WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 13, 883-900. Research Article ISSN 2277–7105

RESEARCH ON: FORMULATION AND EVALUATION OF HERBAL OINTMENT

***Priyanka Deepak Jiwane, Rutuja D. Sonone, Chaitali G. Gayaki**
Prof. Vishnudas K. Lokhande and Dr. R. S. Bijwar

Jagadambha Institute of Pharmacy and Research, Kalamb.

Article Received on
7 May 2025
Revised on 27 May 2025
Accepted on 16 June 2025
DOI: 10.20959/wjpr202513-37230

***Corresponding Author**
Priyanka Deepak Jiwane
Jagadambha Institute of Pharmacy and Research, Kalamb.

ABSTRACT

Azadirachta indica (A. Juss), also known as the neem tree, has been used for millennia as a traditional remedy for a multitude of human ailments**.** A. indica as an antimicrobial, additional studies are clearly needed to determine the specific mechanisms of action, clinical efficacy, and in vivo safety of neem as a treatment for human pathogens of interest. Herbal ointment for wound healing, integrating extracts from Neem and Aloevera. Physicochemical parameters, including pH, viscosity, and spreadability, were evaluated alongside stability assessments to ensure formulation quality. Neem in herbal formulations for wound management, providing a foundation for further investigation, including in vivo studies to validate efficacy and safety. An ointment is a viscous semisolid preparation used topically on a variety of body surfaces. It's to formulate and evaluate the antimicrobial herbal ointment from local medicinal plants. The ointment base was prepared and formulation of ointment was done by incorporating the active ingredients in most effective ratio in the base by trituration. After the completion of the formulation, quality of the ointment was assessed in terms of irritancy, spreadability, diffusion and stability Herbal ointment containing Aloe vera, Neem was formulated and evaluated to study antibacterial and antifungal activity. Aloe ointment is exhibiting broad-spectrum antifungal activity against A. varies and antibacterial activity against E.coli. Also it was found that ointment containing mixture of Aloe vera, Neem, showed prominent antifungal activity than antibacterial activity. This ointment can be used in the treatment of sun burns, rashes, burns, wounds and other skin infections. In addition to several dose forms, herbal drugs can also be made as an ointment. On the variability of body exteriors, a cream glutinous semisolid mixture is applied topically.

The base was triturated to include the active ingredients in the majority of the effective ratio, completing the preparation of the ointment.

KEYWORDS: Azadirachta indica, Aloe vera, Neem, Herbal ointment, Anti- inflammation, skin.

INTRODUCTION

Neem is a natural herb that comes from the neem tree, other names for which include Azadirachta indica and Indian lilac. The extract comes from the seeds of the tree and has many different traditional uses. Neem is known for its pesticides and insecticidal properties, but people also use it in hair and dental products. All parts of the neem tree- leaves, flowers, seeds, fruits, roots and bark have been used traditionally for the treatment of inflammation, infections, fever, skin diseases and dental disorders. The medicinal utilities have been described especially for neem leaf.[1] In other plant parts, including leaves, medicinal plants have shown antibacterial properties over the past 20 years.Since the 1940s, bacteria have started to evolve resistance toward them. Rendering to Braunter and Grein (1994-1995), natural plant products might provide a fresh foundation of antibacterial chemicals.[2,3]

Ointments are another formulation for herbal medications, in addition to other dosage forms. A viscous semisolid preparation used topically to various body surfaces is called an ointment. These consist of the skin as well as the mucous membranes of the nose, eyes, vagina, and anus. An ointment could contain medication or not.[4,6] Medicated ointments have a dissolved, suspended or emulsified in the base. Ointments are used topically for several purposes, e.g. as protectants, antiseptics, emollients, antipruritic, keratolytics and astringents. Ointment bases are almost always anhydrous and generally contain one or more medicaments in suspension or solution or dispersion. Ointment bases may be hydrocarbon (oligeanous), absorption, water removable and water soluble type. On the basis of their level of action, they are classified as: epidermatic, endodermatic and diadermatic (Carter, 1987). An antiseptic ointment is aimed to destroy or inhibit the growth of bacteria.[7]

In an earlier study, medicinal plants have been reported to be very beneficial in wound care, promoting the rate of wound healing with minimal pain, discomfort, and scarring to the patient (Odimegwu et al., 2008).[8] Different types of antibiotics and chemotherapeutic agents are being used in the treatment of one form of disease or the other.[9] Plants are the oldest source of pharmacologically active compounds and have provided human kind with many

medicinally useful compounds from centuries. Today more than two thirds of the world's population relays on plant derived drugs. The origin of many effective drugs is found in the traditional medicinal practices and in view of this it is very important to undertake studiespertaining to screening of the medicinal plants for their proclaimed biological activity.[10]

Fig No. 1: Sun burn.

Fig No. 2: Wound.

Fig No. 3: Crack skin.

Dislocation of skin hedge led to the colourful type of skin problem. Most common condition is loss of water content which leads to blankness of skin similar as crack skin, scaling, roughness or dryness, sun burn, wound, rashes and an uncomfortable feelings of miserliness, occasionally with itching and scavenging. Treatment with moisturizer aims at maintaining skin integrity and well being by furnishing a healthy appearance of the existence, figure of moisturizer are available under the market of natural, safe, organic, herbal while introducing parcel of occlusivity and emolliency are harmonious across all moisturizer.[11]

DRUG AND EXCIPIENTS PROFILE

API (Drug)

Neem

Fig. No. 4:- Neem.

- Biological source: Azadirachta Indica, commonly Known as margosa, neem, neem tree.[12,13]
- Indian lilac, Is a tree in the mahogany family Meliaceae.
- Genus: Azadirachta.
- Family: Meliaceae
- Botanical name: Azadirachta indica
- Part typically used: Leaves and it's powder
- Common name: Neem
- Colour: Green

Uses

- Neem has an anti-inflammatory property which helps reduces acne.
- Treats Fungal Infections.
- Useful in Detoxification.
- Increases Immunity.
- Insect & Mosquito Repellent.
- Treats Wounds.
- Neem leaves are used to treat head lice, skin Diseases, wounds or skin ulcers.

Properties

- It may have anti-allergenic activity.
- It may have anti dermatic activity.
- It may have anti-inflammatory activity.
- It may have antipyretic activity (fever-reducing).
- Helps Destroy Cancerous Cells.

EXCIPIENTS

ALOE-VERA

Fig. No. 5:- Aloe vera.

- Biological source: Aloe Barbandesis also known as Chinese aloe, Cape aloe, Barbados aloe.[14,16]
- Aloe barbadensis miller belongs to Asphodelaceae (Liliaceae) family
- Genus : Aloe
- Family : Asphodelaceae (Liliaceae)
- Botanical name : Aloe Barbandesis Miller
- Part typically used : Inner fleshy part (Gel)
- Common name : Aloe Vera
- Colour : Slightly greenish

Uses

- Disinfectant Anti- bacterial, Anti-septic, Anti-fungal
- Aloe help reduce inflammation
- Help with detoxification
- Alkalizes the body
- Boost immune system
- Great for skin

Properties

- It may have Anti-oxidant
- It may have anti inflammatory
- It may have antiseptic
- It may have wound healing
- It may have moisturizing

- **BEES WAX**

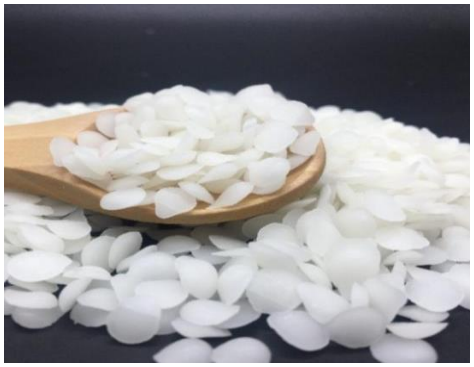

Fig. No. 6:- Bees wax.

- Beeswax is a natural wax produced by honeybees.[17]
- It's a solid, non-crystalline substance with a yellowish colour and a mild, sweet aroma.
- Beeswax is known for its moisturizing, protective.
- It has healing properties, making it a popular ingredient in ointments and other skincare products.

Uses

- Moisturizing and Protective : It provide a protective barrier on the skin, retaining moisture and preventing dryness.
- Healing : Beeswax is believed to havehealing properties & treating burns, cuts, wounds.
- Shooting : Beeswax can help soothe irritated skin and relieve itching.
- Thickness and Texture : It helps create the desired consistency and texture in ointments.
- Emulsification : It aids in the formation of a stable emulsion.

Properties

- Emulsifying : Beeswax can help create stable emulsions in creams, lotions, and ointments.
- Water-repellent : It's water-resistant, making it suitable for waterproofing applications.
- Occlusive : Beeswax forms a protective barrier on the skin, helping to retain moisture and prevent water loss.
- Emollient : It softens and soothes the skin.
- Moisturizing : Beeswax can help attract and retain moisture in the skin.
- Antioxidant : Some studies suggest that beeswax may contain antioxidants that can protect the skin from damage.
- Antimicrobial : Certain studies suggest beeswax has anti-inflammatory, anti-bacterial, anti-viral, and anti-allergic properties.

STEARIC ACID

Fig. No. 7: Stearic acid.

- Stearic acid is a saturated fatty acid, naturally occur-ring in animal and vegetable fats, especially in cocoa and shear butter.[18]
- It's an 18-carbon chain molecule (octadecanoic acid) with the chemical formula C18H3602.
- Stearic acid is a waxy, white solid with a mild odour and is used in various applications.
- Stearic acid is a saturated fatty acid, meaning it has no double bonds between carbon atoms in its chain.

Uses

- Cleansers : Stearic acid aids in removing dirt, sebum, and impurities from the skin's surface,
- Moisturizers : It locks in moisture and soothes the skin, making it a valuable ingredient in moisturizing products.
- Lotions and Creams : It improves the overall texture and feel of lotions and creams by thickening and softening them.
- Soaps : It is used in soap formulations to help solidify the formula and improve lather.
- Shaving Creams : Stearic acid enhances the texture and performance of shaving creams, making them gentler on the skin.

Properties

- Emulsifier : Stearic acid helps to stabilize oil and water-based mixtures, preventing separation and maintaining product consistency.
- Thickener : Its waxy nature allows it to increase the viscosity of creams, lotions, and other cosmetic products.
- Emollient : It softens and moisturizes the skin, preventing moisture loss and creating a barrier for protection.
- Lubricating Agent : It provides a smooth and silky texture to products.
- Stabilizer : It helps to extend the shelf life of products by preventing rancidity, oxidation, and microbial growth.

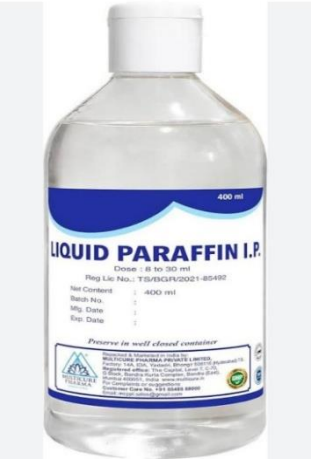

Fig. No. 8:- Liquid paraffin.

LIQUID PARAFFIN

- Liquid paraffin is a highly re-fined mineral oil, used as a lubricant and emollient.[19]
- It's a transparent, colourless, and nearly odourless liquid.
- Primarily composed of saturated hydrocarbons.
- In ointments, li-quid paraffin helps to soften skin, soothe irritation, and prevent moisture loss.
- Highly refined to remove impurities.

Uses

- Treating Dry, itchy Skin : It is in ointments can help to hydrate and soothe irritated skin.
- Protecting Skin : The occlusive nature of liquid paraffin helps to create a protective layer on the skin, preventing moisture loss and protecting it from external irritants.
- Soothing Sores & Lesions : It can help to calm & soothe sores, lesions, and psoriatic plaques.
- Easing Inflammation and Redness : It help to reduce inflammation and redness.
- Locking in Moisture : It helps to retain moisture in the skin, making it soft and supple.
- Base for Ointments : It can beused as a base or component in various ointments, including those for eczema, psoriasis, and other skin conditions.

Properties

- Emollient : Softens and moisturizes the skin.
- Lubricant : Reduces friction and provides a smooth surface.
- Occlusive : Creates a barrier on the skin, preventing water loss.

- Inert : Generally non-reactive with the skin.
- Non-comedogenic : Less likely to clog pores when used in its refined form.

BORAX

Fig. No. 9:- Borax.

- Borax is a naturally occur-ring mineral salt, also known as sodium borate or sodium tetra borate.[20]
- It's a white, odourless, crystalline powder soluble in water.
- Borax has numerous uses, including cleaning, laundry, and as a buffering agent in skincare products.
- In some traditional uses, borax has been used as a medicinal agent, but its use in modern skincare is primarily for its buffering and preserving properties.
- Borax is alkaline, meaning it is slightly basic.
- Chemical Formula: Na2B4O7.10H2O (dehydrate).

Uses

- Borax is used in antifungal foot soaks and other anti-fungal preparations.
- It may be a component of toothpastes and mouthwashes. (Oral hygiene)
- Borax can be used as a pH buffering agent to neutralize acids in various pharmaceutical preparations.
- Specialty toothpastes and mouthwashes.
- Cosmetics such as lotions, skin creams, moisturizers, sunscreen, and acne care products.
- Paint and ceramic glaze.

Properties

- Alkaline Nature : Forms alkaline solutions when dissolved in water.
- Reaction with Acids : Reacts with strong acids like hydrochloric acid to form boric acid and sodium chloride.

- Flame Test : Borax gives a yellow-green flame.
- Solubility : Soluble in water, particularly in hot water.
- Complex Formation : Can form complex structures with various organic and inorganic substances.
- Anomalous Properties: Exhibits some anomalous properties compared to other boron compounds, such as high melting and boiling points, and non-metallic nature.

LEMON OIL

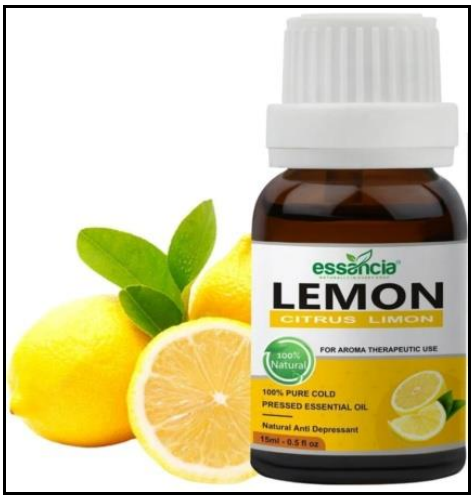

Fig. No. 10: Lemon oil.

- Lemon oil is a pale yellow to greenish-yellow liquid extracted from the peel of lemons.[21]
- It has a strong, fresh, and citrusy aroma.
- The oil is known for its various uses, including in aromatherapy. Skin care, and cleaning products.
- Composition: It primarily contains terpenes, with limonene being the most abundant.
- Lemon oil has a thin, watery viscosity.

Uses

- Aromatherapy : Lemon oil is used for its invigorating and mood-boosting properties.p
- Skincare : It's believed to help clear skin, soothe anxiety, and stimulate the mind.
- Cleaning : Lemon oil is used in cleaning products due to its antiseptic and natural cleaning properties.
- Flavouring : It can be used to add a citrus flavour to food and beverages.
- Personal care : It is found in variouspersonal care products like soaps and face washes.

Properties

- Antimicrobial : Lemon essential oil contains compounds like limonene and linalool that inhibit the growth of bacteria and fungi, making it effective for treating skin infections and supporting wound healing.
- Anti-inflammatory : The oil's anti-inflammatory properties can help reduce pain and swelling associated with arthritis and other inflammatory conditions.
- Antioxidant : Lemon essential oil is rich in antioxidants, which help neutralize free radicals, reducing oxidative stress & potentially lowering the risk of chronic diseases.
- Topical Applications : Lemon essential oil can be used to treat acne, fungal infections.
- Aromatherapy : Lemon essential oil's refreshing scent can promote mental well-being by reducing stress and anxiety when inhaled.

EXCIPIENTS AND THEIR PROPERTIES

Table No. 1: Excipient and their properties.

Sr No.	Excipient name	Properties	Uses
1	Aloe vera	Anti-septic	Reduce inflammation
2	Bees wax	Humectant	Provide hydration
3	Stearic acid	Hardener	Surfactant to help cleans skin
4	Liquid paraffin	Emollient	Soften & moisturizing the skin and decrease itching &flaking
5	Borax	Emulsifier	Preservative, buffer
6	Lemon oil	Anti-oxidant	Diluted and applied topically

FORMULATION

Neem extraction

- Take a few fresh neem leaves and sundry them for 2 days until all the moisture from leaves gets dried out becoming dry and crispy. Put them in a blender grind them into a fine powder and store it in an airtight container.
- The powdered neem material is mixed with ethanol in a suitable container. Take a 1gm of neem powder dissolve in 10ml of ethanol. The ratio of neem material to ethanol can vary depending on the desired concentration of the extract.
- The mixture is allowed to soak for a specific period (e.g., 24 hour at room temperature) with occasional agitation to ensure proper extraction.
- The mixture is filtered to remove any solid particles, resulting in a clear ethanolic extract.

Formulation table for ointments (F1 to F9)

Table No. 2: Formulation table for ointments (F1 to F9).

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Neem Extract	2 ml	2 ml	2 ml	2 ml	2 ml	2 ml	2 ml	2 ml	2 ml
Aloe Vera	2 gm	2 gm	3 gm	4 gm	3 gm	3 gm	3 gm	3 gm	4 gm
Bees wax	6.5 gm	4.5 gm	5 gm	6 gm	4.5 gm	5 gm	5.5 gm	6 gm	7 gm
Stearic acid	5 gm	5 gm	5.5 gm	4.5 gm	6 gm	5.5 gm	5 gm	6 gm	6.5 gm
Liquid paraffin	6 ml	7 ml	8.5 ml	8.5 ml	7 ml	7.5 ml	8 ml	7 ml	5 ml
Borax	0.05gm	0.05gm	0.05gm	0.05gm	0.05gm	0.05gm	0.05gm	0.05gm	0.05gm
Lemon oil	8.5 ml	9 ml	6 ml	5 ml	7.5 ml	7 ml	6.5 ml	6 ml	5.5 ml
Total	30gm	30gm	30gm	30gm	30gm	30gm	30gm	30gm	30 gm

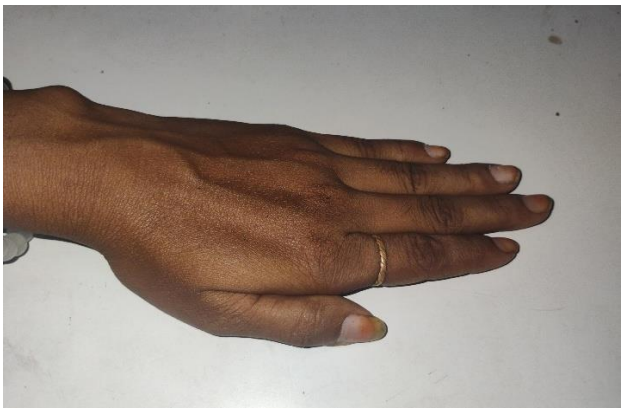

Fig. No. 11:- Irritacy test.

EVALUATION TEST

1) **Organoleptic evaluation :** This is basically used to check colour, odour, texture and stability of ointment.

2) **pH determination :** Ensure compatibility with skin pH. Weigh 1 g of the ointment. Dissolve in 100 mL of distilled water. Stir thoroughly. Measure pH using a calibrated pH meter.[22]

3) **Spreadability :** Place 1 g of ointment between two glass slides. Apply 500 g weight on top for 5 minutes. Measure the spread diameter (in cm).[23]

Use the formula : Spreadability (Weight Length) / Time

4) **Viscosity measurement :** This test is basically used to check or predict how materials used in ointment will behave in the real world. It is mainly used to check efficacy.

5) **Skin irritation :** This is used to check the quality of materials as well as chemicals and whether it is harmful to skin / mucosal or not. Evaluate safety on skin. Apply ointment on shaved skin of a lab animal or in vitro model. Observe for redness, swelling, or irritation over 24-72 hours.[24]

6) **Washability :** This test is also used to check quality of ointment. In this first of all we have to add small amount of ointment which was applied on the hand. After that we have to washed with tap water.[25]

7) **Antimicrobial activity :** Assess efficacy against microbes. Use agar well or disc diffusion method. Prepare culture plates with bacterial strains (e.g., Staphylococcus aureus, E. coli). Apply ointment into wells/discs. Incubate at 37°C for 24 hours. Measure the zone of inhibition (in mm).[26]

8) **Stability test :** Check shelf-life under different conditions. Store samples at different temperatures (25°C, 37°C, 45°C).Observe over 1-3 months. Note any changes in colour, texture, odour, or phase separation.[27]

RESULT

1) Organoleptic evaluation

- In this test colour, odour and texture were checked.

Table No. 3: Organoleptic evaluation.

Sr. No.	Batch No.	Colour	Odour	Texture
1	F1	Light yellow	Pleasant	Oily
2	F2	Light yellow	Pleasant	Oily
3	F3	Light yellow	Pleasant	Slightly smooth
4	F4	Light yellow	Pleasant	Oily
5	F5	Light yellow	Pleasant	Oily
6	F6	Light yellow	Pleasant	Oily
7	F7	Light yellow	Pleasant	Oily
8	F8	Light yellow	Pleasant	Oily
9	F9	Light yellow	Pleasant	Oily

2) pH determination

- According to the result the pH of all nine formulation that is F1, F2, F3, F4, F5, F6, F7, F8 and F9 was found to be nearer to skin pH so it can be safely use on the skin.

Table No. 4: pH test.

Sr. No.	Batch No.	pH
1	F1	4.7
2	F2	4.9
3	F3	5.8
4	F4	6.4
5	F5	5.4
6	F6	6.1
7	F7	4.6
8	F8	5.6
9	F9	6.5

3) Spreadability

- The spreadability of all formulation was determined and it was observed that formulation F3 has greater spreadability as compared to other formulation.

Table No. 5: Spreadability test.

Sr. No.	Batch No.	Spreadability (g.cm/sec.)
1	F1	5.7
2	F2	4.58
3	F3	5.7
4	F4	6.66
5	F5	5.4
6	F6	6.0
7	F7	5.77
8	F8	4.60
9	F9	6.57

4) Viscosity measurement

- The viscosity of all formulation was determined and it was observed.

Table No. 6: Viscosity test.

Sr. No.	Batch No.	Viscosity (cps)
1	F1	3950
2	F2	4587
3	F3	5000
4	F4	2090
5	F5	1896
6	F6	3567
7	F7	4897
8	F8	2018
9	F9	2040

5) Skin irritation

- All formulation showed no sign of irritancy.

- **Table No. 7: Irritant test.**

Sr. No.	Batch No.	Irritancy
1	F1	Nil
2	F2	Nil
3	F3	Nil
4	F4	Nil
5	F5	Nil
6	F6	Nil
7	F7	Nil
8	F8	Nil
9	F9	Nil

6) Washability

- The result observed F3, F4, F7 and F9 was easily washable. And F1, F2, F5, F6 and F8 was taken few second.

Table No. 8: Washability test.

Sr. No.	Batch No.	Washability
1	F1	Taken few sec.
2	F2	Taken few sec.
3	F3	Easily washable
4	F4	Easily washable
5	F5	Taken few sec.
6	F6	Taken few sec.
7	F7	Easily washable
8	F8	Taken few sec.
9	F9	Easily washable

FINAL PRODUCT

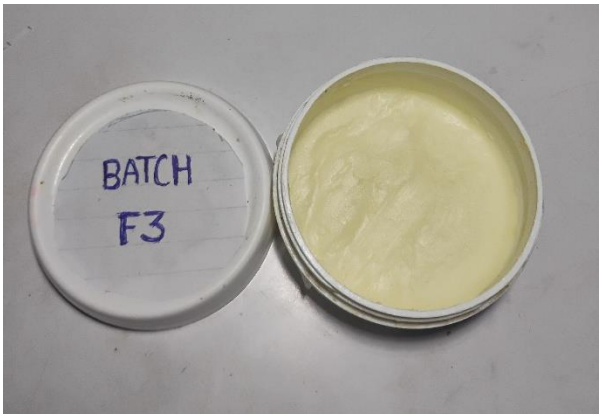

Fig. No. 12: Herbal ointment.

CONCLUSION

In conclusion, the formulation and evaluation of a herbal ointment utilizing Neem, and Aloe Vera have shown promising results in enhancing wound healing. The ointment has demonstrated notable efficacy in accelerating the wound healing process. The synergistic properties of Neem, and Aloe Vera have contributed to their combined therapeutic effects, including anti-inflammatory, antimicrobial, and wound-repairing activities.

The purpose of the study was to prepare antimicrobial herbal ointment using locally available plants. On the basis of antimicrobial efficacy, five different local plants were taken and their ethanolic extracts were incorporated in the most effective ratio in appropriate base. The final product readily spread on skin surface, showed no irritant effect, diffused well and was stable at different temperatures.

Formulating and evaluating a herbal ointment involves a series of tests to ensure its quality, safety, and efficiency. A study on herbal ointment found that the pH was in the range of 5.8, which is considered good for skin. In a non-irritancy test, all formulations showed no signs of irritation. In a washability test, final batch result are easily washable.

The prepared ointment with cultural ingridents like neem extract, aloe vera and lemon oil which enhance the property of formulation and show effectiveness. The formulations, batch by batch improved results, the final formulation F3 have good spreadability, viscosity and washability. This ointment are wound healing the skin, lightening the skin and protect for the harmful sunrays also it is used to treat crack skin the based of result this ointment is safe, efficient and non toxic of natural ingradients used in formulation.

REFERENCE

1. Carmagnole İ, Chen C, Chen J, Wan C. Chemical constituents, antimicrobial activity, and food preservative characteristics of Aloe vera gel. Agronomy, 2019 Dec 2; 9(12): 831.
2. 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.
3. Himal Paudal Chetri, Nisha ShershaYogal, Jyoti Sherchan, Anupa K.C., S. Mansoor, Panna Thapa; Formulation and evaluation of Antimicrobial herbal ointment. Kathmandu University Journal of Science Engineering and Technology, March 2010; 6(1): 102-107.

4. Yuvaneswaran Krishnan, Nyet Kui Wong; 2015; Cytotoxicity and Antimicrobial properties of neem (Azadirachta indica) Leaf Extract; International Journal of Pharmacy and Pharmaceutics Science; Int Pharm Sci, Nov 2014; 7(2): 179-182.
5. Chhetri HP, Yogol NS, Sherchan J, Anupa KC, Mansoor S, Thapa P. Formulation and evaluation of antimicrobial herbal ointment. Kathmandu University Journal of Science, Engineering and Technology, 2010; 6(1): 102-7.
6. Udegbunam SO, Nanjing TO, Udegbunam RI, Okafor JC, Agbo I. Evaluation of herbal ointment formulation of Milicia excelsa (Welw) CC berg for wound healing. African journal of Biotechnology, 2013; 12(21).
7. Chandra NK, Hessen IR, Rubianti I. Effect of neem leaves extract (Azadirachta indica) on wound healing. Althea Medical Journal, 2015 Jun 30; 2(2): 199-203.
8. Bhandari PR, Kamdod MA. Emblicaofficinalis (Amla): A review of potential therapeutic applications., 2012; 6(2): 257-269.
9. Sharma P, Kharkwal AC, Kharkwal H, Abdin MZ, Varma A. A review on pharmacological properties of Aloe vera. Int J Pharm Sci Rev Res., 2014 Nov; 29(2): 31-7.
10. Liang J, Cui L, Li J, Guan S, Zhang K, Li J. Aloe vera: A medicinal plant used in skin wound healing. Tissue Engineering Part B: Reviews., 2021 Oct 1; 27(5): 455-74.
11. Rahmani A, Almatroudi A, Alrumaihi F, Khan A. Pharmacological and therapeutic potential of neem (Azadirachta indica). Pharmacognosy Reviews, 2018 Feb 1; 12(24): 250-5.
12. Odimegwu, D.C., Ibezim, E.C., Esimone, C.O., Nworu, C.S., Okoye, F.B.C., 2008. Wound Healing and Antibacterial Activities of The Extract of Dissotis Theifolia (Melastomataceae) Stem Formulated in A Simple Ointment Base. J Medicinal Plant Res., 2(1): 011-016.
13. Debjit Bhowmik, Chiranjib, Jitender Yadav, K. K. Tripathi, K. P. Sampath Kumar, J. Chem. Pharm. Res., 2010; 2(1): 62-72.
14. Jagtap NS, Khadabadi SS, Farooqui IA, Nalamwar VP, Sawarkar HA. Development and evaluation of herbal wound healing formulations. Int J Pharm Tech Res., 2009 Oct; 1(4): 1104-8.
15. Carter, S.J., 1987. Cooper and Gunn's Dispensing for Pharmaceutical Students: Ointments, Pastes and Jellies. 12th Edition, CBS Publishers and Distributors, India, 192-210.

16. Hawkins, E.B., Ehrlich, S.D., 2007. Herbal Medicine: Overview. http://www.umm.edu/altmed/articles/herbal-medicine-000351.htm.
17. Venugopalan Santhosh Kumar and Visweswaran Navaratnam Neem (Azadirachta indica): Prehistory to contemporary medicinal uses to humankind Asian Pac J Trop Biomed., 2013; 3(7): 505–514.
18. Marc Maurice Cohen Tulsi - Ocimum sanctum: A herb for all reasons J Ayurveda Integral Med., 2014; 5(4): 251–259.
19. Dash GK and Marty PN. The wound healing effects of a new poly herbal formulation Der Pharmacia Letter, 2011; 3(1): 342-349.
20. Himaja. N Formulation and Evaluation of Herbal Cream from Azadirachta Indica Ethanolic Extract International Journal of Research in Drug and Pharmaceutical Science, 2017; 1(1): 23-26.
21. "The Ayurvedic Pharmacopoeia of India" first edition part-I, 31: 33.
22. Pal Arti, Soni Manish, Patidar Kalpana Formulation and Evaluation of Poly Herbal Cream International Journal of Pharmaceutical and Biological Archives, 2014; 5(4): 67–71.
23. Carter, S.J. Cooper and Gunn's Dispensing for Pharmaceutical Students: Ointments, Pastes and Jellies. 12th edition, CBS Publishers and Distributors, India.
24. Chakole CM, Shende MA, Khadatkar SN. "Formulation and evaluation of novel combined halobestasol propionate and Fusidic acid ointment. International Journal of Chem-Tec Research, 2009 Jan, March; 1(1): 103-106.
25. Raymond CR, Paul JS, Marian EQ editors. Handbook of Pharmaceutical Association Wang Y, Shao J, Zhou Chi, Zhang D, Bie X, et al. Food preservation effects of curcuma microcapsules. Food Control, 2009; 27: 113-117.
26. Debjit Bhowmik, Harish Gopinath, Pragati Kumar, S. Duraivel, Aravind. G, K. P. Sampath Kumar "Medicinal uses of punicagranatum and its health benefit" Journal of pharmacognocy & phytochemistry, 2013; 8192: 1(5): 28-35.
27. Vinod D. Rangari "Pharmacognocy and Phytochemistry" volume IInd second edition Career publication, 265-267.