentylfuran, 1-pentanol, nonanal, 2,4-heptadienal, benzaldehyde, 23-heptadione, 1-pentanol, tetradeconolo acid, pentadecanoic acid, n-hexadecanoic acid.

**Stem and leaves:** - 5,7,4-trihydroxy flavones-7-glycoside

**Roots:** - Taraxerol, tirucallol and other sterols <sup>[5]</sup>

## Traditional uses

1. Blood purifier
2. Sedative
3. Haemostatic
4. Aromatic
5. Stimulant
6. Astringent in diarrhoea and dysentery
7. Anthelminthic
8. Also in cases of flatulence, constipation
9. In chronic cough; as an antiviral in bronchial asthma and paronychia.

## Introduction of a Gel

A gel is a colloidal system in which the dispersed phase is liquid, and the dispersion medium is solid. E.g., when warm sol of gelatin is cooled, it sets to a semi-solid mass which is a gel. Jellies, jams, curd, butter, shoe polish, etc. are gels.

## Characteristics of Gel

- It is the colloidal system in which the dispersed phase is liquid, and the dispersion medium is solid.
- It is an immobile semi-solid.
- It has a honeycomb-like structure.
- No such agent is required for its formation.
- It is classified as an elastic gel and non-elastic gel.
- On heating (dehydration) they give elastic solid.

- They are reversible.
- They are lyophilic.
- They show imbibition.
- Gels, made up of organic substances are elastic<sup>(6)</sup>.

#### Properties of a Gel Swelling or Imbibition:

- Syneresis:
- Thixotropy:
- Fragile Nature:
- Hofmeister or Lyotropic Series<sup>[31]</sup>

#### Uses of Gels:

- Alcohol jellied with calcium acetate is used as solid fuel for military field services.
- Silica gel is most valuable adsorbing and drying (desiccating) agent which is used in industry and laboratory.

#### Methodology used in proposed: -

- **Plant material** - The whole plant material of *Euphorbia thymifolia* was collected from local Nimar region

➤ **Extraction of Plant Material-** Plant powder 50g was extracted with 800ml of ethanol in a soxhlet apparatus at 60 °C for 42 hrs.

**1. Set up the Soxhlet apparatus:** Assemble the round-bottom flask, condenser, and thimble. Place the dry *euphorbia thymifolia* leaves in the thimble.

**2. Add ethanol:** Pour the 800 ml of ethanol into the round-bottom flask. Make sure the leaves in the thimble are not in direct contact with the ethanol.

**3. Start the extraction:** Heat the round-bottom flask, causing the ethanol to boil and vaporize. The vapor will rise and condense in the condenser, dripping back into the thimble.

**4. Continuous extraction:** As the condensed ethanol drips back into the thimble, it will dissolve more compounds from the dried *euphorbia thymifolia* leaves. This continuous cycle of extraction and condensation will allow for efficient extraction of the desired compounds.

**5. Collection:** The extracted compounds will gradually accumulate in the round-bottom flask as the extraction process continues.

**6. Completion:** The extraction process is typically carried out for several hours or until the desired compounds have been sufficiently extracted. The collected solution in the round-bottom flask can then be evaporated to obtain the desired extract. <sup>(29)</sup>

➤ **Phytochemical screening of *euphorbia thymifolia* Linn leaves extract**

Phytochemical tests were done to find out the presence of bioactive chemical constituents such as alkaloids, flavonoids, carbohydrates, saponins, tannins, steroids and amino acids compounds.

#### ✓ **Test for Carbohydrate-**

**Fehling's test:** Mix 1 ml Fehling's A and 1 ml Fehling's B solutions, boil for one minute Add equal volume of test solution. Heat in boiling water bath for 5-10 min. Yellow colour is observed.

✓ **Test for Glycosides-**

**Liebermann reaction:** Mix 2 ml extract with chloroform. Add 1-2 ml acetic anhydride and 2 drops conc. H<sub>2</sub>SO<sub>4</sub>, from the side of test tube. Green colour appears.

✓ **Test for Saponin-**

**Foam test:** Shake the drug extract or dry powder vigorously with water. Persistent foam observed.

✓ **Test for Anthraquinone Glycosides-**

**Borntrager's test :** To 3 ml extract, add dil. H<sub>2</sub>SO<sub>4</sub>, Boil and filter. To cold filtrate, add equal volume benzene or chloroform. Shake well. Separate the organic solvent. Add ammonia. Ammoniacal layer turns pink or red.

✓ **Test for Alkaloid-**

**Mayer's test:** 2-3 ml filtrate with few drops Mayer's reagent gives ppt.

✓ **Test for steroid-**

**Liebermann reaction:** Mix 2 ml extract with chloroform. Add 1-2 ml acetic anhydride and 2 drops conc. H<sub>2</sub>SO<sub>4</sub>, from the side of test tube. Green colour appears.<sup>(30)</sup>

**Table no 2 Result Phytochemical screening of leaves extract of *euphorbia thymifolia* Linn**

S.no	Product	Test	Result
1.	Carbohydrate	Fehling's test	Positive
2.	Glycosides	Liebermann's test	Positive
3.	Anthraquinone	Borntrager's test	Negative
4.	Alkaloids	Dragendorff's test	Positive
5	Steroid	Liebermann Burchard's test	Positive
6	Saponin	Foam test	Negative

## 6. FORMULATION OF GEL

### Preparation of gel:

1 g of Carbopol 934 was dispersed in 50 ml of distilled water with continuous stirring. 5 ml of distilled water was taken and required quantity of methyl paraben and propyl paraben were dissolved by heating on water bath. Cool the solution, then to that added Propylene glycol 400. 200mg\100 extract of *euphorbia thymifolia* was mixed to the above mixture and volume made up to 100 ml by adding remaining distilled water. Finally full mixed ingredients were mixed properly to the Carbopol 934 gel with continuous stirring and triethanolamine was added drop wise to the formulation for adjustment of required skin pH (6.8-7) and to obtain the gel at required consistency. The same method was followed for preparation of control sample without adding any leaves extract<sup>(28)</sup>

Table no. 3 Formulation of gel

S.no.	Ingredients	Quantity
1.	Carbapol 934	1gm
2.	Methyl paraben (0.5%)	0.2ml
3.	Propyl paraben(0.2% )	0.1ml
4.	Propylene glycol 400 (5%)	5 ml
5.	Triethanolamine (q.s.)	1.2ml
6.	Extract preparation	200mg
7.	Distilled water	Upto 100ml

### Evaluation parameters of gel:

#### 1. Measurement of pH:

The pH was determined by using a digital pH meter. Dissolve 1g of gel in 100 ml of distilled water and stored for 2h. done the measurement of pH in triplicate and calculate the average values.

**2. Viscosity study:** It is carried out by using Brookfield viscometer. Rotated the gels at 0.3, 0.6 and 1.5 RPM. Note down the corresponding dial reading at each speed. The viscosity was obtained by dial reading  $\times$  factor given in the Brookfield viscometer catalogues.

#### 3. Spreadability:

It indicates the extent of the area to which gel readily spreads on application to the skin or affected part. The therapeutic potency also depends upon spreading value. The time in sec taken by two slides to slip off from gel which is placed in between the slides under the direction of certain load is expressed as spreadability. Lesser the time taken for the separation of two slides, better the spreadability.

#### 4. Homogeneity:

Set the gel in container and then it was tested for homogeneity by visual inspection. They were tested for their appearance and presence of any aggregates.<sup>(28)</sup>

#### 5. Skin irritation:

Apply a small quantity on the hand, check for irritation and redness.

### Discussion

The objective of the study is to develop a stable and functionally effective wound healin gel by excluding synthetic chemicals, which are normally incorporated in such formulations to larger extent Although the formulated shampoo contains synthetic chemical. The evaluation study on our gel showed good wound healing activity. We have used *euphorbia thymifolia* leaves extract which will heal wound.. It is concluded that the formulated gel was safe and effective to use as an alternative to its synthetic counterpart. The investigation of gel formulation is carried out for its standardization. *Euphorbia thymifolia* Linn plant having some other Pharmacological properties such antifungal, antimicrobial,diuretic, etc.

## Conclusion and result

The formulation and evaluation of wound healing gel using the extract of *Euphorbia thymifolia* indicate promising results in wound healing properties. *Euphorbia thymifolia*, a species of the Euphorbiaceae family, has shown significant potential in promoting wound healing based on various studies. The plant extract has demonstrated properties such as antiseptic, anti-inflammatory, antioxidant, and antibacterial effects, which are crucial for wound recovery. Phytochemical analysis of the extract revealed the presence of beneficial compounds like flavonoids, tannins, alkaloids, and glycosides, contributing to its healing abilities.

**Table no. 4 Result of phytochemical evaluation of *euphorbia thymifolia* extract**

S.no	Parameter	Observation
1.	Physical appearance	Color- green Odour- pungent
2.	pH	7.2
3.	Spreadability	20 cm, Good spreadability
4.	Viscosity	1,50,400 cps
5.	Skin irritation	Non irritant

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