Journal of Advances and Scholarly Researches in Allied Education
Vol. 21, Issue No. 1, January-2024, ISSN 2230-7540

https://doi.org/10.29070/tzyyf739

A Gel Study of Selected Medicinal Plants for Treatment of Skin Disease

Amit Das[1]*, Dr. Ashish Sarkar[2]

[1] Research Scholar, School of Pharmacy, YBN University, Ranchi, Jharkhand, India

Email: amitdaspharma@gmail.com

[2] Professor, School of Pharmacy, YBN University, Ranchi, Jharkhand, India

Abstract - The current research focuses on assessing the effectiveness of medical herbs in the preparation of topical gels to manage skin ailments. Further, for the plant selection, the roots of Rubia cordifolia were taken since they were known to be effective in treating ailments. The roots were authenticated, shade dried and then extracted using ethanol. The obtained extracts were further used in gel formulations through various polymers such as Carbopol 934, HPMC K4, and HPMC K15. These gels were subjected to checks on their stability, cohesiveness and their pH level and phytochemical potentials. Some of the increases chemical compounds known to be useful including alkaloids, flavonoids, anthraquinones, glycosides, tannins steroids, phenol, and saponin were further confirmed through other tests. This work highlights that in accomplishing our research objectives, Rubia cordifolia root extracts show great promises in the formulation of topical antidermatophytic agents, thus aspiring to advance the knowledge of herbal medicine therapeutics.

Keywords: Rubia cordifolia, Glycosides, Phytochemical Potentials, Gels.

- X -

INTRODUCTION

Among its many important physiological functions, the skin provides protection, senses temperature, regulates secretions, and produces vitamin D. By both weight and surface area, the skin outshines all other organs in the human body. The skin is a window into one's overall health as it reflects a variety of ailments. Every stage of a person's life experiences changes to their skin, which serves as a protective barrier against various environmental toxins. Chemical and microbiological agents, heat and electromagnetic radiation, mechanical stress, and a host of other assaults may all affect the skin. The infiltration of harmful microbes is the skin's most detrimental effect. The skin is the body's first line of protection against widespread harm, invasion by microbes and trauma, and the external environment. It is also the principal point of contact with the outside world. Furthermore, the skin has a multitude of active defensive systems. [1]

A significant source of morbidity and disability is the malfunction of the skin, which may be caused by wounds, infections, cancer, or a hereditary condition. Environment, economics, literacy, and employment are some of the elements that might affect skin illnesses. On occasion, skin problems can be signs of more systemic health issues. In addition, HIV often enters the body via the skin. Globally, skin diseases are among the most pressing issues in public health. Albinism, a skin disorder that causes a loss of self-confidence and social exclusion, is only one example of how visible skin illnesses like eczema and psoriasis, as well as skin failure, may be. Therefore, individuals typically experience greater distress from very little skin issues compared to other, more severe medical disorders. The worst handicap is having one's self-esteem ruined since they can no longer "look good and feel good". [2]

Inflammatory and infectious skin illnesses are on one end of the spectrum, while serious neoplastic disorders such malignant melanoma are on the other. There are just too many types of skin problems to mention them all. Having said that, there are generally a few main types of skin problems. Skin conditions that cause inflammation include diaper rash, dermatitis, eczema, psoriasis, and sebaceous cysts. In most cases, bacterial skin infections (pyoderma) start as impetigo, an infection of the skin, or as scabies, a secondary infection of another lesion, or bites from insects. Group A streptococci and *Staphylococcus aureus* are the most common types of bacteria that cause this. Erythrasma, impetigo, ecthyma, folliculitis, erysipelas, and cellulitis are conditions caused by bacteria that infect the skin. [3]

www.ignited.in

Dermatomycoses are the general terms for fungal skin infections. Yeasts and fungi may cause a wide variety of skin illnesses. The most prevalent species of fungus are *Candida albicans, Trichophyton, Epidermophyton, Microsporum, and Malassezia.* Some examples of viral skin diseases include chicken pox, measles, warts, and Herpes simplex virus types 1 and 2. Warts are caused by the human papillomavirus (HPV). Among the many types of skin cancer include melanoma, basal cell carcinoma, and squamous cell carcinoma. Hereditary disorders like albinism and disorders characterized by enhanced pigmentation or hyperpigmentation are examples of pigmentary change disorders. [4]

Leprosy is characterized by a loss of skin pigmentation. In adolescents and teens living in clearly defined tropical locations, a disease known as tropical ulcer may develop. This ailment is caused by a mix of bacteria, including the fusiform bacterium *Fusobacterium ulcerans.* As a result of being infected with HIV, a variety of skin disorders may occur. These include toxic epidermal necrolysis, Kaposi's sarcoma, and HIV-related itchy papular or pruritic eruptions. There are hereditary skin disorders such as Ehlers-Danlos syndrome and systemic lupus erythematosus (SLE). Skin infestations or disorders caused by protozoa include cutaneous larva migrans, tungiasis, pediculosis, and scabies. [5]

There are a lot of variables that determine how common skin disorders are in any given society. These include things like the population's age distribution and nutritional condition as well as environmental and industrial factors. Social and hygienic norms, practices, and jobs all have a role. Different areas of the same nation have different skin disease patterns, and these patterns differ among countries. [6]

Worldwide, population-based research found a prevalence of skin illnesses ranging from fourteen percent to fifty percent. The First US National Health and Nutrition Examination Survey (HANES-1) conducted between 1971 and 1974 is a prime example of a prevalence study. It found that approximately one-third of the population had at least one significant skin disorder, and an additional 12.5% were considered to have a skin condition that was not actively affecting their health at the time of the examination. In the United Kingdom, for instance, 55% of the population was found to have some kind of skin illness in the 1975 Lambeth Study, whereas only 22% of that group really required medical attention. Among the top five reasons individuals in rural regions of developing nations seek medical attention are wounds and dermatological disorders. [7] The prevalence of skin disorders in underdeveloped nations may be anywhere from 20% to 80%. A skin condition that might be treated was present in 27% of the patients surveyed in two Tanzanian rural populations. The percentage of people claiming to have skin diseases in two rural villages in western Ethiopia ranged from 47% to 53%.[8]

Based on school-based studies, the prevalence of skin illnesses among children in different regions of India has varied between 8.7 and 49.1 percent (Sharma and Sharma, 1990; Kumar et al., 1988). According to both community and institutional prevalence surveys, infections and infestations constituted the majority of dermatoses (Sharma and Mendiratta, 1999; Negi et al., 2001). Children account for 30% of all dermatology visits and at least 30% of all pediatric outpatient appointments are for dermatological issues. Research on the frequency of skin problems in 12,586 school-aged Indian children found that 38.8% of the students had at least one visible skin disease. The study found that out of the 3786 youngsters analyzed, 30 percent had a single skin illness, 765 had two, and 336 had three. [9]

Infections of the skin (11.4%), pityriasis alba (8.4%), dermatitis/nonspecific eczemas (5.2%), infestations (5.0%), pigmentation disorders (2.6%), and keratinization disorders (mainly keratosis pilaris, 1.3%) were the most common skin conditions. Leg ulcers caused by untreated wounds, diabetes, leprosy, burns from cooking and sleeping near fires, injuries sustained in disputes, and, more and more, injuries caused by traffic accidents are among the most common types of injuries sustained by rural residents . Acute wound prevalence was 10.55 per 1000 people and chronic wound prevalence was 4.48 per 1000 people in an Indian community-based epidemiological study of wounds . Because every break in the continuity of skin exposes the underlying tissues to the risk of infection, the healing of wounds produced by accidents, assaults, combat, and surgical procedures has long been a fundamental priority in surgical treatment. [10]

RESEARCH METHODOLOGY

Plant Materials

After obtaining authentication from Govt Agriculture College, Ranchi, the roots of *Rubia cordifolia* were purchased from a nearby market. A herbarium sheet containing the shade-dried root specimen is kept at our college department for potential future use. [11] Shade drying the roots preserved their phytoconstituents. Once the roots had dried, they were roughly ground into a powder using a lab mixer. Then, they were extracted with 95% ethanol using a Soxhlet apparatus, which allowed the extraction to continue continuously for 12 hours. [12] After the extract was cooled to ambient temperature, the alcohol evaporated, leaving behind a semi-solid mass. [13]

Figure 1: The *Rubia cordifolia's* roots

Figure 2: *Rubia cordifolia* root powder, coarsely ground

Figure 3: Root removal by use of the Soxhlet apparatus

Chemicals

Ingredients: Triethanolamine, propylparaben, methylparaben, carbopol 934 (Merck Ltd.), and proplene glycol-400 (SD Fine Chemical Ltd.)

Making the Topical Gel

Different combinations of *Rubia cordifolia* root extract (750 mg, 1000 mg & 1200 mg) were tried with different types of polymers (HPMC K 4, HPMC K 15 Carbopol 934) using various formulae. [14]

The following few combination with Carbopol 934 resulted in the best gel formulation, which was smooth and stable. [15] Control sample also was prepared for testing of animal to check the activity of control ingredients. [16]

Root Extract Gel Preparation Procedure

With continuous stirring, 50 mL of distilled water and 300 mg of carbopol 934 were combined.We used 5 milliliters of distilled water that had been boiled in a water bath to dissolve the methyl paraben and propyl paraben. [17] The chilled solution was then supplemented with propylene glycol 400. Add the required quantity of Rubia cordifolia root extract to the aforementioned mixture; use the remaining distilled water to get the content up to 50 gm. [18] The final step was to combine the Carbopol 934 gel with all of the other ingredients while swirling constantly. The skin's pH was then adjusted to a range of 6.8 to 7. The gel's consistency was determined by adding triethanolamine to the mixture

drop by drop. [19] Using the same method, we prepared a control sample devoid of Rubia cordifolia root extract. [20]

Formulation

In Table, you can see the formulae and the process that were mentioned before. Root extracts of Rubia Cordifolia were added at concentrations of 750 mg, 1000 mg, and 1200 mg, respectively, to the control sample gel. [21]

Table 1: Ingredients in gel

Ingredient	Control	F I	F II	F III
Root extract	-	750 mg	1000 mg	1200 mg
Carbopol 934	300 mg	300 mg	300 mg	300 mg
Methyl Paraben (0.5%)	0.1 ml	0.1 ml	0.1 ml	0.1 ml
Propyl Paraben (0.2%)	0.01 ml	0.01 ml	0.01 ml	0.01 ml
Propylene glycol 400 (5%)	3 ml	3 ml	3 ml	3 ml
Triethanolamine (q.s)	1.2 ml	1.2 ml	1.2 ml	1.2 ml
Distilled water	Q.S (upto 50 gm)	Q.S (upto 50 gm	Q.S (upto 50 gm	Q.S (upto 50 gm

- **Initial Check For Plant Metabolites**

(1) Test for Alkaloids

Dragendorff's test: To begin, a little amount of extract solution (one milliliter) was put to a test tube along with a few drops of Dragendorff's reagent (a solution of potassium bismuth iodide). It was determined that alkaloids were present because a reddish-brown precipitate was seen.

Meyer's test: A small amount of Meyer's reagent (a solution of potassium mercuric chloride) was added to a test tube containing 1 milliliter of the extract solution. It was determined that alkaloids were present since a white precipitate was generated.By combining the extract solution with Wagner's reagent in a test tube, a brown precipitate is produced, which indicates the presence of alkaloids. This procedure is known as Wagner's test.One milliliter of the extract solution was added to the test tube along with a few drops of the Hager's reagent, which is picric acid. An alkaloids-reacting yellow precipitate was produced.

Tannic acid testTo test for alkaloids, mix 1 milliliter of extract solution with a few milliliters of 10% tannic acid; a buff-colored precipitate will appear.

(2) Flavonoid Identification

To conduct the alkaline reagent test, a small volume of extract solution was mixed with a solution of sodium hydroxide to produce a bright yellow hue. The presence of flavonoids was confirmed when, after adding a few drops of diluted acid, the color faded.Lead acetate test: The presence of flavonoids is shown by the reddish-brown precipitate that is produced when aqueous basic lead acetate is added to the extract solution.The presence of flavonoids is shown by the rapid formation of a red color in the extract solution, which is achieved using the zinc hydrochloride reduction test, which involves adding a combination of strong hydrochloric acid and zinc dust to the solution.The Shinoda test, also known as the magnesium hydrochloride reduction test, involves extracting a solution by slowly adding strong hydrochloric acid and a few pieces of magnesium ribbon. If the solution becomes reddish to pink, it means that flavonoids are present.

(3) Analyzing Anthraquinones

Method of Borntrager: 5 milliliters of extract solution was mixed with 10 milliliters of benzene, then filtered. To the resulting mixture, 5 milliliters of 10% ammonia solution was added. The presence of free hydroxyl-anthraquinones is indicated when the mixture appears pink, crimson, or violet in the ammonical (lower) phase after shaking. Alternative to Borntrager's test: Mix 2 milliliters of extract solution with 4 milliliters of alcoholic KOH, add 4 milliliters of water, mix, filter, and add hydrochloric acid to acidify. Mixed well with 5 milliliters of ether and set aside to cool. The ether was separated by placing it in a test tube and shaking it with 2 milliliters of a diluted NH4OH solution. Anthraquinones are present when the hue changes from rose red to a deep crimson.

(4) Glycoside Determination

Raymond's test: The presence of glycosides was confirmed by adding 0.1 ml of a 1% m-Dinitrobenzene in ethanol solution and 2 drops of a 20% NaOH solution to the extract solution; the latter produced a violet tint.

Legal's test: A blood-red hue was achieved by treating the extract solution with a pyridine and sodium nitroprusside solution.

Kellar Kiliani test: The presence of glycosides was confirmed by adding 5 ml of extract solution, 2 ml of glacial acetic acid, and one drop of FeCl3 to 1 ml of concentrated H2SO4 in a test tube. A blue hue was then formed.

Concentrated Sulphuric acid test: Glycosides are present when a few milliliters of Con.H2SO4 are added to the extract solution, which causes it to become scarlet.

Bromine water test: The presence of bromine in the extract solution causes a yellow precipitate to form in the water test solution.

Molisch test: A reddish violet ring at the intersection of two layers was seen when naphthol and concentrated H2SO4 were added to the extract solution, which was a positive indicator of the existence of glycosides.

(5) The Tannin Determination Process

Gelatin test: The presence of tannins was confirmed when a white precipitate was formed after

www.ignited.in

adding gelatin and water to the extract solution in a test tube.

Mitchell's test: If tannins were present, adding sodium citrate and iron to the extract solution would create a water-soluble iron-tannic acid combination. In a solution of ammonium acetate, the iron-tannin combination remains insoluble.

(6) Analyzing Steroid Levels

Salkowski test: The presence of steroids was confirmed when a red hue developed at the bottom layer when a few milliliters of con-H2SO4 were added to the chloroform extract solution.

Libermann-Buchard test: After treating the extract solution with a few drops of acetic anhydride and boiling it slightly, a few drops of strong sulfuric acid were added from the test tube's sidewalls. This process produced a brown ring at the junction of the two layers, and the presence of steroids was confirmed when the top layer became green.

(7) Determining the Phenol Content

Ellagic acid test: A murky Niger brown hue was produced when 5% sodium nitrite and glacial acetic acid were added to the extract solution, indicating the presence of phenols.

- **Identifying Quinones**

Alcoholic KOH test: As a result of adding an alcoholic KOH solution to the extract solution, quinines become visible as a shift in hue from red to blue.

NaOH test: The blue hue of the extract solution, which was made by adding a few drops of NaOH, shows the presence of quinones.

- **Saponin Determination**

Froth test: Mix a few milliliters of extract solution with twenty milliliters of water in a test tube, mix well, and let stand for ten minutes. Saponins were detected by the presence of a thick persistent foam.

Table 2: Examination of the phytochemical properties of *Rubia cordifolia* root extracts

Phytochemical Test	EE	ME	AE	CE	AE
ALKALOIDS					
Dragendorff's test	--	--	--	--	--
Hager's test	--	--	--	--	--
Wagner's test	--	--	--	--	--
Tanic acid test	--	--	--	--	--
Mayer's test	--	--	--	--	--
ANTHRAQUINONES					
Borntrager's test	+	+	+	+	+
Modified Borntrager's test	+	+	+	+	+
FLAVONOIDS					
Alkaline reagent test	+	+	+	+	+
Lead acetate test	+	+	+	+	--
Zn-HCl reduction test	+	+	+	+	+
Shinoda's test	+	+	+	+	+
GLYCOSIDES					
Raymond's test	-	--	--	--	-
Legal's test	+	+	+	+	+
KellarKiliani test	--	--	--	--	--
Conc.H2SO4 test	+	+	+	+	+
Bromine water test	+	+	+	+	+
Molisch test	--	--	--	--	--
TANNINS					
Gelatin test	--	--	--	--	--
Mitchell's test	--	--	--	--	--
STEROIDS					
Salkowski test	+	+	+	+	+
Lberman-Buchard test	+	+	+	+	+
PHENOLS					
FeCl3 test	+	+	+	+	+
Elagic acid test	+	+	+	+	+
QUINONES					
NaOH test	--	--	--	--	--
Alcoholic KOH test	--	--	--	--	--
SAPONINS					
Froth test	+	+	+	+	+

+ = Positive; - = Negative; EE =Ethanol Extract, ME= Methanol Extract; AE= Acetone Extract; CE= Chloroform Extract; Aq E= Aqueous Extract.

- **Extracts from roots**

A deeper, darker hue was seen in the many root solvent extracts. You may find anthraquinones, glycosides, saponins, steroids, phenols, and flavonoids in the root's solvent extracts but you won't find any alkaloids, tannins, or quinones in the root's aqueous or solvent extracts.

- **Assessing The Formulation Of Topical Gels**

Assessing the Body

Color and appearance were among the physical factors that were examined.

pH Detection

The gel's pH was determined using a pH meter.

Spreadability

The equipment, which includes a pulley at one end and a wooden block at the other, was used to assess the spreadability. The technique relied on the gels' slip and drag properties to determine their spreadability. This ground slide had an excess of the gel under observation, roughly 2g. Next, the gel was placed between the two slides, one of which had the dimensions of the fixed ground slide, and the other of which had the hook A attached to it. To ensure a consistent layer of gel between the two slides and to release any trapped air, a 1 kg weight was put on top of each for 5 minutes. The edges were scraped to remove any excess gel. After then, 80 gms of pull was applied to the top plate. Time the top slide's progress (in seconds) as it travels 7.5 cm using the thread that's connected to the hook. The spreadability is greater when the interval is shorter. The following formula was used to determine spreadability:

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

For this, we have S= spreadability, M= weight in the pan (attached to the top slide), L= length traveled by the glass slide, and T= time (in seconds) required to fully separate the slides from one other.

Viscosity

The gel's viscosity was determined using a spindle-mounted Brookfield viscometer.

Research on Stability

Following ICH criteria, the stability study was conducted. Various temperatures and humidity settings were used to keep the formed gel for three months. These conditions included 250C ± 20C/ 60% ± 5% RH, 300C ± 20C/ 65% ± 5% RH, and 400C ± 20C/ 75% ± 5% RH. The gel's appearance, pH, viscosity, and spreadibility were examined throughout this time.

Humans in good health used in a patch test

Patients' written agreement and the research's clearance from the Institutional Ethical Committee were acquired before the trial began for the Ph.D. Five healthy male participants (ranging in age from 18 to 24) and five healthy female volunteers (ranging in age from 18 to 24) were each given a patch test to see if they would experience any skin reactions or irritations. The tests were administered both once and twice. Prior to applying the produced gel, the skin on the back of the forearm was cleansed using an alcohol swab. To make sure the gel penetrated the 4x4 cm specified area on the forearm, it was applied in a circular pattern using a clean finger with little pressure. After that, the area was left uncovered. Three times, for different durations, the formulation was reapply (repeated test).After 15 minutes, 30 minutes, 1 hour, and 2 hours, the forearms were rinsed with tap water to assess the cutaneous responses, which included erythema, edema, pruritus, skin allergy, and irritation.

Studies on In Vitro Dissolving

The in vitro drug release experiments used a USP dissolution apparatus type I. The dissolving media, consisting of 900 ml of Phosphate buffer (pH 7.4), was kept at 37±1°C for 30 minutes while the device was spun at 50 rpm. At regular intervals, 5 ml of the sample was removed and replaced with an equivalent volume of drug-free dissolving fluid. After appropriate dilution, the drug concentration in each sample was examined using a UV/Vis Spectrophotometer for extract, and the cumulative percent drug release was computed. The samples were filtered through a 0.45μ membrane filter.

Studies on Release in Vitro

Researchers used Franz diffusion cells to study the release of drugs from *Rubia cordifolia* gel. Figure The patches carrying the medication were placed between the donor and receptor compartments, with a cellophane membrane separating them. To avoid the buildup of a concentrated drug solution layer under the Cellophane membrane, the diffusion medium inside the receptor compartment was agitated using a magnetic stirrer and a magnetic bead. At predetermined intervals, 5 ml of the receptor compartment's sample was removed and replenished with 7.4 pH phosphate buffer. Using a phosphate buffer pH 7.4 as a reference, analysis was carried out using a UV-Visible spectrophotometer at 254 nm.

Figure 4: Thermo-chromatography column

RESULTS

An important part of determining whether pharmaceutical drugs are biocompatible is finding out how they react when exposed to natural chemicals. When it comes to the biologic assessment of herbal products, researchers and regulatory bodies acknowledge the significance of in vitro and animal experiments.

Table 3: First, a physical examination of the formulations (0 month)

Formulation	Control	F I	F II	F III
Colour	White	Reddish	Reddish	Reddish
Appearance	Transparent and Unambiguous	lucid and translucent	lucid and translucent	lucid and translucent
pH	7.10	7.08	7.06	7.06
Spreadibility(gm.cm/sec)	16.02	23.15	21.28	19.12

Table 4: Physical testing of the mixtures at third month at 250 C ± 20C with 60% ± 5% relative humidity

Formulation	Control	F I	F II	F III
Colour	White	Reddish	Reddish	Reddish
Appearance	Transparent and Unambiguous	lucid and translucent	lucid and translucent	lucid and translucent
pH	7.08	7.02	7.00	7.02
Spreadibility (gm.cm/sec)	15.72	22.85	21.02	18.92

Table 5: Third-month physical evaluation of formulations at 300 C ± 20C/65% RH ± 5%

Formulation	Control	F I	F II	F III
Colour	White	Reddish	Reddish	Reddish
Appearance	Transparent and Unambiguous	lucid and translucent	lucid and translucent	lucid and translucent
pH	7.05	7.00	6.98	7.01
Spreadibility (gm.cm/sec)	15.76	22.32	21.00	18.01

Table 6: Physical assessment of the compositions 3 months at 400 C ± 20C/75% ± 5% RH.

Formulation	Control	F I	F II	F III
Colour	White	Reddish	Reddish	Reddish
Appearance	Transparent and Unambiguous	lucid and translucent	lucid and translucent	lucid and translucent
pH	6.92	6.93	6.96	6.98
Spreadibility (gm.cm/sec)	15.02	22.32	21.00	18.01

Table 7: % of Total Drug Release

Timein mins	F1	F2	F3
10	24.5	20.9	15.6
25	90.24	84.5	80.3
20	71.8	73.4	66.7
15	41.2	36.6	32.1
30	100.12	93.9	91.4

Table 8: Diffusion Research

Time in mins	F1	F2	F3
0	0	0	0
20	64.62	66.06	60.03
15	37.08	32.94	28.89
10	22.05	18.81	14.04
30	90.108	84.51	82.26
25	81.216	76.05	72.27

Table 9: Results of a research on skin irritation. (Volunteers in Humanity)

Parameters	Single patch test	Repeated patch test			
		15 mins	30 mins	1 Hr	2 Hr
Erythrema	Nil	Nil	Nil	Nil	Nil
Skin allergy	Nil	Nil	Nil	Nil	Nil
Pruritus	Nil	Nil	Nil	Nil	Nil
Edema	Nil	Nil	Nil	Nil	Nil
Irritation	Nil	Nil	Nil	Nil	Nil

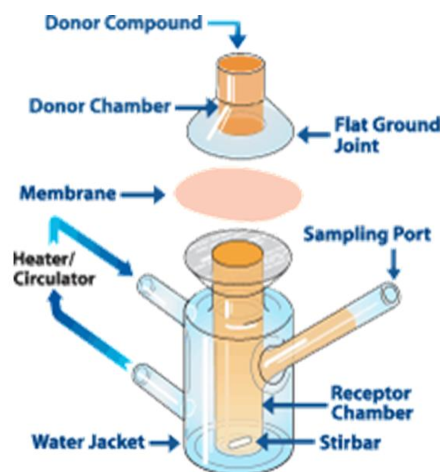

Figure 5: Diffusion cell Franz

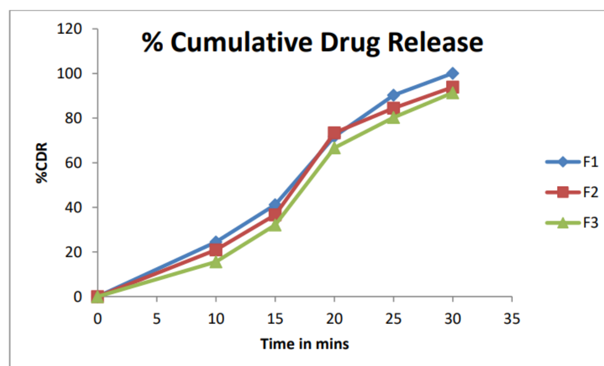

Figure 6: Drug release cumulatively

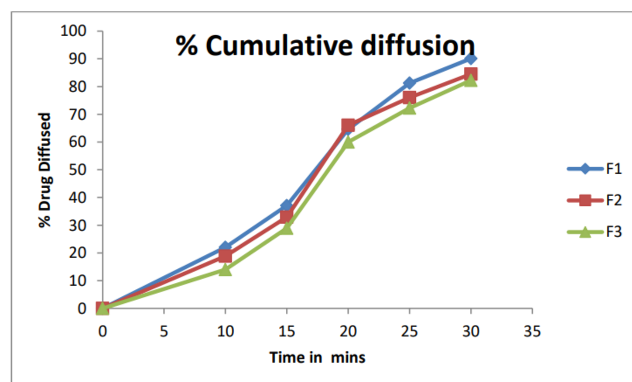

Figure 7: Diffusion cumulative

The reddish-colored, transparent herbal gel had a pleasant, silky texture upon application that persisted even after a rigorous stability test. The pH level,

which ranged from 6.92 to 7.0, remained constant during the research as well. After conducting the stability investigation, we also assessed the gel's spreadability and discovered that it showed less variance compared to the previously created gel. In order to determine the starting viscosities of the gels, a Brookfield viscometer with a spindle was used. After conducting further stability tests for three months, the findings indicated that the gel containing 750 mg of Rubia cordifolia was more stable than the gels containing 1000 mg and 1200 mg. The gel's initial viscosity at various temperatures and humidity levels was quite consistent across all three concentrations of Rubia cordifolia extract (750 mg, 1000 mg, and 1200 mg, respectively), with values of 28620 cps, 29726 cps, and 30156 cps. Tables show the results of the investigations on cumulative drug release and diffusion, respectively. It was determined that batch FI was the most optimised batch. The human participants who were in good health showed no signs of discomfort. Patients with psoriasis may feel comfortable using the newly formulated gel.

CONCLUSION

The findings suggest that the gel formulations have desirable properties such as nice looks, homogeneity, diffusion, in vitro release, and ease of spreading. Psoriasis is a leading cause of death and disability among patients. These herbal extracts have the potential to shorten the duration of the inflammatory phase of the disease by preventing infection, which in turn reduces the risk of scaling. To better understand infection control during healing, further research into the separation of active components and the reciprocal impact of these plant extract machineries on psoriatic conditions is needed.

REFERENCES

1. Choudhary, M.I., Shahwar, D., Zeba, P., Jabbar, A., Ali, I. and Rahman, A., (2018). Antifungal steroidal lactones from *Withania coagulance. Phytochemistry.* 40(4):1243-1246.

2. Govindan, S., Viswanathan, S., Vijayasekaran, V. and Alagappan, R., (2020). A pilot study on the clinical efficacy of *Solanum xanthocarpum* and *Solanum trilobatum* in bronchial asthma. *J. Ethnopharmacol.* 66(2): 205-210.

3. Khan, M.T.J., Ashraf, M., Tehniyat, S., Bukhtair, M.K., Ashraf, S. and Ahmad, W., (2019). Antibacterial activity of *W.coagulans. Fitoterapia.* 64(4):367-370.

4. Ehsan, B.R., Vital, A. and Bipinraj, K.N., (2019). Antimicrobial activity of the ethanolic extract of *Blaciniosa* leaf, stem, fruit and seed. *Afr. J. Biotechnol.* 8(15):3565-3567.

5. Li, G.Q., Huang, H.C., Acharya, S.N. and Erickson, R.S., (2023). Biological control of blossom blight of alfalfa caused by *Botrytis cinerea* under environmentally controlled and field conditions. *Plant Dis.* 88:1246-1251.

6. Masika, P.J. and Afolayan, A.J., (2022). Antimicrobial activity of some plants used for the treatment of livestock disease in the Eastern Cape, South Africa. *J. Ethnopharmacol.* 83(1-2):129-134.

7. Karnick, C.R., (2021). Pharmacology of Ayurvedic Medicinal Plants. Delhi: Shri Satguru Publications. 51.

8. De Clercq, E., (2019). Antiviral therapy for human immunodeficiency virus infections. *Clin. Microbiol. Rev.* 8:200-239.

9. Gessler, M.C., Nkuya, M.H.H. and Mwasumbi, L.B., (2017). Screening Tanzanian medicinal plants for antimalarial activity. *Acta Tropica.* 56(1):65-67.

10. Chopra, R.N., Chopra, K., Handa, K.L. and Kapur, L.D., (2019). Indegenous Drugs of India. *Published by UN Dhar and Sons Pvt. Ltd.* Calcutta. 493:603-648.

11. A. M. Ijeabuonwu, J. Bernatoniene, and Z. Pranskuniene, "Medicinal Plants Used to Treat Skin Diseases and for Cosmetic Purposes in Norway," Plants, vol. 13, no. 19. , p. 2821, Oct. 09, 2024.

12. R. Solanki, "TREATMENT OF SKIN DISEASES THROUGH MEDICINAL PLANTS IN DIFFERENT REGIONS OF THE WORLD," International Journal of Biomedical Research, vol. 2, no. 1. Scholar Science Journals, Oct. 11, 2011.

13. R. Agrawal et al., "Emerging Trends in the Treatment of Skin Disorders by Herbal Drugs: Traditional and Nanotechnological Approach," Pharmaceutics, vol. 16, no. 7. ,p. 869, Jun. 28, 2024.

14. R. Dawid-Pać, "Medicinal plants used in treatment of inflammatory skin diseases," Advances in Dermatology and Allergology, vol. 3. Termedia Sp. z.o.o., pp. 170–177, 2013. doi: 10.5114/pdia.2013.35620.

15. M. Michalak, "Plant Extracts as Skin Care and Therapeutic Agents," International Journal of Molecular Sciences, vol. 24, no. 20. , p. 15444, Oct. 22, 2023.

16. A. N. B. Singab, N. M. Mostafa, I. M. Fawzy, D. Bhatia, P. T. Suryawanshi, and A. Kabra, "Herbal Arsenal against Skin Ailments: A Review Supported by In Silico Molecular Docking Studies," Molecules, vol. 27, no. 19. , p. 6207, Sep. 21, 2022.

17. M. Cedillo-Cortezano, L. R. Martinez-Cuevas, J. A. M. López, I. L. Barrera López,

S. Escutia-Perez, and V. L. Petricevich, “Use of Medicinal Plants in the Process of Wound Healing: A Literature Review,” Pharmaceuticals, vol. 17, no. 3. , p. 303, Feb. 27, 2024.

18. K. Malik et al., “An ethnobotanical study of medicinal plants used to treat skin diseases in northern Pakistan,” BMC Complementary and Alternative Medicine, vol. 19, no. 1. Springer Science and Business Media LLC, Aug. 13, 2019.

19. E. Owusu, M. M. Ahorlu, E. Afutu, A. Akumwena, and G. A. Asare, “Antimicrobial Activity of Selected Medicinal Plants from a Sub-Saharan African Country against Bacterial Pathogens from Post-Operative Wound Infections,” Medical Sciences, vol. 9, no. 2. , p. 23, Mar. 31, 2021.

20. E. E. Tsioutsiou et al., “Medicinal Plants Used Traditionally for Skin Related Problems in the South Balkan and East Mediterranean Region—A Review,” Frontiers in Pharmacology, vol. 13. Frontiers Media SA, Jul. 05, 2022.

21. J. Saising, K. Maneenoon, O. Sakulkeo, S. Limsuwan, F. Götz, and S. P. Voravuthikunchai, “Ethnomedicinal Plants in Herbal Remedies Used for Treatment of Skin Diseases by Traditional Healers in Songkhla Province, Thailand,” Plants, vol. 11, no. 7. , p. 880, Mar. 25, 2022.

Corresponding Author

Amit Das*

Research Scholar, School of Pharmacy, YBN University, Ranchi, Jharkhand, India

Email: amitdaspharma@gmail.com