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Original Article

Formulation And Evaluation Of Herbal Ointment Containing Tridax Procumbens Leaves Extract For Antimicrobial Activity And Atopic Dermatitis Treatment

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ABSTRACT

The present study was carried out to formulate and evaluate a herbal ointment containing Tridax procumbens leaf extract for the treatment of atopic dermatitis and antibacterial activity. Herbal formulations are widely used due to their safety, effectiveness, affordability, and reduced side effects compared to synthetic drugs. Tridax procumbens is a medicinal plant known for its antibacterial, anti-inflammatory, and wound-healing properties and has been traditionally used for various skin disorders. Fresh leaves of Tridax procumbens were collected, shade-dried, powdered, and extracted with ethanol using the Soxhlet extraction method. Phytochemical screening confirmed the presence of flavonoids, alkaloids, tannins, saponins, glycosides, proteins, and carbohydrates, which contribute to its therapeutic activities. The herbal ointment was prepared by the fusion method using beeswax, petroleum jelly, liquid paraffin, methyl paraben, and lemon oil as excipients. The formulated ointment was evaluated for physicochemical parameters including color, odor, pH, consistency, spreadability, washability, viscosity, non-irritancy, and stability. The formulation showed a smooth texture, acceptable pH, good spreadability, easy washability, and satisfactory stability under different storage conditions. The non-irritancy study indicated that the ointment was safe for topical application. Antibacterial activity was assessed against Staphylococcus aureus using the agar well diffusion method. The herbal ointment exhibited a zone of inhibition of 32 mm, while the standard neomycin ointment showed 36 mm. These findings suggest that the formulated herbal ointment possesses significant antibacterial activity and may serve as a promising natural topical formulation for managing atopic dermatitis and related skin infections.

Keywords: Tridax procumbens, Atopic Dermatitis, Antibacterial Activity, Staphylococcus aureus.

INTRODUCTION

OINTMENT

Soft formulations applied to the skin are called ointments. They are utilized as cosmetics, moisturizers, and medications. They shield the skin from dust, dryness, and damaging environmental factors and remain on it for a longer period of time. Ointments also have a calming and restorative impact on the skin.

This project's primary goal is to use Tridax procumbens to make a herbal ointment. The therapeutic qualities of this herb are widely recognized. It is frequently used to halt bleeding, lessen inflammation, and promote wound healing. Additionally, it exhibits antibacterial activity, which aids in preventing bacterial and fungal infections.

Numerous advantages, including hydrating the skin, promoting wound healing, lowering skin infections, and enhancing general skin health, can be obtained from the prepared ointment. Additionally, it might be useful in treating minor skin infections, burns, rashes, and wounds.

Because they are safer and have fewer adverse effects than chemical-based medicines, herbal remedies are growing in popularity. Additionally, they give the skin hydration and natural nutrients.

This study's ointment has a water-in-oil formulation, which lets the medication stay on the skin longer and produces better outcomes. As a result, Tridax procumbens ointment may be a useful and all-natural choice for skin care.

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Herbal ointment's advantages

- The Healing Properties of Nature
- Hydration and Skin Protection
- Management of Skin Conditions
- Enhanced Safety and Texture of Skin
- Focused Therapy

The best qualities for herbal ointment

1) It must be stable both chemically and physically.

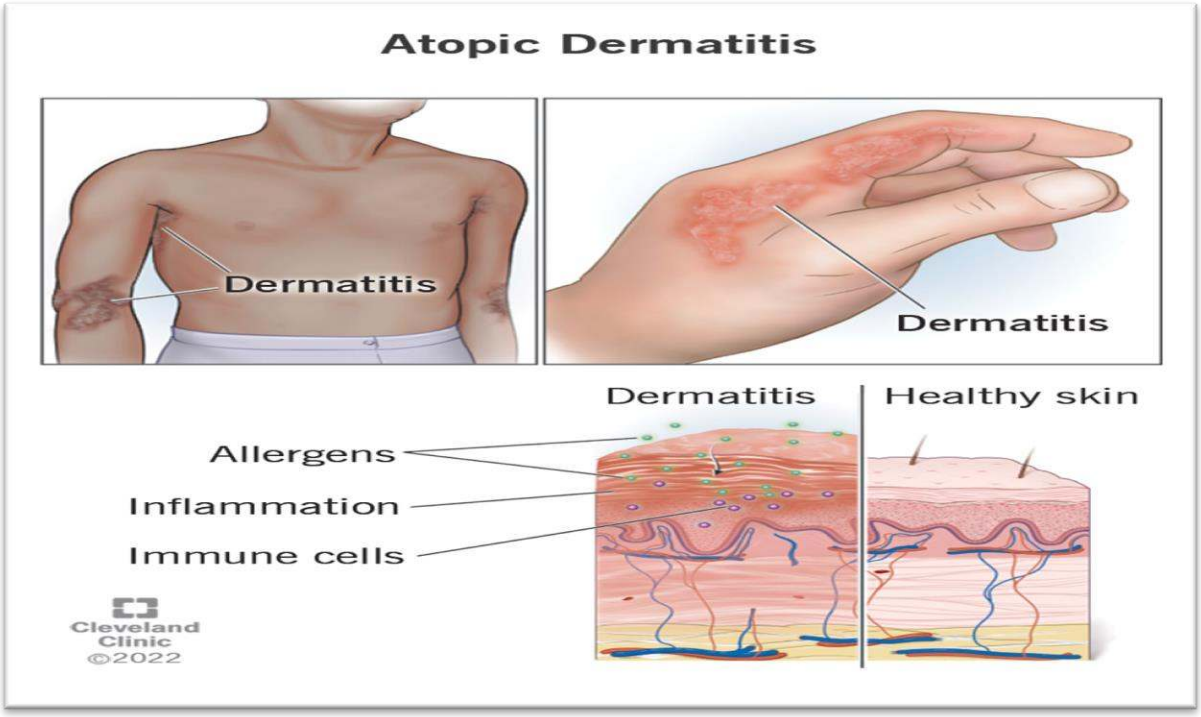
2) The finely split active ingredients should be evenly dispersed throughout the ointment base.

3) The ointment's basis shouldn't have any medicinal properties.

4) There should be no grit and the ointment should be smooth.

Atopic Dermatitis

Dry, itchy, and discolored skin patches are symptoms of atopic dermatitis, a chronic (long-lasting) illness. It can flare up or come and go throughout your life and affects both adults and children. It can be painful and itchy when an atopic dermatitis rash appears. You might want to scratch it right away. Scaling, crusting, cracking, and swelling may result from this. A transparent fluid may "weep" from the rash.



- **Atopic dermatitis types**

• Nummular (Discoid) Dermatitis: This condition is characterized by itchy, coin-shaped patches.

• Prurigo Nodularis: The skin may develop thick, leathery, irritating lumps.

• Follicular dermatitis: tiny skin pimples that resemble acne.

• Exfoliative dermatitis, also known as erythroderma, is characterized by extensive redness and inflammation throughout the majority of the body. • Small, itchy blisters on the hands or feet are known as dyshidrosis (Pompholyx).

• Lichenoid Dermatitis: Thickened, leathery, or "lichenified" skin as a result of persistent scratching

- **Typical signs of atopic dermatitis could be: A rash on the skin**

• Skin that is dry and cracked

• Skin irritation

• Skin discoloration that is red, purple, brown, or gray

• Swelling

Individual differences in symptoms can be substantial. Atopic dermatitis frequently appears in places where your skin flexes or bends, such as the inside of your elbow or behind your knees. But rashes can occur anywhere on your skin. Symptoms range from mild to severe.

MATERIAL AND METHOD

Plant profile

Synonyms: Jakhamjod (Marathi), coat buttons, and Tridax daisy

Asteraceae family

Biological Source: Tropical areas and India are home to the little medicinal herb Tridax procumbens. Flowers and leaves are mostly used medicinally for conditions including skin disorders and wound healing.

Flavonoids, alkaloids, tannins, saponins, terpenoids, and sterols are examples of chemical constituents.

Applications:

antimicrobial,

Antibacterial, antifungal,

anti-inflammatory,

Antioxidant

Collection and Authentication

Rayat Shikshan Sanstha's

Estd. : June 1965

SHRI SADGURU GANGAGEER MAHARAJ SCIENCE, GAUTAM ARTS & SANJIVANI COMMERCE COLLEGE

Kopargaon - 423 601, Dist. Ahilyanagar (M.S.) India. • P.B.No.13

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Founder : Padmabhushan Dr. Karmaveer Bhaurao Patil, D.Litt.

Principal
Prof.(Dr.) Madhav Sarode
M.Sc., Ph.D

Ref. No. : 2049 | 2025-26

Date : 16 / 3 /2026

To,
The Principal,
R. J. S. College of Pharmacy,
Kokamthan,
Tal: Kopargaon,
Dist: Ahilyanagar

Sub: About identification of plant specimen
Ref.: Your letter RJS/PH/2025-26/7969 dated 12/ 03/ 2026

Respected Sir,

This is to certify that the plant species brought by **Ms. Udawant Priyanka Balasaheb** of **R. J. S. College of Pharmacy,** Kokamthan, is identified and authenticated as mentioned below:

Sr. No.	Scientific Name	Family	Synonym	Local Name
1	*Tridax procumbens* L.	Asteraceae	--	Dagdi Pala

The authentication is carried out by using following flora:

Reference:

1. Singh N. P., P. Lakshminarasimhan, S. Karthikeyan & P. V. Prasanna. 2001. Flora of Maharashtra State. Vol. II. Botanical Survey of India, Kolkatta.

Thanking You,

In-charge Professor
Malpure
Dr. N. V. Malpure

Yours faithfully,

16/3/26
Principal
S.S.G.M. College
Kopargaon

• Phone : (Off.) (02423) 223155, 223755 • E-mail : ssgmcoll.kop@gmail.com • Web : www.ssgmcollege.c
• ID No. PU/AN/ASC/09/1965 • HSC Code No. Jr. 12.04.001 • AISHE Code : C-42027

INGREDIENTS PROFILE

Beeswax

Beeswax: Beeswax is utilized as an emulsifier, stiffening agent, and base for ointments. It contributes to the formulation's increased stability and consistency. Almost insoluble in water, mildly soluble in alcohol, and freely soluble in ether and chloroform. It blends well with fats and oils when melted.

• Description: Bee wax is a naturally occurring wax derived from bee honeycombs. It mostly consists of long-chain alcohols and fatty acid esters.

• Category: ointment base, stiffening agent, and pharmaceutical help

• The melting range is between 62°C and 65°C.

Petroleum jelly: Petroleum jelly is a semi-solid, frequently triple-purified blend of hydrocarbons (mineral oils and waxes) that acts as an occlusive moisturizer, creating a water-insoluble, protective barrier on the skin to retain moisture and promote healing.

Because it creates a barrier that stops moisture loss, it is frequently used as a skin protector, moisturizer, and basis in ointments.

Pharmaceutical category: Ointment base, emollient, and protectant

Chemical category: Hydrocarbon mixture (product generated from petroleum)

Paraffin in liquid

• **Liquid paraffin:** This substance is utilized as an ointment base, lubricant, and emollient. It enhances spreadability while calming and softening the skin. Water does not dissolve it; ether and chloroform do. miscible with fats and fixed oils.

• Description: Made from petroleum, liquid paraffin is a transparent, greasy, colorless, and odorless liquid.

• Type: Ointment base, emollient

The boiling point is more than 300°C.

Paraben Methyl

• **Methyl Paraben:** This preservative stops microorganisms from growing in formulations. Slightly soluble in water; freely soluble in alcohol.

• Description: Methyl p-hydroxybenzoate is the chemical name for this white, crystalline powder.

Preservative is the category.

• The melting range is between 125°C and 128°C.

Lemon oil

A strong, natural antibacterial agent, lemon oil (Citrus limon) is being utilized more and more in ointment formulations to treat bacterial skin infections.

The peel of fresh lemons (Citrus limon) is the primary source of lemon oil, a volatile essential oil. Usually, cold pressing is used to obtain it, but steam distillation is also occasionally used.

Category: Flavoring and antimicrobial agents

Boiling point: 176 degrees Celsius

Material /Chemical used with suppliers

SR. NO	INGRDIENT	ROLE	SUPPLIERS
1	Beeswax	Thickning agent	Reserve lab fine industries
2	Petroleum jelly	Moisturizing agent	Reserve lab fine industries
3	Liquid paraffin	Smoothness	Reserve lab fine industries
4	Methyle paraben	Preservative microbial contamination	Reserve lab fine industries
5	Lemon oil	Fragrance	Reserve lab fine industries

Instrument used in this study

SR. NO	INSTRUMENT	MANUFACTURER
1	Soxhlet Apparatus	Samtech
2	pH meter	Equiptronics
3	Electronics balance	Wensar

EXPERIMENTAL METHOD

Plant material collection: gather fresh Tridax procumbens leaves and properly wash them with distilled water to get rid of any dirt. Triturated phytoconstituents are preserved by shade drying (not too fine, to allow solvent penetration).

Tridax Procumbens Extract Preparation

Take 50g of leaf powder. Use ethanol as the solvent (e.g., 50g powder + 300 ml 70% ethanol). Put the

powder inside the Soxhlet apparatus. As a solvent, add ethanol. Heat to between 60 and 80 degrees Celsius for six hours. Use a water bath or a rotary evaporator to concentrate the extract. The extract is dried. incorporation into an organization.

Fig :- Soxhlet Apparatus

Fig :- Extract

PHYTOCONSTITUENT TEST

Phytoconstituent	Reagents Test	Short process	Result
Carbohydrate	Molish test	Take plant extract – Add2-3 drop of molish reagent (alpha- napthol)	Violet color carbohydrate present.
Protein test	Xanthoproteic test	Add extract – Add conc HNO3 – Heat gently – Cool and add NaoH	Yellow to orange color Protein present.
Saponin Test	Foam test	Take extract – Add water – Shaken with water 1-2 min	Foam present in 5 min Saponin present
Alkaloids test	Wagners test	Take extract – Add Wagners reagent	Reddish – Brown ppt Alkaloids present
Flavonoid test	Alkaline reagent test	Add extract – Add few drop of NaoH	Intense yellow color
Glycoside test	Keller – killiani test	Take plant extract – add glacial acetic acid –few drop of FeCl3 – carefully add con.c H2SO4.	Bluish –brown ring junction Bluish lower layer green upper layer glycoside present.

Formula for Herbal Ointment

Ingredient	Quantity	Role
Tridax procumbens extract	3 gm	Active ingredients Antimicrobial activity
Beeswax	3gm	Hardness and Thickness
Petroleum jelly	18 gm	Moisturizing and protective effect
Liquid paraffin	5 gm	Smoothness
Methyl paraben	0.06	Preservative microbial contamination prevent
Lemon oil	0.3 gm	Fragrance

Procedures

Preparation Technique

Step 1: Preparing the extract using an appropriate extraction method (Soxhlet process).

Step 2: -Ointment preparation method

• Base preparation

Heat beeswax, petroleum jelly, and liquid paraffin in a water bath at around 70°C, stirring until all of the ingredients are uniformly melted.

• Preservative addition

Take a tiny amount of warm liquid paraffin and dissolve it with methyl paraben.

Mix thoroughly after adding this solution to the melted base.

• Drug Incorporation

Gradually add the extract of Tridax procumbens.

Make sure the mixing is uniform and free of lumps.

• Cooling

Take off the heat and whisk constantly while it cools.

• The addition of fragrance

When the temperature reaches about 40°C

Next, carefully stir in the lemon

Fig – Formulation of Herbal Ointment

Evaluation of herbal ointment

1. Physical parameters, such as color, texture, and odor, were assessed visually.

2. Consistency: There is no indication of greed.

3.pH: A digital pH meter was used to measure the prepared herbal ointment's pH.

4. Solubility: Miscible with alcohol, ether, and chloroform; soluble in boiling water

5. Washability: After applying the formulation to the skin, the ease of washing with water was assessed.

6. Non-irritation test: A prepared herbal ointment was applied to a person's skin, and its effects were noted. A tiny amount of the sample is applied to the hand, and the results—such as redness, erythema, inflammation, etc. are monitored for a full day.Therefore, no such impact was seen, and it doesn't irritate the skin.

7. Viscosity: At room temperature, the viscosity of the prepared ointment was determined using a Brook field viscometer.

8. Physical stability: A four-week test of the ointment's physical stability was conducted at several temperatures, including 2, 25, and 37 degrees Celsius.

9. In vitro Antimicrobial Activity: The inhibitory zone diameter was measured using a zone reader, and antimicrobial activity was determined using the disk diffusion method.

COMPARATIVE STUDY EVALUATION PARMETERS FOR OINTMENT

Parameter	Test (*Tridax procumbens ointment)*	Standard (Neomycin ointment)
Color	Light green	White
Odor	Pleasant herbal	Mild medical
pH	5.8	5.5
Consistency	Smooth	Smooth
Spreadability	Good	Excellent
Washability	Good	Moderate
Irritation	No irritation	Mild irritation

***Tridax procumbens ointment* Ph**

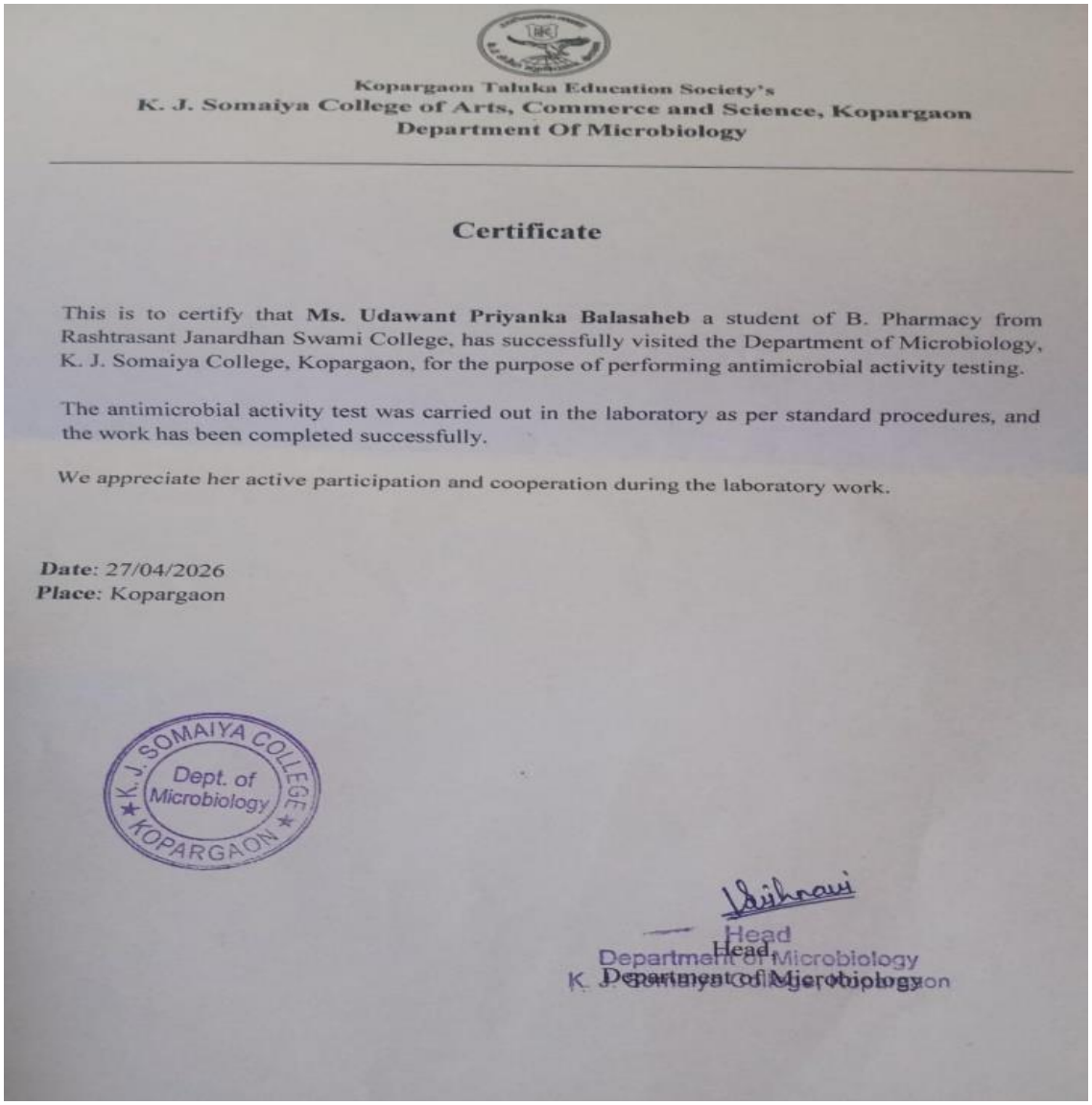
Sr.no	pH RANGE	pH RANGE
1.	5.5 – 7.0	5.8

***Neomycin ointment* pH**

Sr.no	pH RANGE	pH RANGE
1.	5.0 – 7.5	5.5

Antimicrobial activity

Sr.no	sample	Zone of inhibition
1	Test	32mm
2	Standard	36mm



Kopargaon Taluka Education Society's
K. J. Somaiya College of Arts, Commerce and Science, Kopargaon
Department Of Microbiology

Certificate

This is to certify that **Ms. Udawant Priyanka Balasaheb** a student of B. Pharmacy from Rashtrasant Janardhan Swami College, has successfully visited the Department of Microbiology, K. J. Somaiya College, Kopargaon, for the purpose of performing antimicrobial activity testing.

The antimicrobial activity test was carried out in the laboratory as per standard procedures, and the work has been completed successfully.

We appreciate her active participation and cooperation during the laboratory work.

Date: 27/04/2026
Place: Kopargaon

K.J. SOMAIYA COLLEGE Dept. of Microbiology KOPARGAON

Head
Department of Microbiology

RESULT AND DISCUSSION

The goal of the current study was to create and assess the herbal ointment. The Soxhlet technique was used to create the herbal extract for this. to get a high extract yield without endangering the chemical components or their activity

The ointment was prepared using the Fusion process, which ensured that the herbal extract and ointment base mixed uniformly and remained stable throughout storage.

The physiochemical characteristics were examined, and the results for washability, spredability, and other aspects are excellent.

I made a herbal ointment formulation that has good color, texture, and consistency. Using the agar well diffusion method, the antibacterial activity against Staphylococcus aureus was assessed. Effective antibacterial action was demonstrated by a distinct zone of inhibition surrounding the herbal ointment sample.

With a zone of inhibition of around 32–36 mm, the herbal ointment demonstrated strong antibacterial activity against Staphylococcus aureus and good physicochemical qualities. The herbal formulation has significant antibacterial action, according to a comparison study with Neomycin ointment.

CONCLUSION

The study examined the antibacterial activity of a herbal ointment made using extract from Tridax procumbens. Good consistency, spreadability, smooth texture, and sufficient stability for topical application were among the formulation's favorable physicochemical characteristics.

The herbal formulation's antibacterial potential was demonstrated by the antimicrobial activity research, which showed notable action against Staphylococcus aureus. The antibacterial activity of Tridax procumbens may be attributed to the presence of phytoconstituents such flavonoids, tannins, and alkaloids.

The antibacterial properties of a herbal ointment derived from Tridax procumbens extract were investigated in this study. The formulation's advantageous physicochemical properties included good consistency, spreadability, smooth texture, and enough stability for topical administration.

The antimicrobial activity study, which indicated significant action against Staphylococcus aureus, demonstrated the antibacterial potential of the herbal mixture. The presence of phytoconstituents such flavonoids, tannins, and alkaloids may be responsible for Tridax procumbens' antibacterial activity.

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