

# Formulation And Evaluation of Herbal Anti-Eczema Gel Containing Glycyrrhiza Glabra Extract

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**Abstract**—Objective of the study was formulation and evaluation of an anti-eczema gel using extract of Glycyrrhiza glabra (Liquorice). Increasing use of herbal drugs is associated with their ability to provide therapeutic benefits with better patient compliance, which makes these agents an important alternative to traditional treatments. The current study involved preparation of a topical gel formulation with the help of Carbopol 940 as the gelling agent and other required excipients, including propylene glycol, glycerin, methyl paraben, propyl paraben, disodium EDTA, and triethanolamine.

The formulated gel was subjected to various physicochemical evaluations involving parameters such as appearance, homogeneity, pH, viscosity, spread ability, and skin irritation tests. Apart from formulation development, pre-formulation studies including organoleptic evaluation, solubility, UV visible spectrophotometry, and FTIR analysis were conducted to identify the nature and compatibility of the active ingredient. Results revealed the presence of satisfactory properties such as uniform composition, adequate viscosity, smoothness, and spread ability of the gel. Furthermore, the tested gel formulation proved to be compatible with skin pH and free from skin irritation. Conclusively, the anti-eczema gel with the herbal active ingredient Glycyrrhiza glabra extract demonstrated excellent physicochemical properties, which made it a promising herbal topical formulation for eczema.

**Index Terms**—Glycyrrhiza glabra, Anti-eczema gel, Carbopol 940, Topical formulation, Herbal preparation.

## I. INTRODUCTION

Eczema is a common inflammatory skin disease that includes symptoms such as itching, redness, dryness, irritation and development of lesions on the skin. Eczema can affect all the age groups. This condition may occur due to genetic reasons, environment,

allergy, or immune system. The conventional therapies used for the treatment of eczema include steroids, antihistamines and other synthetically derived topical applications. The long-term use of these therapies may cause some side effects such as thinning of the skin, irritation, burning sensation and poor patient compliance.

There has been increased attention towards the use of herbal preparations due to its therapeutic efficiency, natural origin, safety, cost effectiveness and fewer incidences of adverse effects. Herbal medicinal plants having anti-inflammatory, antimicrobial, antioxidant and wound healing properties have been proved to be beneficial in treating different types of skin disorders including eczema.

Glycyrrhiza glabra commonly known as Liquorice is a medicinal plant widely used in conventional systems of medicine. There are number of active components like glycyrrhizin, flavonoids, saponins and phenols that have anti-inflammatory, antimicrobial, antioxidant and soothing effects. Because of these pharmacological properties, Glycyrrhiza glabra appears to be an effective choice of herbal medicine to formulate topical preparations for inflammatory skin disorders.

Topical gels are more preferred over other topical preparations since they are non-greasy, easy to spread, aesthetically acceptable and cause good patient compliance. Gels increase the contact time of the drug and enhance its local activity.

The current research was intended to formulate an herbal anti-eczema gel using Glycyrrhiza glabra extract with Carbopol 940 as gelling agent. Various physicochemical tests such as appearance, homogeneity, pH, viscosity, spread ability and

permeability study were performed on the formulated gel.

## II. MATERIALS AND METHODS

### Materials

Liquorice (*Glycyrrhiza glabra*) liquid extract was taken as the active herbal ingredient for the preparation of anti-eczema gel. Carbopol 940 was taken as gelling agent. Propylene glycol and glycerin were taken as humectants and penetration enhancers. Methyl paraben and propyl paraben were taken as preservatives. Disodium EDTA was taken as stabilizing agent and triethanolamine was taken for pH adjustment and gel formation. Purified water was taken as solvent. All the materials used in the study were of pharmaceutical grade.

Formulation of Polyherbal Anti-eczema gel:

Table 1: Formulation Composition of Herbal Anti-Eczema Gel

Sr. No.	Ingredients	Quantity
1	Liquorice liquid extract	0.2 mL
2	Carbopol 940	0.08 g
3	Propylene Glycol	0.5 g
4	Glycerin	0.4 g
5	Methyl Paraben	0.018 g
6	Propyl Paraben	0.002 g
7	Disodium EDTA	0.005 g
8	Triethanolamine	q.s
9	Purified Water	q.s to 10 g
10	Colouring Agent	q.s

### Method of Preparation

The required amount of Carbopol 940 was dispersed slowly in distilled water using a magnetic stirrer to prevent formation of lumps. The suspension was left to hydrate sufficiently for a definite period of time. In another beaker, propylene glycol, glycerine, methylparaben, propylparaben and disodium EDTA were mixed thoroughly. Afterward, Liquorice extract was mixed in the above solution by stirring.

The prepared solution was then slowly incorporated into the Carbopol suspension while being continuously stirred to ensure homogeneity of the formulation. Triethanolamine was used to adjust the pH of the system. Finally, colouring agent was added

to improve the appearance of the formulation. The resulting gel was transferred to an appropriate container for further evaluation.



Figure 1: Preparation of Gel Using Magnetic Stirrer

### Evaluation of Formulated Gel

#### Organoleptic Evaluation

The prepared gel was observed for its colour, odor, appearance, consistency, and homogeneity under daylight condition.

#### pH Determination

Approximately 1g of the gel was dispersed in 10 mL of distilled water, and the mixture was properly stirred. The pH of the prepared gel was measured by a calibrated pH meter.

#### Viscosity Measurement

The viscosity of the prepared gel was measured using Brookfield viscometer at ambient temperature using suitable spindle and rotational speed.

#### Spread ability test

The spread ability of the gel was measured by spreading the gel between two glass slides and timing how long the upper one took to move owing to weight exerted.

#### Skin Irritation Test

A certain amount of the gel was placed on the skin and monitored for any signs of irritations like itching, swelling, or redness after 24 hours.

#### Permeability study

The permeability test of the formulated gel was performed to assess the release characteristics of the active ingredient from the gel base.

III. RESULTS AND DISCUSSION

Organoleptic Evaluation

The developed gel of the Herbal anti-eczema drug was smooth, glossy, and appeared in an apple-green color, with an excellent texture and homogeneity. There was no phase separation in the developed gel, which had a uniform distribution of components without any formation of lumps or graininess.



Figure 2: Prepared Herbal Anti-Eczema Gel

pH Determination

It was observed that the prepared gel had a pH value of 5.8. This is an acceptable pH value since it falls within the required pH level. Therefore, the formula would not irritate the skin when applied topically.

Table 2: pH Determination of Prepared Gel

Parameter	Observation
pH	5.8

Viscosity Measurement

The viscosity of the gel was found to be moderate, thus allowing for consistency and ease of application. Viscosity is important as it plays a role in ensuring stability and homogeneity

Table 3: Viscosity Measurement of Prepared Gel

Parameter	Observation
Viscosity	Moderate

Spread ability Test

The spread ability of the prepared gel was good, with the spread ability being 18.2 g\*cm/sec. good spread ability ensures the application of the product on an equal surface area of the skin.

Table 4: Spread ability Test of Prepared Gel

Parameter	Observation
Spread ability	18.2 g*cm/sec

Skin Irritation Test

There were no signs of irritation, redness, itching, and swelling noted in the skin after the administration of the gel within 24 hours. Thus, it can be concluded that the formulation is safe for topical use.

Table 5: Skin Irritation Test of Prepared Gel

Parameter	Observation
Skin Irritation	No irritation observed

Permeability Study

The permeation ability of the prepared gel was favorable enough to suggest that there was an efficient delivery of the drug from the gel matrix. The drug delivery system possessed promising qualities.

Table 6: Permeability Study of Prepared Gel

Parameter	Observation
Permeability	High

IV. DISCUSSION

The Herbal gel formulation containing Glycyrrhiza glabra extract exhibited adequate physicochemical properties appropriate for topical applications. The gel matrix prepared using carbopol 940 exhibited satisfactory viscosity and consistency characteristics. The gel preparation exhibited a favorable pH value compared to skin pH values, implying that the formulation is compatible with skin and does not cause irritation during application.

The preparation exhibited adequate spread ability, which could improve patient compliance during topical application. Skin irritation studies did not reveal any irritating effects of the gel formulation during topical administration. Adequate permeability characteristics were exhibited by the formulation during the permeation study.

In summary, the gel preparation exhibited adequate properties necessary for herbal topical preparations used in managing eczema and other dermatological inflammations.

## V. CONCLUSION

In the present study, a herbal anti-eczema gel containing Liquorice (*Glycyrrhiza glabra*) extract was successfully formulated using Carbopol 940 as the gelling agent. The prepared formulation exhibited satisfactory physicochemical properties including acceptable pH, good homogeneity, moderate viscosity, satisfactory spread ability, and absence of skin irritation.

The permeability study indicated satisfactory release characteristics of the active ingredient from the gel base. Based on the evaluation results, the formulated gel was found to be suitable for topical application and may serve as a promising herbal formulation for the management of eczema and related inflammatory skin conditions.

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