WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Formulation and Evaluation of the Antimicrobial Acticity by Hydro-Alcoholic Extract of Aerial Parts of *Galinsoga Quadriradiata* Gel

Poojalakshmi Charanthimata[1], Rakesh G H [2], Mohith Bhuhya D[3], Pavithra V[4]

Department of Pharmaceutics, TMAES MMJG College of Pharmacy, Haveri

ABSTRACT:

The goal of the current study was to employ the hydroalcoholic extract of the aerial portions of Galinsoga quadriradiata to make a topical gel utilizing aloe vera as a gel foundation. Aloe vera and carbopol 940, gel-forming polymers, were utilized in three different amounts to make the gel, while sodium benzoate and potassium sorbate were utilized as preservatives. The generated formulations underwent physical characterization and in vitro antibacterial activity tests. The gel's pH was between 6.2 and 7.2. There was a noticeable zone of inhibition in the antibacterial activity as compared to the control. Thus, it is concluded that the hydroalcoholic extract of aerial parts of Galinsoga quadriradiata shows enhanced antibacterial activity when made into a gel using aqueous Aloe vera as a gel foundation.

Keywords: A hydroalcoholic extract of Galinsoga quadriradiata's aerial parts, Aloevera,, Carbopol 940, Anti-microbial activity.

Introduction:

A royal method of systemically delivering therapeutically active specifics, the transdermal drug delivery system applies a drug expression to healthy, whole skin. Although the oral route is more popular for medication delivery, it has many drawbacks, such as first-pass metabolism, GI vexation, limited bioavailability, and drug decline in the gastrointestinal tract because of stomach pH and enzymes. Chien (1992), Banker (1990), and Guy (1996) developed a Novel Drug Delivery System to dematerialize these issues. It is a method of transdermal medication administration.. Since the skin is the largest and most accessible organ in the human body, drug distribution through it has proven to be both successful and difficult to discuss. [1]. Topical gels or formulations offer many benefits over other traditional lozenge forms. Compared to other lozenge forms, topical gels are more effective and less toxic. Because topical gels apply directly to the skin or to the spot, they are a fashionable option for treating initial infections and skin issues. Topical gels provide direct action at the site of action. Topical gels account for GI vexation and metabolism, which reduces the medication's bioavailability. The sale of topical gels is likewise prohibited, as is the sale of food and medicine. Due to its two phases, gels have a greater penetrating capability. To cure and treat cutaneous disorders, topical gels are semi-solid, homogeneous medications. Because gels are more hydrophilic, the pace at which the medication or active ingredient was released was rapid. Compared to creams and ointments, transdermal application of gels at pathological sites gives a significant benefit in a rapid release of medication straight to the site of action, regardless of the medication's water solubility.[2] It has been revealed that extracts taken from pharmacies demonstrate a variety of natural exertions, such as antioxidant and seditious ones. The antimicrobial composites found in pharmacies may have a substantial clinical benefit in the treatment of resistant microbial strains and may work differently from currently used antimicrobials in inhibiting the growth of bacteria, fungus, contagions, and protozoa. While not as efficient as antibiotics alone, several of those active composites exhibit both natural antibacterial exertion and antibiotic resistance-modifying exertion. When used in conjunction with antibiotics, they can aid in the eradication of antibiotic resistance in bacteria. When compared to synthetic medications, chemically complex mixtures have less adverse effects and a lower likelihood of acquiring resistance, making them more restorative.[3] Aloe vera grows well in arid settings and is often found in India, Africa, and other arid regions. The species is frequently mentioned in relation to herbal drugs. Aloe vera is a succulent factory that defies failure. 99.3% of the gel is water, with the remaining 0.7 being composed of solids, of which carbohydrates make up a significant portion (Foster, 1999). The body's weakest systems can be stimulated by aloe gel (Davis, 1997). There has been a gradual growth in the usage of factory products for pharmaceutical purposes. The World Health Organization states that pharmacies are the most fashionable place to find a wide range of medications (Santis et al., 1995). When treating multicolor microbial illnesses, the use of factory extracts containing recognized antibacterial packages can be quite important.[4]

A member of the Liliaceae family, aloe vera is a type of cactus. Two distinct corridors, a central mucilaginous portion, and additional pack jacket cells make up the aloe vera splint. Aloe vera gel is a transparent, thin, tasteless substance that resembles jelly and is produced by the parenchymal tissue, which makes up the interior part of the aloe leaves. In recent years, the mucilaginous cloth found in the middle of the Aloe vera splint has been used to make colorful ornamental and medicinal items in the form of Aloe vera gel. Aloe vera has been used medicinally for a variety of ailments, including gastrointestinal (GI) pain, sinusitis, becks, hair loss, skin infections, and hemorrhoids. Additionally, it has anti-helminthic, anti-physical, and anti-arthritic properties and is a great healer for bruises, x-ray becks, and nonentity mouthfuls. Aloe vera has been successfully used to treat a variety of skin disorders, such as psoriasis, frostbite, radiodermatitis, and genital herpes infection. Aloe vera has been shown to have anti-inflammatory, antibacterial, antioxidant, antiviral, and antifungal properties in addition to creating hypoglycemic products. [5]Another name for Galinsoga quadriradiata, a species of unfolding

factory in the Asteraceae family, is hairy galinsoga or shaggy dogface. In Mexico, this factory expands significantly. Flavonoids (Apigenin 7-β-D-glucoside, Galinsoside A, Galinsoside B), sweet esters (Galinosoate A, B, C), phenolic acid derivatives (gallic acid, 3,4-dihydroxy benzoic-hydroxy benzoic acid), diterpenoids, steroids (7-hydroxy- β--hydroxy stigmasterol), caffeic acid derivatives, uracil, and other substances are found in factory leaves. It has antibacterial and anti-seditious properties. The taxonomic bracket Like all pharmacies, G. quadriradiata is a member of the Plantae family..

Figure : 01 Galinsoga quadriradiata

It falls into the following taxonomical categories. Kingdom: Plantae, Domain: Eukaryota, Classification: Spermatophyte Class: Dicotyledonae, Order: Asterales, Family: Asteraceae, Subphylum: Angiospermae Galinsoga quadriradiata is the species of the genus Galinsoga. [6]

Objectives:

1. Galinsoga quadriradiata aerial components are extracted using hydro-alcohol.
2. Initial phytochemical analysis of a hydroalcoholic extract of Galinsoga quadriradiata's aerial parts.
3. To create a topical gel by adding aloe vera pulp juice to a hydroalcoholic extract of Galinsoga quadriradiata's aerial parts.
4. To assess different physical characteristics of a topical gel containing a hydroalcoholic extract of Galinsoga quadriradiata's aerial parts.
5. To test the topical gel's antibacterial properties using a hydroalcoholic extract of Galinsoga quadriradiata's aerial parts.

Methodology:

MATERIALS:

Sl, No.	Materials	Source
1	*Galinsoga quadriradiata*	Local available
2	Carbopol 940	S.D. Fine Chem. Ltd., Mumbai, India
3	Sodium benzoate	S.D. Fine Chem. Ltd., Mumbai, India
4	Potassium sorbate	S.D. Fine Chem. Ltd., Mumbai, India
5	Sodium hydroxide	S.D. Fine Chem. Ltd., Mumbai, India
6	Triethanolamine	S.D. Fine Chem. Ltd., Mumbai, India
7	Ethanol	S.D. Fine Chem. Ltd., Mumbai, India
8	Aloe vera	Local available

Instruments:

Table 2: List of instruments used with manufacturer

Sl, No.	Instruments	Make
1	Digital pH meter	Remi Instruments Ltd
2	Incubator	Hanna Instruments Ltd
3	Hot air oven	Remi Instruments Ltd
4	Magnetic stirrer	Remi Instruments Ltd
5	Brooke field viscometer	Remi Instruments Ltd
6	Water bath	Remi Instruments Ltd
7	Electronic balance	Remi Instruments Ltd

A. Collection of plant material

The present study was conducted in department of pharmaceutics, MMJG Collage of Pharmacy, Haveri. The areal parts of Galinsoga quadriradiata was collected from campus of MMJG Collage of Pharmacy, Haveri and was authenticated by taxonomist.

B. Preparation of plant extract

Areal parts of Galinsoga quadriradiata were shade dried (up to 3 weeks) and powdered using mixer grinder. Powdered dry plant material (250g) was macerated with 2000 ml of 70% hydroethanol for 72 hrs and thus hydro-ethanolic extract was obtained. The extract was filtered and concentrated using distillation process.

C. Phytochemical analysis of extrac

Several compounds were detected during a preliminary phytochemical study of the plant extract utilizing conventional method. [11]

1. Alkaloids test;-Hager's examination: After treating the filtrate, Hager's reagent was applied. When a yellow precipitate forms, alkaloids are present

2.**Test for Tannins**;-Lead acetate solution: Add the extract and 1% lead acetate solution. The development of white colour signifies the presence of tannin.

3.**Test for flavonoids;-**Alkaline Reagent Test: A few drops of NaOH solution were applied to the extract. Flavonoids are shown by the formation of a bright yellow color that vanished when concentrated HCL was added.

4.**Test for Saponins** Glycosides;-Test for foam: A mixture of test outcome or water was shaken, and the froth formation that ought to remain steady for 15 minutes was monitored. This finding suggests that saponins are present.

5.**Test for Terpenoids**;- Salkowski Test: Two milliliters of chloroform and two milliliters of concentrated H2SO4 were carefully added to the extract from a layer. Terpenoids are indicated by a reddish-brown color..

D. Formulation of gel

The central parenchymatous pulp was scooped out with a spatula from the Aloe leaves and the pulp was washed repeatedly with water and finally treated with 0.1 N sodium hydroxide (NaOH) to avoid the acidity in preparation. The treated pulp was placed in a blender to obtain the juice. The obtained juice was subjected to vacuum filtration. To the clear liquid so obtained, 1% 2% and 3% w/w Carbopol 940 was added and dispersed uniformly ensuring no lumps. hydroalcoholic extract of aerial parts of Galinsoga quadriradiata, Sodium benzoate and potassium sorbate were dissolved in small volume of ethanol and added to the mixture mentioned above. Drop by drop, the triethanolamine solution was added until a gel formed. Drop by drop, the triethanolamine solution was added until a gel was formed in air tight containers in a dark room to prevent photo-oxidation.[12]

The compositions of all the preparations are shown in the Table no. 3

Table No. 3: HYDROALCOHOLIC EXTRACT OF GALINSOGA QUADRIRADIATA GEL'S AERIAL PARTS BASED ON ALOE VERA FORMULATION DESIGN.

Ingredients	F1	F2	F3
A HYDROALCOHOLIC EXTRACT OF GALINSOGA QUADRIRADIATA'S AERIAL PART (mg)	100	100	100
ALOE VERA (ml)	7.5	7.5	7.5
CARBOPOL 940 (mg)	100(1%)	200(2%)	300(3%)
SODIUM BENZOATE (mg)	0.02	0.02	0.02

POTASSIUM SORBATE (mg)	0.02	0.02	0.02
WATER UPTO (ml)	QS	QS	QS

E. Evaluation parameters

1. Physical evaluation

Formulated herbal gel was further evaluated utilizing the organoleptic characteristics listed below. Color, consistency, odor, and formulation state. • Appearance: A visual inspection of the gel's appearance was conducted. The outcome was noted.

• **Color**: The gel's color was

• **Odour:** The odour of gel was observed and results were recorded.

•**Consistency:** The formulation was examined by applying gel on hand manually.

•**Transparency:** The state of gel was examined visually and results were recorded.

2. Percentage Practical Yield [11]

Percentage yield was calculated by knowing the practical yield and theoretical yield. It was calculated by using equation

$$\text{Percentage yield} = \frac{practical\ weight\ of\ the\ gel}{Therotical\ weight\ of\ extract + weight\ of\ polymer} \times 100$$

3. Determination of pH

pH of prepared herbal a digital pH meter was used to measure the gel. The gel solution was made by dissolving 10 mg of gel in 100 ml of distilled water and set aside for 2h. pH was determined in three time for the solution and the average value was calculated.

4. Viscosity

Viscosity of gel was done by using Brooke field viscometer. The reading taken at 100rpm using spindle no. 06.

5. Spreadability

The parallel-plate approach, which has numerous versions, is the most often used technique for determining spreadability. This approach is quick, easy, and cost-effective. One gram of the sample, which was prepared 48 hours before to the test, is sandwiched between two 20 × 20 cm glass plates during the parallel-plate method of measurement. For one minute, a 125 g weight (50–500 g) is set on top. The sample's diameter between the plates is then measured. The formula for determining spreadability in these situations is $S = d2 \times \pi/4$ S–spreading area (mm2), which depends on mass and d–spreading area diameter(mm).

6. Stability study: After being manufactured in aluminum collapsible tubes, the optimized gel compositions were put through two months of room temperature stability testing. Samples were taken out every seven days and assessed for spreadability, pH, and physical appearance.

7. Antimicrobial activity in vitro: [12] The purpose of the antimicrobial efficacy trials was to determine the formulations' biological activity. The test organisms were E. coli. Using the Cup-Plate method, an agar diffusion test was used to measure the antimicrobial efficiency. sterile solutions of the proposed formulation in specified concentrations (test solutions), gentamicin (standard solution), and aloevera solution**.** Following two hours for the solutions to diffuse, the agar plates were incubated at 37°C for twenty-four hours. These solutions were then poured into cups that had been boring into sterile nutrient agar that had already been seeded with test organisms (E. coli). Each cup's zone of inhibition (ZOI) was measured and compared to the control. A laminar airflow unit was used for the whole process, with the exception of the incubation.

Results

This research project An overview of the recently created hydro-alcoholic extract of the aerial sections of Galinsoga quadriradiata gel based on Aloe vera. The next section contains the specifics of the findings and debates.

1. A hydroalcoholic extract of Galinsoga quadriradiata's aerial components**.** 16.1g of hydro-alcoholic extract was produced.

Figure 02 **:** alcoholic hydrocarbon extract of the aerial portions of galinsoga quadriradiata

2. Phytochemical test: Table no: 04

SL.NO	Secondary metabolites	Test	Observations	Result
1	Alkaloids	Hager's test	Yellow ppt	Positive
2	Tannins	Lead acetate test	White ppt	Positive
3	Flavonoids	Alkaline reagent test	Intense yellow colour	Positive
4	Saponin glycosides	Foam test	Froth formation	Positive
5	Terpenoids	Salkowski test	Reddish brown colour	Positive

3. Formulation of aloe vera based hydroalcoholic extract of aerial parts of galinsoga quadriradiata gel.



Figure.no 04: a.F1 b.F2 c.F

4. Evaluation parameters:

I. Physical evaluation: Table no: 05

Sl, No.	Organoleptic parameters	observation
1	Appearance	Semisolid in nature
2	Colour	Faint green
3	Odour	Characteristic
4	Consistency	Smooth
5	Transparency	Non-transparent

II. Percentage practical yield

The result of % practical yield is shown in table. The % practical yield increases as the amount of polymer increases in the formulation.

III. Surface pH

Surface pH of the formulation F1, F2 and F3 varies from 6.2 to 7.2. Each sample was analysed in triplicate (n=3) which were within acceptable range. The result reveals that all the formulations provided an acceptable pH. Hence, they may not produce any local irritation to the surface of skin.

IV. Viscosity

The Brookfield viscometer from Brookfield Engineering Laboratories was used to measure the created gel's viscosity. The formulation with the best viscosity was identified among these three F2.

V. Spreadability

Figure no: 05 a.F1 b.F2 c.F3

Formulation code	Percentage yield (%)	pH	Viscosity(cps)	Spread ability(mm2)
F1	93.89	7.1	954	12.56
F2	96.86	6.5	2688	15.90
F3	96.19	7.2	3985	13.85

Table no: 06 Evaluvation parameters of galinsoga quadriradiata gel.

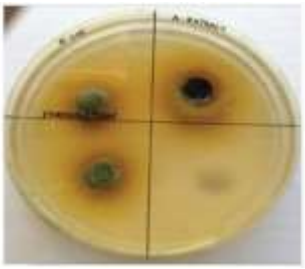
VI. Stability study:

Accelerated stability testing showed that after two months of storage, the produced gel's physical characteristics, rheological characteristics, and spreadability did not change. After two months of storage, the produced gel's pH was found to be between 6.2 and 7.2. Uniform spreadability was achieved.

VII. In-vitro antimicrobial activity:

The in-vitro antibacterial study was performed by measuring and comparing the diameter of zones of inhibition (in mm) for the various products. The clear area surrounding the well that contains an antimicrobial agent is known as the zone of inhibition. It is well known that the greater the restriction zone, the more potent the antimicrobial agent. The E. Coli was tested against the antibacterial properties of pure gentamicin, plant extract, and a hydroalcoholic extract made from aloe vera derived from the aerial sections of Galinsoga quadriradiata gel (F2). Table 5 displays the findings. The findings indicate that pure gentamicin has more antibacterial activity against the investigated microorganisms than plant extract. As seen by their greater zone of inhibition against the tested bacteria, the results further demonstrated the synergistic action of gentamicin and the F2 gel formulation. Table No. 07: Aloe vera's antimicrobial properties based extract of galinsoga quadriradiata gel's aerial components in hydroalcoholic form. Code Creation Inhibition Zone (in mm) 1 Gentamicin 6 3 Plant extract 5 4 Control 0 2 Galinsoga quadriradiata gel's aerial portions are extracted hydroalcoholicly using aloe vera. (F2) 9. Plates Illustrating the Zone of Inhibition in Figure 06 In conclusion The hydro-alcoholic extract of Galinsoga quadriradiata gel's aerial portions had a uniform appearance, a distinct smell, and the ideal pH. It was discovered that the prepared gel was natural and suitable for topical use.

Code	Formulation	Inhibition zone (in mm)
1	Gentamicin	6
2	Galinsoga quadriradiata gel's aerial portions are extracted hydroalcoholicly using aloe vera. (F2)	9
3	Plant extract	5
4	Control	0



Plates Illustrating the Zone of Inhibition in Figure 06

Conclusion

The hydro-alcoholic extract of Galinsoga quadriradiata gel's aerial portions had a uniform appearance, a distinct smell, and the ideal pH. It was discovered that the prepared gel was natural and suitable for topical use and treating microbial infection.

Based on comprehensive evaluation, F2 has been identified as the optimal gel formulation. F2 shows optimized viscosity, when comparison with F1and F3. Formulation 1 is too low viscosity, may not provide sufficient thickness. Formulation 3 is too high viscosity, may be difficult to apply or spread. Formulation 2 is high viscosity shows good thickening without being too excessive and balance between stability and flowability.

The hydroalcoholic extract of aerial parts of galinsoga quadriradiata, formulated as F2, demonstrates enhanced antimicrobial activity compared to the standard antibiotic Gentamicin and the crude plant extract

The significant increases in zone of inhibition for F2 suggests that the formulation has potent antimicrobial properties, likely due to the synergistic effects of aloe vera and Galinsoga quadriradiata extract.

This formulation may be effective against a broad spectrum of microorganisms.

References:

List all the material used from various sources for making this project proposal

1.REVIEW OF TRANSDERMAL DRUG DELIVERY SYSTEM Nikita Shinde1 *, Shubhangi Manikpuriya2 and Dr. Gajanan Sanap

2.A REVIEW ON TOPICAL GEL Prem Samundre*, Surendra Dangi, Teena Patidar, Shubham Maroti Shende. School of pharmacy and research, People's University, Bhanpur, Bhopal (MP) India, 462031

3.Towards Advances in Medicinal Plant Antimicrobial Activity: A Review Study on Challenges and Future Perspectives Natalia Vaou 1,*, Elisavet Stavropoulou 2,*, Chrysa Voidarou 3 , Christina Tsigalou 4 and Eugenia Bezirtzoglou 1

4.ANTIMICROBIAL ACTIVITY OF ALOE VERA LEAF EXTRACT Kedarnath1 , Kamble KaveriM2 , Vishwanath B Chimkod and C S Patil3 1 Singhania University, Pacheri Bari, Rajasthan 2 Plant Tissue Culture and Genetic Engineering Lab, Department of P. G and Research Studies in Botany, Gulbarga University, Gulbarga- 585106, Karnataka, INDIA 3 Department of Biotechnology, B.V. Bhoomreddy College of UG and PG Studies, Bidar,

5.Geetha Bhat, Praveen Kudva, and Vidya Dodwad. Aloe vera: Nature's soothing healer to periodontal disease. J Indian Soc Periodontol. 2011; 15(3): 205–209.

6.WIKIPEDIA
https://en.m.wikipedia.org/wiki/Galinsoga_quadriradiata#:~:text=Galinsoga%20quadriradiata%20is%20a%20species,%2C%20Peruvian%20daisy%2C%20hairy%20galinsoga

7.Comparative study of antimicrobial action of aloe vera and antibiotics against different bacterial isolates from skin infection Safia Arbab1,2,3 | Hanif Ullah4 | Wang Weiwei1,2,3 | Xiaojuan Wei1,2,3

| Salah Uddin Ahmad1,2,3 | Lingyu Wu1,2,3 | Jiyu Zhang

8.Determination of antioxidant activity of extracts and fractions obtained from Galinsoga parviflora and Galinsoga quadriradiata, and a qualitative study of the most active fractions using TLC and HPLC methods Agnieszka Bazylko a , Magdalena Stolarczyk a , Małgorzata Derwińska a & Anna Karolina Kiss a a Department of Pharmacognosy and Molecular Basis of Phytotherapy , Medical University of Warsaw , Banacha 1 , Warsaw 02-097 , Poland Published online: 15 Nov 2011.

9.Comprehensive review of antimicrobial activities of plant flavonoids Ireneusz Go´rniak . Rafał Bartoszewski . Jarosław Kro´liczewski

10.Formulation and Evaluation of Herbal Gel Containing Leaf Extract of Tridax Procumbens Jadhav V. D., Talele Swati G.*, Bakliwal Akshada A., Chaudhari G. N. Sandip Institute of Pharmaceutical Sciences, Mahiravani, Nasik, India.

11.Sharma, T., Pandey, B., Shrestha, B. K., Koju, G. M., Thusa, R., & Karki, N. (2020). Phytochemical Screening of Medicinal Plants and Study of the Effect of Phytoconstituents in Seed

Germination. Tribhuvan University Journal, 35(2), 1–11. https://doi.org/10.3126/tuj.v35i2.36183

12.Patel P, Javia A, Sheth AK. Formulation and evaluation of sustained release chlorhexidine in-situ gel for periodontitis. Int J Pharm Sci. 2013; 4(4): 465-78.