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Research Article

Formulation and Evaluation of Tridax Procumbens Gel

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ABSTRACT

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Herbal medicine has become an item of global importance both medicinal and economical. Although usage of these herbal medicines has increased, their quality, safety and efficiency are serious concerns in industrialized and developing countries. Herbal remedies are getting increasing patient compliance as they are devoid of typical side effects of allopathic medicines. The present research has been undertaken with the aim to formulate and evaluate the herbal gel containing Tridax procumbens leaf extract. The gel formulation was designed by using Carbapol 940, Tridax procumbens leaf extract, propylene glycol, methyl paraben, propyl paraben and required amount of distilled water. The skin pH was maintained by drop wise addition of Tri-ethanolamine. The physicochemical parameters of formulations (pH, spreadibility, viscosity etc.) were determined. Herbal medications are considered safer than allopathic medicines as allopathic medicines are associated with the side effects. One of the method for its survival is preparation of extract and their formulations for better absorption and penetration of the active moiety into the systemic circulation.

INTRODUCTION

Medicinal plants have been a major source of cure for human diseases since time immemorial. It is no wonder that the world's one-fourth population i.e. 1.42 billion people, are dependent on traditional medicines for the treatment of various ailments . Recently considerable attention has been paid to utilize eco-friendly and biofriendly plant based products for the prevention and cure of different human diseases. It is documented that most of the World's population has taken in traditional medicine, particularly plant drug for the primary health care . The Indian flora offers a variety of plants having medicinal properties. These plants can be exploited to find out effective alternative to synthetic drugs [3]. Plants play a vital role in curing various ailments of the man and herbal remedies are getting increasing patient compliance as they are devoid of typical side effects of allopathic medicines. The allopathic system of medicine includes two conventional line of the

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treatment for rheumatoid arthritis, which come along with certain side effects. Hence, turning to safe, effective and time tested ayurvedic herbal drug formulations would be a preferable option. drugs and their effective formulation for the better patient acceptance . In India, medicines based on herbal origin have been the basis of treatment and cure for various diseases. Moreover, Indian folk medicine comprises numerous prescriptions for therapeutic purposes such as healing of wounds, inflammation, skin infections, leprosy, diarrhea, scabies, venereal disease, ulcers, snake bite, etc. More than 80% of the world's population still depends upon traditional medicines for various skin diseases . Herbal medicines in wound management involve disinfection, debridement and providing a moist environment to encourage the establishment of the suitable environment for natural healing process . Research on medicinal plants is one of the leading areas of research globally. Topical antimicrobial therapy is one of the most important methods of wound care. In folklore medicine, medicinal plants have been used widely in facilitating wound healing with high degree of successes. This has inspired many researches which are aimed at validating the claims and discovering mechanisms which possibly explains the potentials of these herbs on wound repair processes & eliminating infections . Drug deliveryvia skin to achieve systemic effect of drug is commonly referred to as transdermal drug delivery. Transdermal drug delivery systems (TDDS) provide a means to sustain drug release as well as reduce the intensity of action and thus reduce the side effects associated with its oral therapy. Semisolids available as a wide range of dosage forms each having unique characteristics.

Types of gels:

1. Hydrogel



- Properties: High water content, biocompatible, and can be used in medical applications.

2. Organogel

- Definition: A gel-like material composed of an organic solvent and a network of polymer chains.
- Properties: Can be used in pharmaceutical and cosmetic applications.

3. Aerogel

- Definition: A gel-like material composed of air and a network of polymer chains.
- Properties: Extremely low density, high surface area, and can be used in insulation and filtration applications.

4. Emulgels

- Definition: A gel-like material composed of a mixture of oil and water.
- Properties: Can be used in pharmaceutical and cosmetic applications.

5. Hydrocolloid Gel

- Definition: A gel-like material composed of a mixture of water and a hydrocolloid polymer.
- Properties: Can be used in wound dressing and skin care applications.

6. Silicone Gel

- Definition: A gel-like material composed of a mixture of silicone oil and a polymer network.



- Properties: Can be used in medical implants, sealants, and adhesives.

7. Polymeric Gel

- Definition: A gel-like material composed of a network of polymer chains.
- Properties: Can be used in a wide range of applications, including pharmaceutical, cosmetic, and biomedical.

8. Biodegradable Gel

- Definition: A gel-like material composed of biodegradable polymers.
- Properties: Can be used in biomedical applications, such as tissue engineering and drug delivery.

9. Thermoresponsive Gel

- Definition: A gel-like material that changes its properties in response to temperature changes.
- Properties: Can be used in biomedical applications, such as drug delivery and tissue engineering.

10. pH-Responsive Gel

- Definition: A gel-like material that changes its properties in response to pH changes.
- Properties: Can be used in biomedical applications, such as drug delivery and tissue engineering.

Advantages of Gel

- □ Non-greasy application.
- □ Being easy to formulate with active ingredients.
- □ Adhering well to the application site.
- □ Being washable and non-toxic.
- □ Stability over time.
- □ Ability to target affected area for rapid treatment and relief.
- □ Preventing unwanted side effects through bypassing the digestive system.
- □ Easy spreading.
- □ Skin retention.
- □ A cooling effect on

Benefits of Gel

1. Natural and safe: Herbal gels are made from natural ingredients, making them a safer alternative to synthetic products.

2. Targeted delivery: Herbal gels allow for targeted delivery of active ingredients, providing localized benefits for specific skin concerns.

3. Easy to apply: Herbal gels are easy to apply and can be used on various skin types.

4. Promotes skin health: Herbal gels can promote skin health by providing antioxidants, antiinflammatory compounds, and other beneficial phytochemicals.

Review of Literature



1. Jadhav V. D, Telele Swati G 2015. Herbal gels are used since many years. Gel is the semisolid dosage form of at least two constituents, consisting of a condensed mass enclosing and interpenetrated by aliquid. It has an easy application, easy removable property. It is widely accepted dosage form, and it has more patient compliance. Tridax procumbens is an anti-bacterial drug, it also has wound healing activity for such activity it has been used in traditional medicinal systems in India, the rural parts of country still has a wide use of this plant.

2.Victoriya Salomi, M. etal.2016."PhytochemicalAnalysisand Antimicrobial

ActivityofFourDifferentExtractsfromtheLeavesof Murrayakoenigii".Research enlight the study of four different extracts of Murraya Koenigii (Rutaceae) leaves were screened for theirphytochemical

compositionandantimicrobialactivity. The present study investigates the qualitative and quantitative analysis of the major phytochemicals in four different extracts of Murraya Koenigii.

3. Bhapkar Sachin Anandrao 2024, The present study reveals vial information on anti-bacterial and blood clotting activity on the tridax procumbens L. (Asteraceae) medicinal plant. The present study on phytochemical analysis on the plant is essential. Herbal gel is used in many years but some problems are occurred in emulgel formulations so novelty preparation ie emulgel formulation which are shows better thickness and spreadability with activity. The combination of emulsion and gel then the formation of emulgel formulation which is give semisolid topical dosage form at least two constituents. It has an easy application, easy removal property. 4. Roqaiya, Mariyam et al. 2016 ".Acacia arabica (Babool)- A Review on Ethnobotanical and Unani Traditional Uses as well as Phytochemical and Properties". As the pharmacologists are looking forward to develop natural sources, development of modern drugs from Acacia arabica can be emphasized for the control of various diseases. It contains a number of phytoconstituents, which are the key factors in the medicinal value of this plant. It is quiteev identfrom this review that Acacia arabica is an important medicinal herb and extensively all types of medicinal systems.

5. Chaudhari, Pankaj et al.2014. "Formulation and Evaluation of Antifungal herbalgel of Indian traditional Herbs".Literature evaluate the various parameter of herbal gel formulation and compared their result with standard.

6. Viswanad, Vidya et al. 2012. "Development and evaluation of antimicrobial herbal formulations containing the methanolic extract of Samadera indica for skin diseases". Inthisliterature, formulations showed acceptable phy properties, and compared sical theirresultwithstandard, we recompatible with the ski n.Thein-vitroantimicrobial activityshowedthattheformulatedgelofthemethano licextractofSamaderaindica showed comparativelymoreagainstthebacterialandfungals peciesratherthanthe formulated gel.

7. Aiyalu et al. 2012. "Formulation and evaluation of topical herbal gel for the treatmentof arthritis in animal model". Anti-arthritic activity of the developed

topicalherbalgelformulationmaybeduetothepresen ceofluteolinandapigenin in methanol leaf extracts of Cardiospermum halicacabum and Vitex negundo



8. Sandeep D. et al.2010. "Formulation and Evaluation of Antibacterial Herbal gels of Murraya koenigii Leaves Extract". From the present investigation, it has been revealed that herbal gels of plant Murraya koenigii leaves extract can be formulated using carbopol940 as polymer with other ingredients and the evaluation of physical parameters shown satisfactory results. From the antibacterial activity it was found that prepared herbal gels of Murraya koenigii leaves extract were significantly active against tested pathogens which were comparable with standard antibiotic. Hence, from the over all results, finally it was concluded that the formulated herbal gels have significant antimicrobial properties and hence will be better, safe and effective than allopathic medications.

Rationale Of The Study: -Need Of Work: -

Overall, the use of antimicrobial herbal gels is a safe and effective way to protectagainst harmful microorganisms while promoting overall health and wellbeing. The aim of preparing an herbal antimicrobial formulation is to develop a product thatcan effectively kill or inhibit the growth of harmful microorganisms such as bacteria, viruses, fungi usingnatural ingredients. and Theprimarygoal preparing of an herbal antimicrobial formulation is to provide a safe, effective, and natural alternative to synthetic antimicrobial agents that can have harmful side effects. Herbal antimicrobial formulations are considered to be safer and less toxic than synthetic antimicrobial agents, makingthemapopularchoice for people who prefer natural products.

Objectives: -

1. Reduces the spread of infections: Antimicrobial herbal gel is effective in killing harmful

microorganisms on the skin, thereby reducing the spread of infections.

- 2. Promotes wound healing: Some antimicrobial herbal gels contain ingredients that promote wound healing.
- 3. Safe and natural: Antimicrobial herbal gels are made from natural ingredients, making them safe for use on the skin.
- 4. Environmentally friendly: Antimicrobial herbal gels are made from renewable resourcesandbiodegradableingredients. Theydon otcontainharmfulchemicalsthat can harm the environment.

PLAN OF WORK: -

- Selection of pure drug
- 1. Tridax Procumbens.
- Preparation of reagents-
- 1. Collection of Plant Material
- 2. Preparation of extract
- 3. Formulation
- Experimental design-

1. To Prepare And evaluate herbal antimicrobial gel

- Comparative study
- Result & discussion
- Conclusion
- Reference

Drug Profile: -

1.Tridax Procumbens:

Synonyms: Dagadipala, Kabarmodi.

Genus: Tridax



Order: Asteraceae.

Species: T. Procumbens.

Family: Asteracear.

Kingdom: Plantae.

Uses: Antioxidants, anti-inflammatory, antiallergic, Anti fungal, wound healing, Blood clotting activity, Anti microbial.



Fig. 1 Tridax Procumbens

MATERIALS AND METHODS:

Table6.1:	List o	of Mate	rials
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Sr. No.	Particular	Quantity
1.	Extract	5gm
2.	Carbol	2gm
3.	Propylene glycol	1gm
4.	Methyl paraben	1gm
5.	Propyl paraben	1 ml
6.	Glycerin	1ml
7.	Triethanolamine	Q.S
8.	Water	Q.S

Drugs and chemicals: Extract, carbapo, Propylene Glycol, ethanol, methyl parabenpropyl paraben, distilled water, ethanolamine **Glassware's and instruments**: Beaker , volumetric flask , china dish , measuring cylinder, weighing balance, stirrer,

Methods:

Collection Of Plant Material

Fresh leaves of tridax procumbens were collected. The leaves were washed under running tap water. Then the leaves were shade dried for about 2-3 weeks. The dry leaves were homogenized to fine powder or coarse powder and stored it .

Preparation of Extraction:

Collected tridax procumbens leaves of shade dried plant materials were 10 g powdered and extracted with 100 ml of 100% ethanol and allowed digestion for 72 hours. The resultant extract was concentrated and separated in to a 250 ml iodine flask.



Extraction Of Tridax Procumbins

Preparation and formulation.



Required quantity of carbopol was taken and 20ml of water was added in it; it was stirred at 300-500RPM in a homogenizer for 15 minutes. After achieving a sticky consistency add triethanolamine and more 10ml of water. Again it was stirred at higher than 500RPM. After another 20 minutes a gel base was formed then Tridax procumbens extract was added; and it was further stirred for 10 minutes at higher rpm, Propylene glycol, Propyl Paraben and methyl paraben were further added in geometric proportions to yield a homogenous gel. Add glycerine in the formulation and stirred for 10 minutes to proper mix up. Finally this whole mixture was stirred for another 45 minutes with small incremental addition of water.



Gel

Preliminary- Evaluation test of drug:

Identification Test:-

Phytochemical screening of tridax procumbens leaves

The phytoconstituents present in the Ethyl alcohol extracts of leaves Tridax procumbens were analyzed qualitatively by using standard procedures

Test for Alkaloids

About 2 ml of extract was taken and added 2 ml of concentrated HCL and then Mayer's reagent was added drop wise. The formation of white precipitate indicates the presence of alkaloids

Test for Flavonoids

The extract of 0.1 ml was taken and made up to 5 ml with distilled water, after which 0.3 ml of sodium nitrate was added and incubated for 5 mins at room temperature and then added 3 ml of 10% aluminium chloride which is incubated for 6 mins at room temperature. Finally, 2ml of sodium hydroxide (NaOH) was added. The formation of yellow color indicates the presence of flavonoids.

Test for Saponins

About 2ml of filtrate was mixed with 1ml of distilled water and shaken vigorously for about 3 seconds and it was allowed to stand for few mins and then added 3 drops of olive oil and shaken vigorously. Formation of emulsion indicates the presence of saponins.

Test for Terpenoids

About 1ml of the extract and 2ml of chloroform was taken and followed by the addition of 5ml of concentrated H2SO4 along the sides of the test tubes. Formation of a reddish-brown coloration in the interphase indicates the presence of terpenoids.

Test for Phenolic Compounds

To 1ml of extract, 1ml of Iron (III) chloride was added and mixed well. A deep blue green color was formed which indicates the presence of phenolic

Test for Quinones



To 2ml of plant extract, 1ml of concentrated H2SO4 was added. Formation of red color indicates the presence of quinones.

Test for Steroids

To 10 mg of plant extract, 2ml of acetic anhydride and followed by 2ml of H2SO4 were added. Formation of violet or blue color indicates the presence of steroids.

Test for Tannins

To1ml of the extract added 0.1% of ferric chloride solution and observed brownish green or a blue black coloration which indicates the presence of tannins.

Test for Glycosides

About 1ml of extract was treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1ml of concentrated sulphuric acid. A brown ring at the interface indicates deoxysugar which confirms the presence of cardenolides. A violet-green ring appearing below the brown ring in the acetic acid layer indicates the presence of glycosides.

Test for Coumarins

The extract was dissolved in methanol and then added alcoholic NaOH. A yellow color appears which later disappears on addition of drops of concentrated HCl indicates the presence of coumarins.



Evalution Test:

1. Organoleptic Characters:

when evaluating food or beverages, organoleptic characteristics include factors like flavor, aroma,

color, texture, and mouthfeel. These characteristics play a significant role in determining the overall quality and consumer acceptance of a product.

2. Determination Of pH:

A digital pH metre was used to determine the pH of the formulation. One gram of formulation was dissolved in one hundred millilitres demineralized water and stored for two hours. The pH of the formulation was measured in triplicate. Before use, the instrument was calibrated with standard buffer solutions at pH 4, 7, and 9.

3. Spreadability:

Spreadability refers to how far the emulgel spreads after being applied to the skin or affected area. The spreading value of an emulgel formulation also influences its bioavailability efficiency. The Spreadability of semi-solid preparations was determined using the parallel plate method, widely



used for determining and quantifying Spreadability.



4. Viscosity:

The viscosity of the polyherbal emulgel was measured at 10 rpm using a Brookfield viscometer, model DV-||+pro. 20 grams of the gel were taken in a beaker, and the spindle No. 64 was immersed for about 5 minutes before taking the reading.

5. Grittiness:

All the formulations were evaluated miscroscopically for the presence of any appreciable particulate matter which was seen under light microscope. Hence obviously preparations fulfils the requirements of freedom from particulated matter and from grittiness as desired for any topical preparations.

6. Microbial growth

Nutrient agar media was used in microbial growth study. In this method the blank and sample petriplates were used and gel sample were aseptically transferred on to the sample plates in a cross pattern, the microbial growth was observed (Table 10). Antimicrobial activity was assessed against staphylococcus aureus strain and found to exhibit significant antimicrobial activity.

7. TLC-Thin layer chromatography

Samples were eulted with column using silica gel 120 mesh with Chloroform: ethylacetate (10:2) and TLC performed on precoated TLC plates (silica gel 60F-254). Chloroform ethanolethylacetate-hexane and acetic acid (10:2:5:1:1) is used as mobile phase. Samples were placed on TLC using capillary tube at the bottom of plate and allowed to dry. The plate is kept under mobile phase and separation of compounds permitted until the solvent reached ³/₄ the distance and exposed under UV at 365 and 254 nm.

Marketed Product for Comparative Studt : Silva Kollagen Gel

SilvaKollagen Gel, a hydrolyzed bovine collagen gel with silver oxide, is primarily used as a wound dressing to support wound healing by creating a favorable environment for the wound. It helps with autolytic debridement, protects the wound bed, and can be used on various wound types. The silver in the gel controls microbial growth, while the collagen helps soothe and deodorize the wound.



Product Highlight:

- Anti-microbial
- Anti-allergic



- Anti-inflammatory
- Wound Healing

Formulation:

Hydrolyzed Type I Bovine Collagen 1% Silver Oxide

Hydrolyzed Type I Bovine Collagen: Provides essential proteins and amino acids that serve as building blocks for skin and connective tissue regeneration.

1% Silver Oxide: Acts as an antimicrobial agent, controlling microbial growth within the gel and reducing the risk of infection.

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allowed to dry. The plate is kept under mobile phase and separation of compounds permitted until the solvent reached ³/₄ the distance and exposed under UV at 365 and 254 nm.

RESULT:

We can conclude that Tridax procumbens has good antibacterial and anti-inflammatory properties after evaluating parameters like antiinflammatory and anti-bacterial action. batch F1 was notable among the batches and demonstrated good spreadability, viscosity, and the desired pH, making it an optimized batch.

Sr.	Physical Test	Observation of formulated	Observation of Marketed
No.		Product	Product
1	Colour	Green	translucent
2	PH	6.9	6.5
3	Appearance	Gel	Gel
4	Texture	Easily Applied	Easily Applied
5	Odour	Mild	Mild
6	Spredability	Easily spreability	Easily spreability
7	Grittiness	No	No
8	Homogeneity	Homogenous	Homogenous
9	Irritancy	Non Irritant	Non Irritant

CONCLUSION

The combination of Tridax procumbens in wound healing formulations shows promising potential. Both plants have been traditionally used for their medicinal properties, including anti-inflammatory, antimicrobial, and wound healing effects. By harnessing their synergistic properties, such formulations could offer enhanced wound healing capabilities, promoting faster recovery and reduced risk of infection. Further research and clinical studies are needed to fully explore and validate the efficacy and safety of these formulations for broader medical applications. The comparative study indicated that it has an easy application, easy removal property. It is widely used in dosage form an it has more patient compliance. Tridax procumbens is anti – bacterial drug.

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