

AN OVERVIEW ON VARIOUS FORMULATION EFFORTS OF PHYTOCONSTITUENT EMULGEL

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A B S T R A C T

This work's primary goal was to formulate and assess an emulgel using extracts from *Curcuma longa*, *Nigella sativa* seeds, and aloe vera while also examining the extract's microbiological activity and various characterizations. *Curcuma longa* is a member of the Zingiberaceae family. Turmeric, or *Curcuma longa*, is widely recognized. *Curcuma longa* comprises volatile oils and three primary curcuminoids: curcumin, demethoxycurcumin, and bisdemethoxycurcumin. Black cumin, or *Nigella sativa* Linn (Ranunculaceae), has a variety of pharmacological properties, including as anti-inflammatory, antibacterial, antifungal, and antihelmenthic properties. Succulent tropical plant *Aloe barbadensis* is a member of the Liliaceae family. *Aloe vera* gel is used to treat psoriasis by minimizing scaling and redness. It is used to create lotions and creams for topical use. In addition, *aloe vera* possesses anti-inflammatory, antioxidant, immunomodulatory, anti-fungal, and anti-tumor qualities. By raising collagen activity, it also facilitates wound healing and skin hydration. This helps to repair the detrimental effects of psoriatic skin.

Keywords: Herbal emulgel, Formulation and evaluation of *curcuma longa* emulgel, *Nigella sativa* seeds, *Aloe vera*

HERBAL EMULGEL EMULGEL

Emulgel is a combinational formulation made up of gel and emulsion; the kind of combination used relies on the drug's nature in order to maximize bioavailability. Emulgel's advantages over conventional topical treatment include being thixotropic, greaseless, having superior spreadability, being readily removed, being biodegradable, emollient, and having greater convenience. Additionally, Emulgel's high stability and longer shelf life are motivating researchers to create new products.

HERBAL EMULGEL

"Medicinal plant" refers to a broad category of plant species utilized in herbalism, often known as "herbology" or "herbal medicine." utilization of plants as medicine. Every part of a plant, including the root, flower, stem, seeds, bark, and other sections, is used in the globe. Plants were utilized for therapeutic purposes even before the prehistoric era. Eighty percent of the global population, according to a WHO assessment, uses therapeutic plants. Because there are few or no adverse effects, using medicinal herbs is seen to be extremely safe. It is thought that herbal plants are a rich supply of active ingredients that can be utilized to create synthetic medicines. ^[1]

Advantages

- Avoidance of First pass metabolism
- Selective to a selected site
- Enhance patient compliance
- Integration of aquaphobic drugs
- Superior loading capability
- Better penetration and stability
- Low manufacturing cost
- Easy to apply

Disadvantages

- Dermal inflammation on contact dermatitis
- Hyper sensitivity
- Poor absorbance of few drugs through the pores and skin
- Large molecule size of drug does not soak up via skin
- Possibility of allergic reaction[6]

FORMULATION I

Curcumin, a brilliant yellow substance that is extracted from the plant *curcuma longa*, also referred to as **turmeric**, is a phyto polyphenol pigment that belongs to the ginger family, Zingiberaceae. Its chemical identification is [1,7-bis(4-hydroxy-3-methoxyphenyl)-1, 6-heptadiene-3, 5-dione], and it possesses numerous biological qualities, including anti-tumor, anti-oxidant, and anti-inflammatory capabilities. Many conditions are treated with curcumin, such as rheumatoid arthritis, eye disorders, irregular menstruation, urinary tract infections, and problems with the liver and gastrointestinal tract (e.g., irritable bowel disease, abdominal pain). Additionally, it is used as an adjuvant treatment for wound healing, chicken pox, and skin cancer. There are about 40–50 species in India, compared to about 30–40 in Thailand. ^[2]

MATERIALS

List of chemicals used and its manufactures.

INGREDIENTS	PURPOSE	SOURCE
Curcuma longa	Plant extract	
Flaxseed oil	Oil phase	Kedarnath Pharmacy
Carbopol	Gelling agent	Yarrow chem
Tween	Emulsifier	Yarrow chem
Propyl paraban	Preservative	Titan biotech
Methyl paraban	Preservative	Yarrow chem
Vit E	Antioxidant	Merk
Propylene glycol	Drug stabilizer	Finar
Triethanolamine	Adjust the pH and viscosity enhancer	Finar
Ethanol	Solvent	Loba

FORMULATION OF CURCUMIN LONGA EMULGEL

INGREDIENTS	F1	F2	F3	F4	F5	F6
Curcuma longa	10	10	10	10	10	10
Linseed oil	5	5	5	5	5	5
Carbopol	1	1	1	1	1	1
Vitamin E		400	400	400		400
Tween 80	10	5	10	10	10	10
Propylene glycol	5	5	5	5	5	5
Methyl paraben	0.03	0.03	0.03	0.03	0.03	0.03
Propyl paraben	0.03	0.03	0.03	0.03	0.03	0.03
Water	q.s	q.s	q.s	q.s	q.s	q.s

EVALUATION OF EMULGEL

Physical examination: Color, appearance, consistency, extrudability, and grittiness of the formed emulgel formulations are observed.

pH measurement: The most important standard for topical composition is pH. The Emulgel's pH varies from 5 to 7 depending on the condition of the skin. Either an acidic or basic Emulgel may cause irritation. A digital pH meter was used to measure the pH of the prepared Emulgel. In order to determine the pH of the formulations, 100 milliliters of distilled water were mixed with 1 gram of Emulgel, allowed to settle for two hours, and then the pH meter was submerged in the Emulgel.^[3]

Viscosity: When handling, storing, and traveling, Emulgel's viscosity is a crucial factor. A Brookfield viscometer was used to measure the viscosity of the prepared Emulgel.^[4]

Spreadability: Spreadability is the length of the affected area that the Emulgel quickly distributes when applied to the skin or damaged area. The value of spreading an Emulgel also affects its bioavailability and effectiveness. The prepared Emulgel are positioned in between two slides, separated by a 6.8 cm space adjacent to the side.^[5] A load weighing one hundred grams was placed on the upper slide, and the emulgel was evenly pushed to create a fine layer.^[6] Equation was used to calculate spreadability.

$$M \times L / T = S.$$

where, T is the time (in seconds) needed to separate the slides

L is the length of the glass slide

M is the weight contained by the pan (fastened to the upper slide)

S is the spreadibility.

Extrudability: The force required to extract material from a collapsible aluminum tube is measured experimentally on a regular basis. Applying the weight in grams required to extract a 0.5-cm Emulgel ribbon in 10 seconds. Greater amounts squeezed out indicate good extrudability for the substance.^[5] Every prepared batch is evaluated three times, and the mean is determined. The formula is used to determine extrudability.

$$\text{Extrudability} = \text{Applied weight (in gm)} / \text{Area (in cm}^2\text{)}$$

In Vitro Antioxidant Activity: The H₂O₂ scavenging assay is used to measure in vitro antioxidant activity. H₂O₂ (40 mM) was dissolved in 50 mM of phosphate buffer (pH 7.4). To the H₂O₂ solution, 50–250 mg/ml of plant extract were added. Absorbance at 230 nm was measured after 10 minutes in comparison to the blank solution. The standard solution is vitamin C, while the blank solution is pH 7.4 phosphate buffer.

In vitro Release/Permeation investigations: Curcuma longa skin penetration investigations The emulgel preparation was made in a pH 6.8 phosphate buffer. Goat ileum membrane was taken for permeation and Franz diffusion cell was employed for the study. To get rid of stick fat, the ileum was cleansed and submerged in isopropanol. After the membrane was removed from the ileum, it was cut into the appropriate location and cleaned with regular saline. Between the donor chamber and the receptor, the membrane was clipped. Phosphate buffer with a pH of 6.8, kept at 37°C, was put into the receptor chamber and continuously mixed with a magnetic stirrer. One milliliter of the sample was collected on a regular basis. and has new buffer added to it. The collected sample was tested using UV visible light for drug release

FORMULATION II

The annual herb *Nigella sativa* Linn belongs to the Ranunculaceae family. People refer to it as black cumin. Nutritional factors such as carbs, lipids, vitamins, minerals, and proteins—eight of the nine essential amino acids—are among the constituents found in *Nigella sativa* seeds. The seed extract has a broad range of actions, including anti-inflammatory, antibacterial, antifungal, and antihelminthic properties, according to pharmacological studies^[7]. The seeds are utilized externally to treat skin outbreaks. The seeds are traditionally used to treat psoriasis tropicus, which causes patches to appear and generalized pain.

FORMULATION OF NIGELLA SATIVA EMULGEL

INGREDIENTS	QUANTITY
Carbopol 940	1 g
Kalonji seed extract	10 %
Methanol	5 ml
Glycerin	15 ml
Sodium hydroxide solution (1%)	q.s
Methyl paraben	0.5 g
Distilled water	Up to 100 g

EVALUATION OF EMULGEL

Appearance: The gel had a translucent, yellowish look.

Ph measurement: A digital pH meter was used to ascertain the gel formulation's pH. After dissolving one gram of gel in 100 milliliters of distilled water, it was kept for two hours. Three separate measurements of the pH were made, and average values were computed.

Viscosity: A Brookfield viscometer was used to measure the produced gel's viscosity. The rotation speed of the gels was 50 revolutions per minute. The matching dial reading was recorded for each speed. The dial measurement was multiplied by a factor found in the Brookefield Viscometer catalogs to determine the gel's viscosity.

Phytochemical screening: The extract underwent a preliminary phytochemical investigation using straightforward chemical tests.

Pharmacological screening

Animals

The study made use of 25–30 g male adult albino mice in good health that were acquired from the animal house of JSS College of Pharmacy in Ooty, Tamilnadu, India. The mice were kept in cages made of polypropylene, fed a regular pellet diet, and given unlimited access to water. The room was kept at a consistent temperature of $22\pm 2^{\circ}\text{C}$ with a 12-hour light-dark cycle. Seven days were given to the animals to acclimate before any studies were conducted. According to CPCSEA norms, authorization from the institutional ethical committee was sought.

Mouse tail model

A mouse tail psoriasis model was used to test in vivo antipsoriatic activity.[8] The animals were divided into three groups, each consisting of six animals. As a positive control, the second group received conventional tazarotene gel treatment (0.1%), whereas the first group was left untreated and acted as the control. Nigella sativa seed extract (95 percent ethanolic) was administered to the third group. The extract was applied topically to the tail, particularly the proximal region, after being

dissolved in water at a 1:2 ratio. For fourteen days, the animals received treatment once a day. The proximal portion of the tail was topically treated with 0.5 mL of tazarotene, or *Nigella sativa* seed extract, and left in contact with the tail. After the contact time, the tails were rinsed with ordinary water. The animals were put to death by deep ether anesthesia, and the proximal portions of their tails, which were about 2.5 cm long and removed two hours after the final treatment, were chopped off. They were then stored in various containers that contained ten percent formalininsaline.

FORMULATION III

Known by another name, *Aloe vera* Linnaeus, *Aloe barbadensis* Miller appears to be a succulent tropical plant belonging to the Liliaceae family. While aloe leaf mucilage or gel contains 99.5% water, aloe leaf pulp contains 98.5% water. The remaining 0.5–1% is made up of proteins, carbohydrates, mucopolysaccharides, enzymes, anthraquinones, salicylic acid, chromones, vitamins, and minerals. *Aloe vera* gel is used to treat psoriasis by minimizing scaling and redness. It is used to create lotions and creams for topical use. In addition, *aloe vera* possesses anti-inflammatory, antioxidant, immunomodulatory, anti-fungal, and anti-tumor qualities.

By raising collagen activity, it also facilitates wound healing and skin hydration. This helps to repair the detrimental effects of psoriatic skin. Out of all the more than 300 varieties of aloe, *A. vera* is the most commonly used type in food, cosmetic, and medicinal goods. Polysaccharides are responsible for the majority of its medicinal qualities, which include antiviral, antibacterial, healing, antioxidant, anti-inflammatory, anticancer, antidiabetic, antiallergic, immunostimulant, and UV protection.

FORMULATION OF ALOEVERA EMULGEL

INGREDIENTS	FC1	FC2	FH3	FH4	FUNCTION
Aloevera extract	80.0	80.0	80.0	80.0	API
Carbopol 940	1.0	1.0			Gelling
Hydroxy ethyl cellulose	-	-	2.0	2.0	Gelling
Citric acid	0.5	-	-	0.5	Acidulant
Amino methyl propanol	q.s	q.s			Alkalizing
Methyl paraban	0.2	0.2	0.2	0.2	Preservative
Imidazolidine urea	0.3	0.3	0.3	0.3	Preservative
Propylene glycol	5.0	5.0	5.0	5.0	Humectant
Disodium edetate	0.1	0.1	0.1	0.1	Chelator
Sodium metabisulphate	0.05	0.05	0.05	0.05	Antioxidant
Distilled water	100.0	100.0	100.0	100.0	Vehicle

EVALUATION OF EMULGEL

Physical Appearance: Visual perception and a basic microscope were used to assess physical appearances. Using a cover slip, the sample was put onto a glass slide. After that, the slide was examined under a microscope, and the gels' outward appearances were investigated.

Ph measurement: The pH of gel compositions is determined using a digital pH meter. The 1 gram of gel was thoroughly dissolved in 50 milliliters of distilled water in a sanitized beaker, and it was left there for two hours. Each formulation's pH was measured three times, and the average result was noted.

Viscosity: The Brookfield viscometer (LVDV-II+ Pro) was used to measure the viscosity of the gel. A appropriate amount of herbal gel was added to a separate sample holder. The gel's height in the sample holder should be adequate to allow the spindle to dip. By changing the spindle's rotational speed to 2.5 rpm, the viscosities of the gels were measured.

Swelling Index: To calculate the swelling index, 1 gram of gel is taken and placed in a 50 milliliter (mL) beaker that is dry and clean and holds 10 milliliters of distilled water. The samples were maintained in a beaker for a while before being removed from the gel after a while. Then placed in a clean, dry area for a while before weighing it once more to determine the percentage of gel that had swelled

We can use the following formula to determine the swelling index:

$$W_o / W * 100 = W_t - SW (\%)$$

In this case,

swelling (SW)% = %

W_t = Gel weight swollen after time (t)

W_o = Gel's initial weight

Spreadability: The Spreadability device, which holds two 20 by 20 cm glass slides, is used to determine the spreadability of gel compositions. One gramme of gel is taken and put on a slide. The gel was compressed and dispersed between two glass slides as a result of the second slide being placed over it. The top slide was then covered with a 100 g weight to push the gel freely and produce a thin layer. After the weight was taken out, a 20 gram weight was cautiously connected to the upper slide. We looked at how long the top slide took overall and how far it traveled.

Homogeneity: Every gel formulation was kept in a container and visually inspected to check for the presence of any aggregates of any kind.

Grittiness: To determine if any undesired particles were present, a microscopic examination of the gel formulations was conducted. Every gel composition was found to meet the requirement of being free of undesired particle materials.

Microscopic Evaluation: To determine whether lumps were present, the gel formulations that were made were examined under a microscope. To accomplish this, a small amount of gel was taken, placed on a glass slide, and examined under a microscope.

CONCLUSION

The future topical drug transportation system plays a vital role to pass on patient acceptance. Out of numerous formulations used topically Emulgel are extended due to their unique characteristics to increase spreadability, lower viscosity, non-greasiness and appealing appearance. In the research done, herbal Emulgel of *Curcuma longa*, *Nigella sativa* and *Aloe vera* for topical use was formulated by using cold maceration process.. The prepared Emulgel were then subjected to physiological studies like rheological studies, pH test, spreadability evaluation, extrudability, and drug release study in-vitro. The Emulgel was then evaluated for anti-psoriatic activity and the results specify that, they exhibit enhanced activity. The herbal Emulgel were designed due to their non-greasy, pleasant allure, non-staining property. From the present study it can be said that topical application of 95% ethanolic extract of the emulgel formulations of curcumin, *nigella sativa* and *aloe vera* has antipsoriatic activity and the external application is beneficial in the management of psoriasis.

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