International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 13 Issue: 01 | Jan 2026 www.irjet.net p-ISSN: 2395-0072

FORMULATION AND EVALUATION OF HERBAL ANTIMICROBIALOINTMENTUSINGEUPHORBIAHIRTA EXTRACT FOR SKIN INFECTIONS

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Abstract- *Herbal medicines play an important role in the management of skin infections due to their efficacy and minimal adverse effects.* Euphorbia hirta *Linn., a well-known medicinal plant, has been traditionally used for its antimicrobial potential. In this study, a herbal antimicrobial ointment incorporating a hydro alcoholic leaf extract of* Euphorbia hirta *was formulated and evaluated. Three ointment formulations (F1–F3) containing different concentrations of the plant extract were prepared and subjected to physicochemical characterization and stability studies. Preliminary phytochemical analysis revealed the presence of flavonoids, phenolics, alkaloids, and saponins. The antimicrobial efficacy of the formulations was assessed against selected bacterial pathogens using the agar well diffusion technique. Among the formulations, F3 exhibited the highest zone of inhibition, indicating superior antimicrobial activity. The findings suggest that* Euphorbia hirta*–based ointment has promising potential as a topical antimicrobial agent for the treatment of skin infections.*

1. INTRODUCTION

Euphorbia hirta Linn. (Family *Euphorbiaceous*) is a small annual herb widely found in tropical and subtropical regions, especially in India and Asia. It has long been used in traditional medicine to treat skin infections, wounds, gastrointestinal and respiratory disorders, and inflammatory conditions. Phytochemical studies show that the plant contains flavonoids, tannins, alkaloids, phenolic compounds, glycosides, and triterpenoids, which contribute to its antimicrobial, anti-inflammatory, antioxidant, antimalarial, and antiviral activities.

The antimicrobial potential of *Euphorbiahirta* has attracted interest for herbal topical formulations. Herbal ointments are preferred due to their safety, low cost, and minimal side effects. Ointments provide prolonged skin contact, ease of application, and localized drug action. *Euphorbiahirta* ointment is commonly used for wounds, cuts, boils, skin infections, minor burns, eczema, and inflammatory skin conditions.

The ointment contains an extract of fresh or dried *Euphorbiahirta* leaves incorporated into a suitable ointment base. It is applied externally once or twice daily. Proper storage in a cool, dry place is necessary, and use should be discontinued if irritation or allergic reactions occur. This topical formulation allows localized antimicrobial and wound-healing effects while minimizing systemic side effects.

Advantage:

- Natural antimicrobial – fights bacteria & fungi
- Reduces redness, swelling & pain
- Boosts wound healing
- Cheap, easy to find & eco-friendly
- Less risk of antibiotic resistance

Disadvantage:

- May cause skin irritation or allergies
- Effectiveness varies by extraction
- Limited human clinical trials to fully confirm its safety and efficacy
- Shorter shelf life than synthetic ointments
- High doses may be toxic
- Act slower than synthetic antibiotics, especially in severe skin infections.

1.1 FORMULATION COMPOSITION AND ITS USES:

- Paraffin wax pellets act as a stiffening agent and increase the hardness and melting point of the ointment.
- White beeswax is used as a consistency enhancer and stabilizer and also acts as a natural stiffening agent.
- Petroleum jelly serves as the ointment base and emollient and provides smoothness and occlusive properties.
- Liquid paraffin functions as a softening agent, improves spread ability, and acts as a levitating agent.
- Methyl paraben is used as a preservative to prevent microbial growth and increase the shelf life of the ointment.

1.2 MICROORGANISMS

The microorganisms employed for the evaluation of antimicrobial activity of *Euphorbia* hirtaincluded selected bacterial strains commonly associated with skin and wound infections. The test organisms used in the present study were *Enterobacter cloacae*, *Enterococcus faecalis*, *Streptococcus pyogenes*, and *Proteus vulgaris*. These pathogenic bacteria are frequently implicated in cutaneous infections and delayed wound healing. The antimicrobial efficacy of the plant extract and formulated ointments was assessed by determining the zone of inhibition using the agar well diffusion method, which provides a reliable measure of antibacterial activity.

1.3 ANTIMICROBIALACTIVITY

*Euphorbia hirta*is a well-known medicinal plant extensively utilized in traditional medicine for the treatment of wounds, skin infections, and microbial diseases. The antimicrobial potential of the plant is attributed to the presence of various bioactive constituents, including flavonoids, tannins, alkaloids, phenolic compounds, and terpenoids. These phytochemicals exhibit significant antibacterial properties by disrupting the microbial cell wall, interfering with cellular metabolism, and inhibiting bacterial growth.

Several studies have reported that *Euphorbia hirta*extracts are effective against abroad range of pathogenic bacteria, including *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The ability of the plant extract to inhibit both Gram-positive and Gram-negative bacteria highlights its broad-spectrum antimicrobial potential. Owing to these properties, *Euphorbia hirta*is considered a promising natural source for the development of herbal antimicrobial formulations, particularly topical preparations such as ointments for the management of skin and wound infections.

2. PLANTBIOGRAPHY

FIGURE1: EUPHORBIAHIRTALINN

2.1 TAXONOMICAL CLASSIFICATION:

Kingdom:Plantae.
Sub-kingdom :Viridiplantae
Infra-kingdom :Streptophyta
Division :Tracheophyta.
Sub-division : Spermatophyta
Infra-division :Angiosperms
Class :Magnoliopsida
Super order :Rosane

Order :Malpighiales
Family:Euphorbiaceae
Genus:Euphorbia
Species: Euphorbia hirta

2.2 VERNACULARNAME:

English :Asthma plant, Snake weed
Tamil: Amman pacharisi
Hindi : Dudhi
Telugu:Paleru
Kannada:Halusoppu
Sanskrit :Dugdhika
Malayalam :Chittappal

2.3 PLANTDESCRIPTION:

Leaves: The leaves are present in opposite pairs on the stem leaves have a curved base and are simple, elliptical to slightly rhombic hairy, with a jauntily dentate margin.

Stem: Stemof the plantare small hairy andlongwith monopodial branchingpattern.Internodes of the plant are 2.5-3 cm in length, stipules present.

Flowers: Flowers are unisexual, season of the flower is through hout the year.

Fruits: The plant has allomorphic pistillate fruits. fruit of the plan exerted a3-lobed capsule, three seeded, covered with short hairs. Green colored fruit with fleshy prickles.1-2 mm in diameter.

Root: It has developed and different distinct primary root ,i,e. tap root system.

3. MATERIALSANDMETHODS

3.1 MATERIALSREQUIRED

- Dried powdered *Euphorbiahirta*
- Ethanol(70%or90%)
- Beaker(500 ml)
- Magneticstirrerwithhotplate
- Magneticbead
- Measuring cylinder
- Filterpaper
- Water bath

3.2 PRELIMINARY WORK

3.2.1COLLECTIONANDDRYINGOFLEAVES

Collection and Preparation of Plant Material Fresh and healthy *Euphorbia hirta* plants were collected from areas of Dharmapuri and Krishnagiri Districts, and thoroughly washed to remove surface contaminants. Leaves were rinsed with distilled water

3.2.2 DRYING METHOD

a) Shade Drying (Preferred for Herbal Drugs)

The cleaned leaves were spread in a single thin layer on drying trays. The trays were kept in a well-ventilated, dust-free area away from direct sunlight .Leaves were turned occasionally to ensure uniform drying .Drying was continued for 7–10 days until the leaves became crisp and brittle.

b) Oven Drying (Rapid Method)

Leaves were placed on trays and kept in a hot air oven at 40–45°C.Drying was carried out for 6–8 hours.Leaves were allowed to cool to room temperature.

3.2.3 PROCEDURE FOR EUPHORBIA HIRTA LEAVES EXTRACT

The dried Euphorbia hirta plant leaveswere powdered and passed through sieve no.40.The quantity 50 gpowdered drug was transferred into a clean 500 mlbeaker.500 ml of solvent (water and ethanol)1: 10 ratio was added to the beaker to completely immerse the powder. A magnetic bead was placed in the beaker and the beaker was kept on themagnetic stirrer. The mixture was stirred at 200–300 rpm for 6–8 hours at room temperature without heating. After stirring, the mixture was covered and allowed to stand for 24 hours for complete maceration. The mixture was filtered using Whatman filter paper. The filtrate was concentrated on a water bath to obtain a semi-solid extract. The extract was stored in an airtight container for further formulation.

3.3 PHYTOCHEMICALSCREENING

Theextractafter obtained are subjected to phytochemical screening to determine the presence of following various phytochemicals present in the extracts.

1. Test for Alkaloids:

a) **Wagner reagent test:** 3ml conc. Extract + 1ml HCL heat for 20 min cooled and filter. Filtrate treated with Wagner reagent. Formation of brown reddish precipitate indicates presence of alkaloid.
b) **Dragendroff's Test:** 1 ml of Dragendroff's reagent was added to 2 ml of the extract along the test tube's edge. Alkaloids were present when an orange or orange reddish-brown precipitate formed.
c) **Mayer reagent test:** When Mayer's reagent is added to a sample containing alkaloids, a cream-colored precipitate forms, indicating a positive result.

2. Test for Phenols:

a) **Ferricchloride test:** Test extract + 4 drops alc. $Fecl_3$solution , formation of bluish black color indicates the presence of phenol.
b) **Lead Acetate Test:** Add a few drops of lead acetate solution to 2 mL of the extract. There is a Formation of a white or yellowish precipitate, indicate the presence of phenols

3. Test for Flavonoids:

a) **Shinoda Test:** 2 ml of the extract was mixed with 1 ml of a 1% ammonia solution. The easiest way to identify whether flavonoids are present visually is by the color yellow.
b) **Alkaline Reagent Test :** Add a few drops of sodium hydroxide (NaOH) solution to the extract. Then add dilute HCl, intense yellow colour that becomes colourless after adding acid , indicate the presence of flavonoids.

4. Carbohydrate Test:

a) **Fehling's Test:** Equal amounts of Fehling A and B reagents were added, and the mixture was then heated slightly before adding 2 ml of crude extract. Because a brick-red precipitate developed at the test tube's bottom, reducing sugars were discovered.
b) **Benedict's test:** 1 ml of crude extract and 2 ml of Benedict's reagent were combined and heated. Carbohydrates were present because a reddish-brown precipitate formed

5. Protein Test:

a) **Biuret test:** To check the presence of protein in plant extract Add 4-6 drops of copper sulphate solution and 2 ml of sodium hydroxide to the plant extract, mix the contents well by gently shaking the test tube, and allow the mixture to rest for about 4-5 minutes. A bluish-violet color indicates the presence of protein

b) **Xanthoproteic test:** To 2 ml of extract, add few drops of conc. HNO_3 and heat gently. After cooling, add NaOH , formation of yellow to orange colour indicate the presence of proteins

6. Saponin Test:

a) **Foam Test:** 2 ml of extract and 5 ml of distilled water were mixed and agitated vigorously in a test tube. Add some olive oil drops. The formation of steady foam was thought to indicate the presence of saponins.
b) **Froth test:** 2 ml of extract add 5 ml of distilled water and shake well. Honeycomb-like froth persists for 10 mines.

7. Tannins Test:

a) **Ferric chloride test :** 2ml extract is placed in test tube, a small amount of $FeCl_3$ solution was introduced. If a deep or dark green color appears, this indicates the presence of tannins.
b) **Lead acetate test:** 2 ml of extract, add few drops of lead acetate solution. Formation of white or yellow precipitate, indicate the presence of tannins.

8. Amino Acid Test:

a) **Millon's Test:** 1 ml of crude extract and 2 ml of Million's reagent are combined to generate a white precipitate. This precipitate turns red when it is slowly heated, signifying the presence of protein.
b) **Ninhydrin Test:** 1 ml of the natural extract and 2 ml of Ninhydrin 0.2% solution were combined and heated. The presence of proteins and amino acids was indicated by the violet precipitate that appeared.

9. Glycoside Test:

a) **Keller-killianitest :** To detect the presence of glycosides in a plant extract solution, 1 ml of the paste was mixed with 2 ml of H_2SO_4 and 2 ml of chloroform in a test tube. The solution was thoroughly mixed, and a reddish-brown colour ring occasionally appeared, indicating the presence of glycoside.
b) **Salkowski test:** 2 ml of extract + chloroform, add concentrated H_2SO_4, red or brown color at interface indicate the presence of glycosides

3.4 PREPARATIONOFOINTMENT:

3.4.1 PREPARATIONOFHERBALOINTMENT

a) Initially ointment base was prepared by weighing accurately grated hard paraffin which wasplacedinevaporatingdishonwaterbath.Aftermeltingofhardparaffinremaining ingredients were added and stirred gently to aid melting and mixing homogeneously followed by cooling of ointment base.

b) Herbal ointment was prepared by mixing accurately weighed euphorbia extract to the ointment base by Levi gation method to prepare a smooth paste with 2 or 3 times its weight of base, gradually incorporating more bases until to form homogeneous ointment, finally transferred in a suitable container.

3.4.2 PROCEDURE FOR OINTMENT

Melting of Waxy Materials

Weighparaffinwaxpelletsandwhitebeeswax.Meltthemtogetheronawaterbathat65-70°C.Thisensurescompletemeltingwithoutdecomposition

Addition of Base Components

Reduce temperature to 60–65 °C . Add petroleum jelly and stir until uniform and add liquid paraffin (heavy) at 55–60 °C .Maintain gentle stirring to form a clear molten base

Preservative Incorporation

Dissolve methyl paraben in a small quantity of warm liquid paraffin at 50–55 °C.Add this solution to the molten base with continuous stirring.

Herbal Extract Incorporation

Allow the base to cool to 40–45 °C. Prevents degradation of active constituents , Add herbal extract slowly with continuous stirring, mix until a smooth and homogeneous ointment is obtained

Cooling& Packing

Continue stirring while cooling to avoid crystallization. Allow to cool to room temperature (25–30 °C) transfer into a clean container and label.

Precautions

Do not exceed 70 °C → prevents wax degradation. Add herbal extract below 45 °C → protects heat-sensitive phytochemicals , Continuous stirring to prevents grainy texture.

3.4.3 FORMULATION OF HERBAL ANTIMICROBIAL OINTMENT USINGEUPHORBIA HIRTAEXTRACT

TABLE 1: FORMULATION OF HERBAL ANTIMICROBIAL OINTMENT

S.No	INREDIENTS	F1	F2	F3
1.	Paraffinwaxpellets	15g	15g	15g
2.	Petroleumjelly	59g	57g	55g
3.	Whitebeeswax	10g	10g	10g
4.	Liquid paraffine	15g	15g	15g
5.	Methylparaben	0.15g	0.15g	0.15g
6.	Herbalextract	1g	3g	5g

4. EVALUATIONOFOINTMENT

Theevaluationswerecarriedoutontheointmentbyusingthefollowingparameters.

1. **Colour and odour:**
   The color of the ointment is evaluated by visual inspection under natural light. The odour of the ointment is assessed by smelling a small quantity of the formulation

2. **Loss on drying:**
   1 g of ointment was placed in the Petri dish and heated in the water bath at 105 °C every 30 min until it gets constant weight.

3. **pH:**
   The pH of ointment was determined by digital pH meter. 1 g of ointment was dissolved in 50 ml of distilled water and the pH was measured.

4. **Stability study:**
   The stability studies are carried out for the prepared ointment at temperature of 37^{o}C for 2 months.

5. **Spread ability:**
   The spread ability of ointment was determined by the parallel plate method. Two glass slides of 20/20 cm were selected. About 1 gm of the ointment formulation was placed over one of the slides. The other slide was placed upon the top of the ointment such that the ointment was sandwiched between the slides and 125 gm weight placed upon the upper slide so that ointment between the two slides was pressed uniformly to form a thin layer. The weight was removed and the spread diameter was measured.

6. **Wash ability:**
   The prepared formulation is applied on the skin then wash with water and result is observed. Ointment not easily washes out with water. Water soluble ointment is easily washable; while oleaginous (greasy) types of ointment are not easily wash out.

7. **Homogeneity**:
   Take a small quantity of ointment, spread on the clean glass slide. Observe visually and by gentle rubbing between fingers for the presence of lumps, gritty particles, phase separation, or color variation

8. **Solubility**:
   Take a small quantity of ointment; spread it on a glass slide. Add a drop of suitable solvent and observe the dispersion of extract.

5. ANTIMICROBIALACTIVITYOFF1, F2, ANDF3OINTMENTS

5.1 TESTMICROORGANISMS

A total of four bacterial strains were used for the evaluation of antimicrobial activity throughout the study. All bacterial cultures were procured from the Microbial Type Culture Collection (MTCC), Institute of Microbial Technology, Chandigarh, India.TheselectedtestorganismsincludedEnterobactercloacae,Enterococcusfaecalis,Streptococcuspyogenes,andProteusvulgaris,whicharecommonlyassociatedwithskin and wound infections.

5.2 ANTIBACTERIALASSAY

PreparationofInoculum

Stock cultures of the bacterial strains were maintained on nutrient agar slants at 4°C. Forexperimentaluse,aloopfulofeachbacterialculturewasasepticallytransferredintotest tubes containing Mueller–Hinton broth (MHB) and incubated at 37°C for 24 hours without agitation to obtain actively growing cultures. The bacterial suspensions were then diluted with fresh MHBto achieve a standardizedinoculumdensitycorresponding to approximately 2.0×10^6 colony forming units (CFU/ml), as described by Smith and Doe (2018).

Preparation of Sterile Swabs

Sterile cotton swabs mounted on wooden or plastic applicators were used for inoculation. The swabs were packed in culturetubesorwrappedinsuitablematerialsdsterilizedbyautoclaving. In the case of wood enswabs, sterilization by dry heat was also employed.

Sterilization of For caps

Forcepsusedduringtheexperimentweresterilizedbydippinginalcoholfollowedby flaming to burn off the alcohol, ensuring aseptic handling during the assay.

5.3 ANTIBACTERIALASSAYUSINGAGARWELLDIFFUSIONMETHOD

The agar well diffusion method was employed to evaluate the in vitro antibacterial activity of the formulated ointments. Mueller–Hinton agar (MHA) medium obtained from HiMedia (Mumbai) was prepared and sterilized, and approximately 15 ml of moltenmediumwaspouredintosterilePetridishes.Aftersolidification,theagarplates were uniformly swabbed with 0.1 ml of the standardized bacterial inoculum and allowed to dry for 5 minutes.

Wells were aseptically punched into the agar using a sterile cork borer, and 20 µl of different concentrations of the test formulations(F1,F2,andF3)wereintroducedinto pectivewells.Theplateswerethenincubatedat37°Cfor24hours.Antibacterial activity was assessed by measuring the diameter of the zone of inhibition formed aroundeachwellinmillimeters,followingtheguidelinesoftheNationalCommitteefor Clinical Laboratory Standards (NCCLS, 1993). A chloramphenicol disc was used as the positive control for comparison.

6. RESULTS AND DISCUSSION

The present study focused on the formulation and evaluation of herbal ointments containing hydroalcoholic extract of Euphorbia hirta. The plant material was authenticated and subjected to extraction using the maceration method to obtain bioactivecompounds.Theantimicrobialpotentialoftheextractanformulatedointments(F1,F2,andF3)wasevaluatedagainstselectedbacterialstrains,including Enterobacter cloacae, Enterococcus faecalis, Streptococcus pyogenes, and Proteus vulgaris.

The prepared extract was found to contain various phytoconstituents responsible for antimicrobial activity. The formulatedointmentswerefurtherevaluatedforysicochemicalparameterssuchaspH,viscosity,andspreadabilitytoensureproduct quality and stability. The results indicated that the ointment formulations exhibitedappreciable antibacterial activity, supporting the potential of Euphorbia hirtaas a natural antimicrobial agent. The incorporation of the extract into an ointment dosage form demonstratedits efficacyandsafety for topical application in themanagement of skin and wound infections

6.1 PHYTOCHEMICAL SCREENING

TABLE 2: PHYTOCHEMICALSCREENINGOFHYDRO ALCOHOLIC EXTRACT OF *EUPHORBIAHIRTA*LEAVES

S.NO:	PARAMETERS	OBSERVATION
1	**TEST FOR ALKALOIDS**	
	i) Wagner reagent test	(+)
	ii) Dragendroff's test	(+)
	iii) Mayer's reagent test	(-)
2	**TEST FOR PHENOLS**	
	i) Ferric chloride test	(+)
	ii) Lead acetate test	(+)
3	**TEST FOR FLAVONOIDS**	
	i) Shinoda test	(+)
	ii) Alkaline reagent test	(+)
4	**TEST FOR CARBOHYDRATE**	
	i) Fehling's test	(+)
	ii) Benedit's test	(+)
5	**TEST FOR PROTEINS**	
	i) Biuret test	(-)
	ii) Xanthoproteic test	(-)
6	**TEST FOR SAPONIN**	
	i) Foam test	(+)
	ii) Froth test	(+)
7	**TEST FOR TANNINS**	
	i) Ferric chloride test	(+)
	ii) Lead acetate test	(+)
8	**TEST FOT AMINO ACIDS**	
	i) Million's test	(-)
	ii)Ninhydrin test	(-)
9	**TEST FOR GLYCOSIDES**	
	i) Keller-killani test	(+)
	ii) Salkowski test	(-)

6.2 PHYSICOCHEMICAL EVALUATION OF ANTIMICROBIAL OINTMENT USING *EUPHORBIA HIRTA* EXTRACT

TABLE3: PHYSICO CHEMICAL EVALUATION OF FORMULATED OINTMENT

S.NO:	PARAMETERS	OBSERVATION		
		F1	F2	F3
1	Color	Light green	Green	Dark green
2	Odour	Mild	Characteristic	Strong
3	Loss on drying (%w/w)	0.82 ± 0.04	0.95 ± 0.06	1.12 ± 0.05
4	PH (Mean ± SD)	6.4 ± 0.1	6.2 ± 0.1	6.0 ± 0.1
5	Spreadability	6.8 ± 0.2	6.5 ± 0.3	6.2 ± 0.2
6	Washability	Poorly washable	Poorly washable	Poorly washable
7	Homogeneity	Homogeneous	Homogeneous	Homogeneous
8	Solubility	Uniformly dispersed	Uniformly dispersed	Uniformly dispersed

6.3 STABILITY STUDY OF ANTIMICROBIAL OINTMENT USING *EUPHORBIA HIRTA* EXTRACT

The formulations were stored at 37 °C for 2 months and observed periodically, all formulations remains stable through the period.

TABLE 4 : STABILITY STUDY OF FORMULATED OINTMENT

S.NO	PARAMETER	OBSERVATION		
		F1	F2	F3
1	Color change	No	No	No
2	Odour change	No	No	No
3	Phase separation	No	No	No
4	Consistency	Stable	Stable	Stable

6.4ANTIMICROBIAL ACTIVITY OF EUPHORBIA HIRTA OINTMENT

TABLE 5 : ZONE OF INHIBITION OF EUPHORBIA HIRTA OINTMENT WITH STANDARD

S.NO	MICROORGANISMS	ZONE OF INHIBITION			
		F1	F2	F3	STD
1	**GRAM POSITIVE BACTERIA**				
	Streptococcus pyogenes	11	14	19	24
	Enterococcus faecalis	6	12	15	22
2	**GRAM NEGATIVE BACTERIA**				
	Enterobacter cloacae	9	12	18	24
	Proteus vulgaris	8	11	20	22

FIGURE 2 : COMPARATIVE ZONE OF INHIBITION OFF1,F2,ANDF3 FORMULATIONS OF *EUPHORBIA HIRTA* OINTMENT WITH STANDARD DRUG

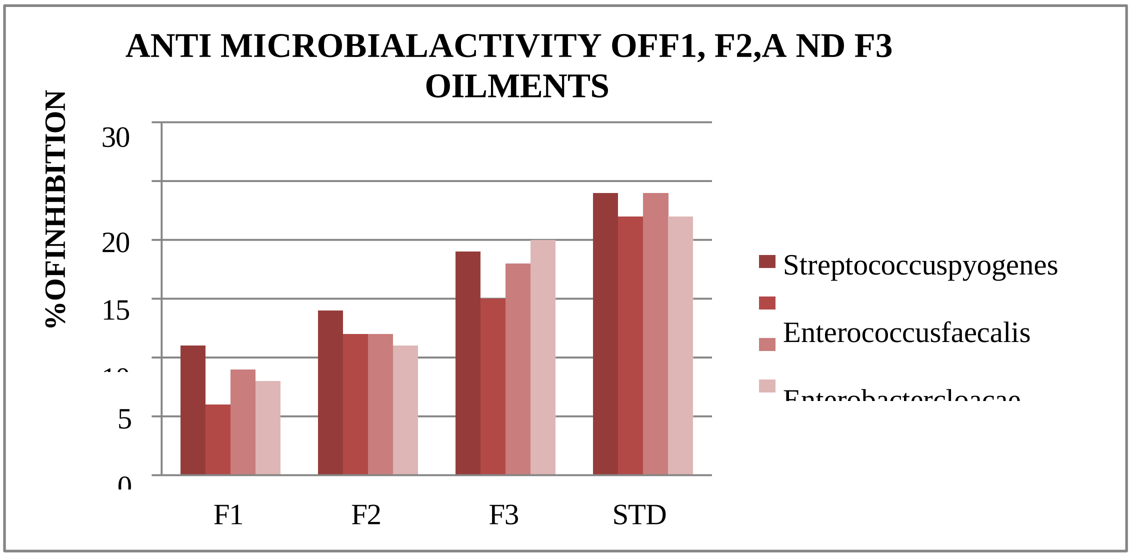
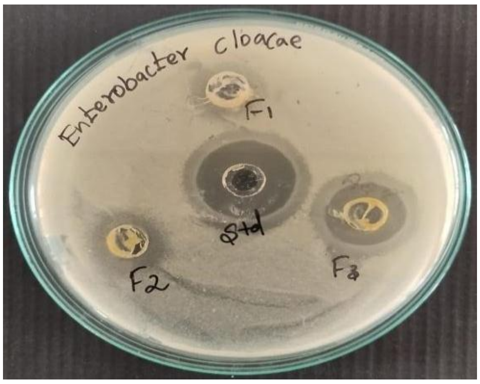
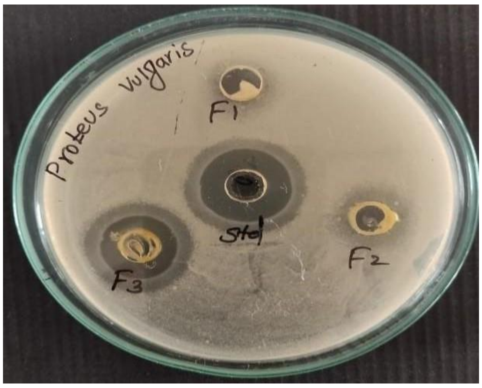


FIGURE3 : ZONE OF INHIBITION OF F1, F2, F3 FORMULATIONS AGAINST BACTERIA ON AGAR PLATE

A) GRAM NEGATIVE BACTERIA

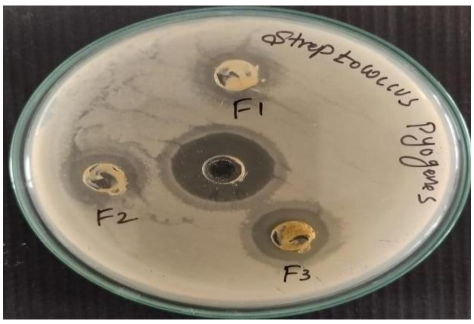
i) ***Enterobacter cloacae*** **ii)** ***Proteus vulgaris***

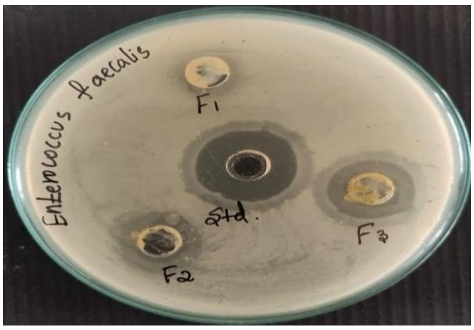




B) GRAM POSITIVE BACTERIA

i) ***Streptococcus pyogenes*** **ii)** ***Enterococcus faecalis***





7. CONCLUSION

The present investigation successfully formulated and evaluated a herbal antimicrobial ointment containing *Euphorbia hirta* extract. The developed formulation exhibited acceptable physicochemical characteristics, including suitable pH, good spread ability, uniform drug content, and satisfactory stability. The presence of bioactive phytochemical constituents contributed to the observed antimicrobial activity against common skin-infecting pathogens. These results suggest that *Euphorbia hirta*–based ointment represents a safe, cost-effective, and promising herbal alternative for the management of skin infections. However, further clinical and toxicological studies are necessary to confirm its therapeutic efficacy and safety in human use.

REFERENCE

1. RajasreePH,VishwanadV,CherianM,EldhoseJ,SinghR.Formulationandevaluation of antiseptic polyherbal ointment. International Journal of Pharmacy and life sciences 2012;3(10):2021-31.

2. Pandey A, Jagtap JV, Patil AA, Joshi RN, Kuchekar BS. Formulation and evaluation of anti-bacterial and anti-fungal activity of herbal ointment containing Aloe vera, Azadirachta indica and Curcuma lona. Journal of Chemical and Pharmaceutical Research 2010;2(3):182-86.

3. Anjula Patidar*, Suhana Khan Formulation of Antimicrobial Gel using extract of EuphorbiaHirtaLinnINTERNATIONALJOURNALOFPHARMACEUTICALSCIENCESAnujlaPatidar,Int.J.ofPharm.Sci.,2024,Vol2,Issue1,342-353|Review

4. Asha S, Thirunavukkarasu P, Mani VM, et al.: Antioxidant Activity of Euphorbia hirta Linn Leaves Extracts. European Journal of Medicinal Plants. 2016;14(1):

5. Amutha R, Sudha A and Pandiselvi P. "Tridax procumbens (Coat Buttons)–A Gift Of Nature 4. Ansari A A, Khatun T, Ahmad Md. P, Gupta R S, Ansari M, Madhikarmi N Laxmi, "A review on pharmacological and chemical documentation of Euphorbia Hirta Linn. (Asthma herb) Journal of NMC, Birgunj, Nepal ,2016, 1,

6. Selvamohan T, Ramadas. V ,Shibila .S, Selva K, " Antimicrobial activity of selected medicinal plants against some selected human pathogenic bacteria , PelagiaResearch Library advanced in Applied science Research , 2012, 3, 3374-3381

7. T. Pavithra * , Saba Noorain, G. Vishwas and J. S. Yogesha A COMPREHENSIVE REVIEW ON PLANT OFEUPHORBIAHIRTALINNPavithra etal., IJP, 2024;Vol.11(9):

8. Tahir J , Mohammad A,Akash .T, Basreen A, Riaz V, M. AbdEIsalam, "Antimicrobial activity of three medicinal plants'' ,Afr J Tradit Complement Altern Med. , 2015, 12,.

9. Waseem Ahmad, Shilpa Singh and Sanjay Kumar Phytochemical Screening and antimicrobial study of Euphorbia hirta extracts Journal of Medicinal Plants Studies 2017; 5(2): 20.

10. Wavikar P, Vavia P. Nanolipidgel for enhanced skin deposition and improved antifungal activity. AAPS pharmscitech. 2013 March.

11. Yogesh Pounikar L.K. Omray,International Journal Of Pharmacy And Pharmaceutical Science,Vol.4,2012,.

12. Asha S,Thirunavukkarasu P, Mani VM, et al. : Antioxidant Activity of Euphorbia hirta Linn Leaves Extracts. European Journal of Medicinal Plants. 2016;14(1):1-14.

13. Tawaha K, Alali FQ, Gharaibeh M, et al. : Antioxidant Activity and Total Phenolic Content of Selected Jordanian Plant Species. Food chemistry. 2007;104(4):1372-8.

14. Gupta C, Prakash D, Gupta S: Studies on the Antimicrobial Activity of Tamarind (Tamarindus indica) and Its Potential as Food Bio-Preservative. International Food Research Journal. 2014;21(6):2437 41.

15. Zhao, J., et al. (2019). Secondary metabolites from endophytic fungi and their biological activities. Molecules, 24(8), 1472.

16. Samrot, A. V., et al. (2022). Formulation and evaluation of antifungal herbal cream using plant derived extracts.

Journal of Applied Pharmaceutical Science, 12(7), 121– 129.

17. Puri, S. C., et al. (2005). Endophytic fungal association with Taxus wallichiana and its biotechnological applications. Applied Microbiology and Biotechnology, 69(4), 439– 449.
18. Dhale, M. A., & Vijay-Raj, A. S. (2017). Extraction and antimicrobial activity of secondarymetabolitesfromendophyticfungiisolatedfrommedicinalplants.Journal of Applied Microbiology, 123(4), 1014–1024.
19. Asha S,Thirunavukkarasu P, Mani VM, et al. : Antioxidant Activity of Euphorbia hirta Linn Leaves Extracts. European Journal of Medicinal Plants. 2016;14(1):1-14
20. Tawaha K, Alali FQ, Gharaibeh M, et al. : Antioxidant Activity and Total Phenolic Content of Selected Jordanian Plant Species. Food chemistry. 2007;104(4):1372-8.
21. Sukanya MK, Shimi, Aruna SR. Phytochemical Analysis Antimicrobial Analysis Antimicrobial careening and Anthelmintic properties Of Phyllanthusemblica. International Journal of Pharma and Bio Sciences. 2013; 4(4):55 64.
22. Anujla Patidar, Suhana Khan, Formulation of Antimicrobial Gel using extract of Euphorbia Hirta Linn, Int. J. of Pharm. Sci., 2024, Vol 2, Issue 1,
23. Ansari A A, Khatun T, Ahmad Md. P, Gupta R S, Ansari M, Madhikarmi N Laxmi, "A review on pharmacological and chemical documentation of Euphorbia Hirta Linn. (Asthma herb) Journal of NMC ,Birgunj ,Nepal ,2016 ,1,. 31-38.
24. Sunil K, Rashmi M , Dinesh. K , "Euphorbia Hirta : its chemistry , traditional and medicinal uses and pharmacological activities'' , Institute of Kurukshetra Pharmaceutical University, India,2010,4, 8-61.
25. Prof. Dr. Ali E Al-S, "Pharmacology and therapeutic potential of Euphorbia Hirta'', Journal of pharmacy,2017,7,.7-20.