

Shorea Robusta Herbal Gel-A Burn Healing

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Abstract

Herbal medicines, favored for their cultural compatibility and minimal side effects, are primary healthcare for 75-80% of the global population. This study aims to formulate and evaluate a herbal gel from *Shorea robusta* resin for burn treatment. Utilizing Carbopol 940 as a base, the gel incorporates *S. robusta* resin for its wound healing, anti-inflammatory, and antimicrobial properties. The preparation involves dispersing Carbopol in water, adding the resin powder, and adjusting pH with Triethanolamine. Evaluation includes assessing physical attributes, pH, clarity, and spreadability, demonstrating the gel's potential as an effective, side-effect-free burn treatment.

Keywords: Burn Healing, Skin Repair, Natural Remedy, Soothing Gel, Skin Healing Gel, Herbal Burn Treatment, Burn Care

* Introduction *

Herbal medicines are the oldest form of health care known to mankind. Herbal medicines is still the mainstay of about 75-80% of the world's population, mainly in developing countries, for primary health care because of better cultural acceptability, better compatibility with human body and lesser side effects. Herbal medicines consist of plant or its part to treat injuries, disease or illnesses and are used to prevent and treat diseases and ailments or to promote health and healing. It is a drug or preparation made from a plant or plants and used for any to such purpose.

Topical Drug Delivery System:

Skin is one of the most readily accessible organs on human body for topical administration and is main route of topical drug delivery system. The route of administration has a significant impact on the therapeutic outcome of a drug. The goal of any drug delivery system is to provide a therapeutic amount of drug to the proper site in the body to promptly achieve and then maintain the desired drug concentrations. Topical delivery can be defined as the application of a drug containing formulation to the skin to directly treat cutaneous disorders (e.g. acne) or the cutaneous manifestations of a general disease (e.g. psoriasis) with the intent of containing the pharmacological or other effect of the drug to the surface of the skin or within the skin. Semi-solid formulation in all their diversity dominate the system for topical delivery, but foams, spray, medicated powders, solutions, as well as medicated adhesive systems are also in use.

- External topical that are spread, sprayed, or otherwise dispersed on to cutaneous tissues to cover the affected area.
- Internal topical that are applied to the mucous membrane orally, vaginally or on anorectal tissues for local activity.

Herbal gel

Herbal gel is formulation made from a plant or plants and used For any skin diseases. Herbal medicines are the oldest form of health care known to mankind

Benefits of Herbal gels :

Herbal formulations have reached widespread acceptability as therapeutic agents like antimicrobial, anti-ageing, anti-arthritic, anti-depressant, anti-anxiety, anti-inflammatory, anti-

HIV, treatment of cirrhosis, asthma, migraine, Alzheimer's disease and memory enhancing activities.

What is a burn?

A burn occurs when heat, chemicals, sunlight, electricity or radiation damages skin tissue. Most burns happen accidentally. There are different degrees of burns i.e. first degree, second degree and third degree burn. Your healthcare provider determines the seriousness (degree) of a burn based on the depth of the burn and the amount of affected skin. Burns can be painful. Left untreated, a burn can lead to infection.

What are the types of burns?

Healthcare providers classify burns by degrees of severity. Your provider will evaluate the extent of skin damage. Burn degrees include:

- **First degree burns** are mild (like most sunburns). The top layer of skin (epidermis) turns red and is painful but doesn't typically blister.
- **Second degree burns** affect skin's top and lower layers (dermis). You may experience pain, redness, swelling and blistering.
- **Third degree burns** affect all three skin layers: epidermis, dermis and fat. The burn also destroys hair follicles and sweat glands. Because third-degree burns damage nerve endings, you probably won't feel pain in the area of the burn itself, rather adjacent to it. Burned skin may be black, white or red with a leathery appearance.

Causes of burn

Many things can cause a burn. Thermal sources, including fire, hot liquids, steam and contact with hot surfaces, are the most common causes of burns. Other causes include exposure to:

- Chemicals, such as cement, acids or drain cleaners.
- Radiation.
- Electricity.
- Sun (ultraviolet or UV light).

Signs of burns

Burn symptoms vary depending on the severity or degree of the burn. Symptoms are often worse during the first few hours or days after the burn. Burn symptoms include:

- Blisters.
- Pain.
- Swelling.
- White or charred (black) skin.
- Peeling skin.

Diagnoses of burn

Your healthcare provider will examine the burn to determine the degree or severity. This process involves estimating the percentage of the body affected by the burn and its depth. Your provider may classify the burn as:

- **Minor:** First and second-degree burns that cover less than 10% of the body are considered minor and rarely require hospitalization.
- **Moderate:** Second-degree burns that cover about 10% of the body are classified as moderate. Burns on the hands, feet, face or genitals can range from moderate to severe.

Severe: Third-degree burns that cover more than 1% of the body are

Cultivation details of shorea robusta

A plant of the tropics, where it is found at elevations up to 2,000 meters. It grows best in areas where annual daytime temperatures are within the range 28 - 34°C, but can tolerate 7 - 47°C. The plant can survive temperatures down to about -1°C. It prefers a mean annual rainfall in the range 1,500 - 3,500mm, but tolerates 1,000 - 7,300mm]. There is usually a dry season of 4 - 8 months. Prefers a position in full sun, but tolerates light shade. Succeeds in most well-drained, fertile soils, though it prefers a moist sandy loam with good subsoil

drainage . Prefers a pH in the range 5 - 6.7, tolerating 4.5 - 7.5. Young trees grow quickly, developing a long taproot at a very young age and attaining top heights of up to 6 meters after 6 year. Fruit and seed bearing begins around the age of 15 years, the tree then bears fruit regularly every 2 years or so, and a good seed-bearing year can be expected every 3 - 5 years]. The tree responds well to coppicing. Rotations of 30 - 40 years are used when coppice regeneration is practiced, and 80 - 160 years for high forest regeneration. The tree is very tolerant of forest fires, usually surviving them if not too small.

Experimental design:

During formulation one gelling agents used at single concentrations, resulting in single gel formulation of resin powder of drug shores robusta prepared. In this case Carbopol 940 these types of gelling agents were taken.

○ The gelling agent were used as follows:

Carbopol 940 (at concentration 1%)

○ During formulation the drug used as follows :

Shorea robusta (at concentration 2 %)

Gel composition was finalized after doing many trial and errors. And the composition finalized is described here. The gel formulation were prepared according to the experimental design.

Preparation of Gel:

a) Preparation of gel with Carbopol 940:

Carbapol is prepared as gelling agent because it is water soluble polymer , used as an emulsifying ,stabilising ,suspending ,thickening agent also they can be developed in room temperature .unlike hydroxypropyl methylcellulose which needs to be developed in hot water.

Accurately weighed Carbopol 940 was taken in a beaker and dispersed in 100 ml of distilled water. Kept the beaker aside to swell the Carbopol for half an hour and then stirring should be done using mechanical/lab stirrer at 1200 rpm for 30 min.



b) Preparation of gel by adding Drug powder:

A crude drug resin crushed to powder using mortar and pestle followed by passing through the sieve of a size to make a fine powder.

2gm of powdered drug was dissolved and mixed with previous mixture of Carbopol , then for a 5 min it was stirred using mechanical stirrer.

Triethanolamine was added drop wise to the formulation for adjusting the required skin pH (pH-6 to 7) and to obtain the gel at required consistency. After that the formulation was allow to stand for 48hours to settle.



Equipment's :-

- Digital balance
- Magnetic stirrer
- Digital pH meter
- Stability chamber
- Rheometer
- Homogenizer

Evaluation of Herbal Gel

○ Physical Evaluation:

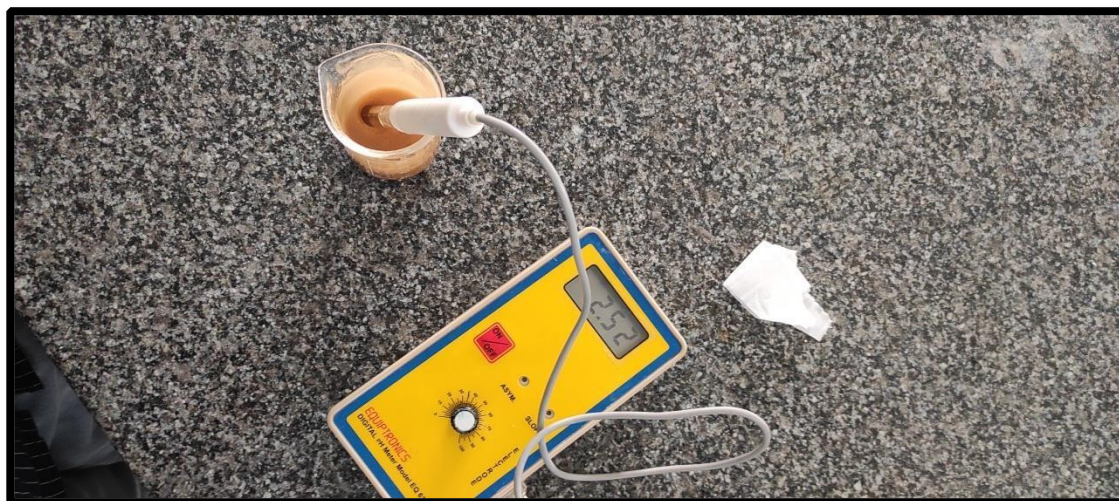
Physical parameters such as colour, consistency, appearance, washability and odour were assessed.

Sr. No.	Parameter	Standard Values Of Shorea robusta	Test Values Of Shorea robusta
1	Odour	Odourless	Odourless
2	Colour	Dark brown to pale amber or yellow red	Dark brown and yellow
3	Shape	Cylindrical shape	Cylindrical
4	Taste	Tasteless	Tasteless
5	Surface Characteristics	Brittle pieces, irregular, cylindrical	Cylindrical pieces
6	Size	1.5 - 5 cm	2 - 5 cm

○ pH:

The pH of various gel formulations were determined by using digital pH meter. 2.5gm of gel was accurately weighed and dispersed in 25ml of distilled water and stored for two hours.

Sr. No.	pH
1.	5.8
2.	6.1
3.	6.3



○ Spreadability:

Spreadability denotes the extent of area to which the gel readily spread on application to skin or the affected part. The bioavailability efficiency of a gel formulation also depends on its spreading value. The spreadability is expressed in terms of time in seconds taken by two slides slip off from the gel, placed in between the slides, under certain load. Lesser the time taken for separation of two slides, better the spreadability. Two sets of glass slides of standard dimensions were taken. The herbal gel formulation was placed over one of the slides. The other slide was placed on the top of the gel, such that the gel was sandwiched between the two slides in an area occupied by a distance of 6 cm along the slide. A 30gm weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 6cm and separated away from the lower slide under the influence of the weight was noted. The experiment was repeated three times both formulated gels and marketed gel and the mean time taken for calculation

$$[\text{Formula: } S=M \times L/T]$$

S= Spreadability

M= Mass in gm (30gm)

L= Length of the glass (6cm)

T= Time in sec

➤ Viscosity and rheological studies:

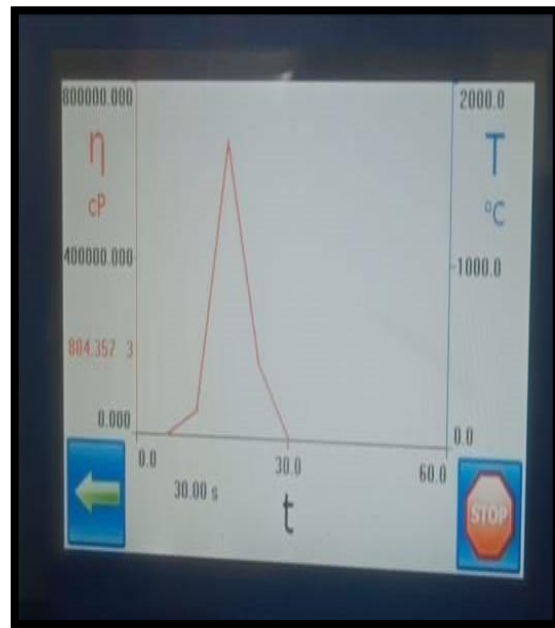
Viscosities of gels were determined using Brookfield viscometer. Gels were tested for their rheological characteristics at 250C using Brookfield viscometer. The measurement was made over the whole range of speed settings from 10rpm to 100rpm with 30seconds between 2 successive speeds and then in a descending orders.

Spindle number: 14

Sr. No.	Viscosity
1.	387.5
2.	388.8
3.	389.6



Rheometer



Graph (Thixotropy)

Extrudability:

Extrudability is the force required to exude material out of tube determining the consistency of preparation. The extrudability was calculated using the following formula

Extrudability = Applied weight to extrude gel from tube (in gm) / Area (in cm²)

Stability study:

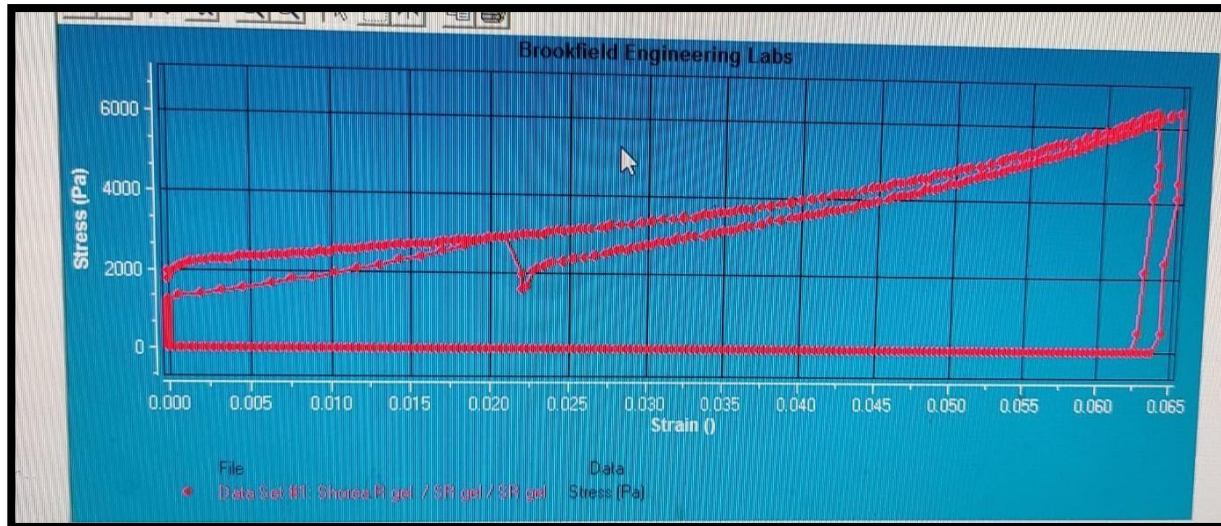
The stability of gels was assessed using the ICH guidelines 8. The optimized gel formulations were prepared; packed in aluminum collapsible tubes and subjected to stability studies at 40°C/75% RH for a period of 3 months as per ICH Guidelines. Samples were withdrawn at 1 month time intervals and evaluated for physical appearance, pH, rheological properties, spreadability and extrudability.



➤ Clarity:

The clarity of all batches was determined by visual inspection.

Parameters of Gel : (result)



Data Report of different parameters of gel Result and

Discussion :

The gel was prepared and subjected to evaluation of the various parameters. The herbal gel was dark creamy colour and translucent in appearance and had a cool and smooth feeling on application. pH also maintained constant throughout the study which was found to be 6.5 to 7.0 and the gel was non-irritant upon application on the skin. Spreadability were also measured and found to be less variant than the initially prepared gel after performing stability study. Further stability test for one month has been carried out and result revealed gel containing 2% shores robusta. From the above examinations it was found to be that gel formulation has ideal pH along with the parameters. The gel base for the sample is fabricated by dissolving 1gm of carbopol940 in 100 ml of water and 2gm of drug Shorea robusta. The amounting 0.30ml trimethylamine was added which neutralized the solution and brought the pH to around 6 that matches the pH range of the skin.

Out of all the different formulations this sample has maintained a constant pH-6 over a period of 1 month.

Conclusion:

The outcomes of all tests and analyses point to high compatibility between the constituents and all the herbal substances led to a complimentary action on burns. The formulation's ability to maintain qualities like viscosity and stability over the course of three months suggests that the formulation's diverse constituents were compatible with one another. Together with Carbopol shows good compatibility, and their separate benefits work synergistically to create the desired impact on burns. As observed for sample the prolonged the gel's shelf life and assisted in keeping a steady pH. Hence it has the potential to serve as a herbal gel product for the Management of burns

Reference

1. <https://www.researchgate.net/publication/315837136> A Comparative Pharmacognostic Evaluation of Different Extracts of Shorea robusta Gaertn f Resin
2. <https://www.researchgate.net/publication/362814217> Formulation and evaluation of antioxidant and antityrosinase activity of Polygonum amplexicaule herbal gel
3. <https://www.researchgate.net/publication/368478625> Formulation and evaluation of Pharmaceutical aqueous gel of Citrus Aurantium Dulcis peels extract for mouth ulcer Treatment
4. <https://www.researchgate.net/publication/368392238> HERBAL TOOTH GEL FOR THE MANAGEMENT OF GINGIVAL BLEEDING AND TOOTHACHE
5. <https://www.researchgate.net/publication/288361178> Formulation and evaluation of herbal gel
6. <https://www.researchgate.net/publication/235642834> Formulation and evaluation of herbal gel containing Sesbania Grandiflora L Poir Leaf extract
7. <https://www.semanticscholar.org/paper/Formulation-and-Evaluation-ofHerbal-Gel-Containing-Singh-Mittal/ab690e1d98b2f3e4e11a87069255955cf36d3065>
8. <https://doi.org/10.1093/burnst/tkab041>
9. <https://doi.org/10.1073/pnas.1115973108>
10. <https://doi.org/10.1073/pnas.1115973108>
11. <https://images.app.goo.gl/aL2NtwTvEfmRqCe1A>