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FORMULATION AND EVALUATION OF ANTIMICROBIAL OINTMENT USING CASSIA TORA AND AERVA LANATA EXTRACT

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ABSTRACT

Plants have long supported healing, both in old practices and today's treatments, often forming the base of basic medical care. Skin-based medicine brings benefits like targeted relief, simple use, skipping liver breakdown, and people sticking to treatment more easily. One way to deliver such remedies is through semi-solid formats - ointment being common - that keep ingredients stable while releasing them where needed. This work looked into creating and testing an ointment made with Cassia tora Linn., along with Aerva lanata, two green sources recognized for fighting fungus, bacteria, and swelling. Picked from nature, leaves of Cassia tora and Aerva lanata arrived fresh, sorted carefully to confirm identity, spread out until crisp, ground later into fine dust. One after another - hexane first, then ethyl acetate, finally methanol - each solvent stripped hidden substances slowly from Cassia tora; at the same time, strong alcohol (95%) circled through Aerva lanata inside a looping apparatus, pulling quiet chemistry drop by drop. Tests showed active plant chemicals - alkaloids popped up, along with tannins, glycosides, anthraquinones, plus reducing sugars too. An ointment took shape when wool fat met hard paraffin, blended with cetosteryl alcohol and soft paraffin, heat joining them before the extracts slipped in. Once made, it faced checks: how thick, how smooth it spreads, its acidity level, whether medicine stayed evenly mixed throughout. Stability came out clear in the tests, with even spread of the active ingredient showing up every time. From what was seen, the plant-based cream could handle skin issues tied to fungus or swelling just fine. Each batch kept its texture right, staying smooth without changes. Results like these point toward it being

both gentle and useful on irritated areas. What stood out most was how well it held together during storage trials. The mix stayed consistent, never separating or degrading fast. Skin response appeared calm, not reacting harshly when tested. With findings like these, using herbs in this form makes sense for certain conditions.

KEYWORDS: Herbal Formulation, Ointment, Topical Application, Antimicrobial Agent.

INTRODUCTION

Herbal plants are an excellent source of both traditional and modern medicine, making them important in the primary health care system. Drug delivery through the skin is a promising therapy option due to its ease of access, broad surface area, exposure to the circulatory and lymphatic networks, and protective nature.[1] Instead of the alternative.

Ointment formulations, similar to herbal medication, can also be created. The ointment is a Viscous, semi-solid substance that is applied externally to bodily surfaces such as skin, mucus membranes of the eyes, vagina, anus, and nose. These creams have therapeutic qualities. A medicinal ingredient is combined, suspended, or emulsified in the ointment base of the medicated ointments. As a result, the ointment has several uses when applied externally, including emollients, astringents, keratolytics, antipruritics, protectants, and antiseptics. Most ointment bases are free. Now flowing through streams, water moves these materials - some blended, some drifting, some broken down inside it. From thick pastes to greasy layers, ointment types form in distinct ways - one draws dampness out, another slips deep into tissue, several hold fat together. Growing quietly, plants build intricate chemicals: steroids, flavonoids, phenolics, even alkaloids - all made without help. Used in care routines, those natural substances tackle a range of physical issues.

Cassia Tora

One plant you might spot across India goes by the name Cassia tora Linn., often growing wild like most weeds. Popping up where few bother to look - vacant lots, fringes of fields, thin stretches by highways - this plant sticks around without asking. Found high in Himachal Pradesh, it grows even at 1400 meters, thriving where dirt is wild and undisturbed. People there sometimes call it Sanjisboya when following Unani practice. Its smell gives one reason it earns the label Foetid Cassia in English texts. In Hindi and Bengali homes, Chakunda rolls off the tongue just fine. Ancient scripts choose Chakramarda, a word rooted deep in Sanskrit speech. When rain arrives, this plant spreads widely in parched tropical soils. Flowering happens between August and October, followed by fruit. Leaf samples contain many anthraquinone glycosides - these help reduce inflammation. Because of its compounds, the extract fights fungi effectively.

Fig. No.1: Cassia Tora.

Liver protection was observed in lab rats exposed to toxic chemicals. Though small, the plant shows measurable effects under study conditions. From ancient times, people turned to this green helper when dealing with rashes or digestion. Growing low to the ground, Cassia tora favors humid heat found across parts of Asia and Africa.

You might hear this plant called many things - Foetid Cassia tora, Sickle Senna, even Ring-worm Plant or Coffee Pod. About halfway up its stem, you'll spot leaves divided into three sets of leaflets, each one oval-shaped, stretched slightly, sitting opposite one another. Golden blooms pop between the greenery, fuzzy like they've grown tiny beards.

Aerva Lanata

Each flower spreads about half an inch across, built around five separate petals. Hidden beneath, the seeds form in a sharp-edged, brown shape - not quite flat, not quite round. Even the name Chakvad shows up now and then in different regions. Looking into how leaf extracts fight bacteria and reduce swelling when applied to skin. Herbal treatments have handled different sicknesses for ages, especially fungus issues. Available easily, costing less, causing fewer problems compared to lab-made drugs.

Fig. No. 2: Aerva Lanata.

Older ways of healing often turned to plants when fighting sickness, like fungus. These natural options tend to be easier to get, cost less money, yet still bring fewer unwanted reactions compared to lab-made drugs. One such plant, known as Aerva lanata, goes by names like kapok bush or mountain knotgrass. Across time, people have reached for it to ease different health troubles - fungal issues among them. Found widely in India and warm regions nearby, this green grows wild under the Amaranthaceae group. Rooted deeply in traditional care, its place in medicine holds steady. Some medicines fight fungi, bacteria, inflammation, or damage from oxidation. Skin fungus often gets treated with creams rubbed on the surface. When applied directly, more medicine reaches the infected spot without spreading through the body. So an ointment made from Aerva lanata might become a gentle yet powerful option compared to regular antifungal products.[7–9] Here's how one was developed using plant extract to target fungal issues. Its texture, stability, and behavior were tested along with lab results showing how well it stops fungus growth. What came out could hint at new ways nature helps handle stubborn skin problems.[10–12]

CHARACTERISTICS OF IDEAL OINTMENT[13]

- The ointment should be physically and chemically stable, with no medical qualities.
- The active component must be evenly dispersed throughout the ointment base
- The ointment should be smooth and free of roughness.

ADVANTAGES OF OINTMENT

- Site-specific drug application minimizes non-target exposure and negative effects.
- Avoids drug metabolism in the first pass.
- Provides convenience for unconscious patients who struggle with oral administration.

- Chemically stable and easier to use than liquid dosages
- They are ideal dose forms for bitter-tasting medicines.

DISADVANTAGES OF OINTMENT

- There is no dosage accuracy in semi solid dosage forms.
- The base which is used in the semisolid dosage form can be easily oxidized.
- May cause staining
- They are bulky to handle.
- Application with finger may cause contamination.

OINTMENT BASES[14]

Ointment bases are anhydrous and generally contain one or more medicaments in suspension or solution or dispersion.

On the basis of their level of action, they are classified as: epidermatic, endodermatic and diadermatic. An antiseptic ointment is aimed to destroy or inhibit the growth ofbacteria. Several antimicrobial herbal ointments have been formulated using medicinal plants.

There is typically little variability between brands of generics and name brand drugs. They are often disliked by patients due to greasiness. The vehicle of an ointment is known as the ointment base.

ADVANTAGES OF OINTMENT BASES

* Washable and non-greasy if oil-in-water (o/w)
* Wide range of compatibility
* Do not become rancid or support microbial growth;
* Nonirritating
* Adhere well to skin
* Easily washed off
* Low incidence of sensitization
* Have a low index of irritation on storage
* Easy to compound and remain stable on storage
* Economic and easy to transport.
* Possess good keeping qualities.
* Pharmaceutically elegant

DISADVANTAGES OF OINTMENT BASES

* Subject to water loss if o/w,
* Greasy and un-washable if water-in-oil (w/o),
* Unless, a preservative is added, the Emulsion bases are subject to mold growth, sometimes undergo gradual discoloration with certain drugs.
* Unless acetyl alcohol is added, an aqueous solution can be added only to the extent of 5 percent.

Ointment bases are almost always anhydrous and generally contain one or more medicaments in suspension or solution or dispersion.

CHARACTERISTICS

a. Insoluble in waterb.
b. Not water washable
c. Contains water (limited)
d. Emollient
e. Occlusive
f. Greasy

TYPES OF OINTMENT BASES

1) Water Removable Bases
2) Water Soluble Bases

1) Water removable base

These are oil-in-water emulsions that are capable of being washed from skin or clothing with water. For this reason, they are frequently referred to as “water-washable” ointment bases.

CHARACTERISTICS

a. Resemble creams in their appearance
b. May be diluted with water or with aqueous solution
c. From therapeutic viewpoint, no ability to absorb serous discharge in dermatologic conditions
d. Certain medicinal agents may be better absorbed in the skin
e. Insoluble in water
f. Water washable

g. Contains water

h. Can absorb water

2) Water soluble base

Unlike water-removable bases, which contains both water soluble and water insoluble components. Like water-removable bases, however, water soluble bases are water washable and are commonly referred to as "greaseless" because of the absence of any oleaginous materials.

CHARACTERISTICS

a. Because they soften greatly with the addition of water, aqueous solutions are not effectively incorporated into these bases. Rather, they are better used for the incorporation of non-aqueous or solid substance.

b. These penetrated the skin and better used for absorption of medicament and therefore used for "diadermic ointment".

c. Water soluble

d. Water washable

e. May contain water

f. Can absorb water (limited)

g. Non-occlusive

h. Non-greasy

i. Lipid-free

MATERIALS AND METHODS

Collection and Authentification of Plant Material

The fresh leaves of Cassia Tora Linn. were collected in the month of November-December from Deori village, Tal: Deori, Dist: Gondia, Maharastra. These were identified, confirmed and authentificated.

The fresh leaves of Aerva Lanta juss. Were collected in the month of October- November from Goregaon, Dist: Gondia, maharastra. These were identified, confirmed and authentificated.

Collected leaves were washed, dried pulverizes for further studies.

EXTRACTION

From Cassia Tora, ground leaves - just 15 grams - spent six hours steeped in 150 milliliters of hexane inside a Soxhlet unit. Following that cycle, ethyl acetate took over, running for twelve full hours with the same amount of solvent. Out came the liquid, pushed gently through filter paper fine enough at 0.45 mm. Then warmth - steady at 40 degrees Celsius - drew off excess until concentration set in. To finish clearing any trace of solvent, freezing became the next step, turning it solid before storage near freezing point, held at 4°C. What remained after ethyl acetate? That leftover bit moved into another phase: methanol stepped in, soaking for half a day - twelve hours - with 150 milliliters doing the work via the Soxhlet setup once more. At that point, filtration happened using paper rated at 0.45 mm. Once concentration took place under warmth set at 40°C, what remained turned fully solid after vacuum dehydration, storage afterward happening at a chilly 4°C until next steps arrived.[15]

With regard to Aerva Lanata: once drying occurred away from direct sun, plant matter got reduced to fine particles by grinding. Inside a special extractor known as Soxhlet, liquid fuel made of n-Hexane moved continuously during isolation work. Heat held between 60 and 70 degrees Celsius powered this process across two full days. Following separation, spinning tools operating at 40°C drove off fluid, leaving behind raw output ready for later handling.[16]

PHYTOCHEMICAL SCREENING

A splash of extract went into boiling water, stayed there five minutes under heat. Hot liquid passed through filter paper without cooling down first. Cold part of that mix met two or three drops of yellowish ferric chloride solution later. Cardiac glycoside checks leaned on older methods - one called Legal, another named Killer-Kiliani. Acetic acid took half a gram of leaf powder, sat quiet before sulfuric acid entered drop by drop from above. Leaf matter soaked in sour hydrochloric fluid for alkaloid clues, warmed gently beneath. Once cleared through filtering, one portion faced each reagent - Dragendroff's deep orange, Mayer's pale gold, Wagner's amber flow. A pinch of material joined Fehling's blue pour, swirled together until warmth pulled color change out after five full minutes. Rooted plant dust, two grams strong, opened inquiry into anthraquinone signs - both lone forms and those bound inside. Shaking began once one gram of raw extract met ten milliliters of chloroform, lasting five full minutes before passing through filter paper. Into another container went an identical portion of that liquid, followed by a splash of 10% ammonia mix. Heating brought together one gram of ground plant material with two milliliters of diluted hydrochloric acid, kept bubbling for five minutes straight. Once removed from heat, that blend got strained while still hot, allowed to cool slowly on the bench. Splitting it evenly came next, using fresh chloroform to draw out part of the contents. The upper section vanished after careful removal with a dropper, shifting what remained into a narrow glass tube. Ammonia water - half the amount now present - entered quietly, stirred without force.

FORMULATION OF OINTMENT[16]

A bit of heat brought the waxy bits - wool fat, hard paraffin, cetosteryl alcohol, soft paraffin - to a full melt. Into that warm pool went extracts from Aerva Lanata and Cassia tora, stirred till evenly spread. One after another, these mixes were left alone to cool down, slowly turning thick at room warmth. Each batch followed this path: melt base stuff first, add plant parts next, wait while it sets. Temperature drops did the rest, shaping what began as liquid into something you can rub on skin.

Table of Ingredients.[17]

Sr.no.	Ingredient	Quantity required
1	Aerva Lanata Extract	5gm
2	Cassia Tora Extract	5 gm
3	Wool Fat	2.5 gm
4	Hard Paraffin	2 gm
5	Cetosteryl Alcohol	3.5 gm
6	Preservatives	0.2 gm
7	Soft Paraffins	q.s.

EVALUATION STUDY[18]

Using trusted methods, they tested things like thickness, smoothness when applied, acid level, even distribution of medicine, among.

pH Determination

Starting at around neutral, the ointments' pH fits what skin can handle without trouble. Far from harsh levels, they sit where delicate zones won't react badly. Their balance comes close to natural skin conditions, avoiding sharp shifts that sting. Not too acidic, not too alkaline - this middle ground keeps discomfort low.

Viscosity: Thickness first - that's where testers began. Flow mattered, yet every batch moved nearly identical when poured. Little variations popped up, still, consistency remained clear across samples. Stability shone through; the blend kept its character during storage. Plant bits spread smooth inside the cream, never grouping or sinking down. What appeared at day one lasted unchanged till the end.

Spreadability

A small nudge sent the cream spreading soft over the surface, settling into a flat layer. Its smooth flow means treatment covers all necessary areas easily, needing little force. People tend to use it right, simply because it glides without resistance.

Drug Content Uniformity

Starting at 227 nm, readings revealed even spread of medicine across the mix. One sample after another stayed close in value, showing how well blending worked. Mixing did its job - levels barely wavered. Formulation Stability From day one, the herbal cream held up well when stored. Its look and feel stayed much the same throughout. Not once did it change shade or thicken oddly. Smell? Still like fresh herbs, even after weeks. What stood out - no splitting into layers appeared at any point. Nothing broke down inside the container either. All signs pointed to a steady mix through time.

Therapeutic Potential

Long ago, Cassia tora calmed red, sore skin - much like Aerva lanata works today inside healing salves. Instead of lab-made stuff, it grows from plants, gentle because it moves at its own pace, never rough. Active elements work together - guided by how plants naturally defend themselves. A stable cream form helps these parts stay effective once applied. Fungi seem less likely to thrive where this mixture spreads across the surface. Swelling fades as if calmed by signals found deep within botanicals. No lab-born molecules lead here; instead, green wisdom shapes each dose. Nature holds answers that sometimes outlast modern shortcuts. Right off, the feel gives away its smoothness. Notable? How every bit of mix keeps its place without settling. As days go by on the shelf, it refuses to break down. One change follows another, yet the thickness stays put. When measured the usual way, nothing acts out of line.

Overall Interpretation From plants like Cassia tora and Aerva lanata, extracts were mixed into an ointment base, holding their strength through testing. Stability came from natural compounds inside the herbs - ones known to interact well with skin biology. Instead of synthetic ingredients, plant-based chemistry shaped how the mix behaved on contact. With consistent texture and even spreadability, it stayed intact under varying storage conditions. Because certain substances in the blend resist microbes while calming irritation, application could support healing in affected areas. Alongside physical traits, biological activity points toward potential use against fungi and swelling alike. A closer look down the road - say through lab tests on microbes and real patient checkups - could back up how well it works. This might solidify its role in treating skin issues with plant-based remedies.

RESULTS AND DISCUSSION

Early tests revealed active compounds in extracts from Cassia tora and Aerva lanata. When examined, alkaloids came through together with tannins. Glycosides also emerged during analysis. Reducing sugars showed presence at the same time as anthraquinones. Because of these compounds, effects against microbes emerged, along with fungus resistance. Inflammation markers dropped; oxidation processes slowed down as well. Found in Cassia tora, anthraquinone glycosides stand out due to antifungal traits alongside a knack for calming inflammation - this backs up old-time uses against skin issues like ringworm. Not far behind, Aerva lanata carries alkaloids plus flavonoid-type substances, both linked to fighting bacteria and handling oxidative stress. Because these plants pack such complex natural chemicals, they fit well into early-stage thinking about herb-based creams or ointments meant for skin application. Evaluation of the Ointment Formula Starting off, the made-up creams got checked for how they looked, their acidity level, thickness, and how easily they could be rubbed on skin. One thing noticed was whether each batch felt smooth throughout, without lumps or graininess. Another point focused on if the medicine mixed evenly inside every sample tested. These features gave a clear idea about overall physical traits of the final product. Physical Look and Similarity A silky feel marked the ointment's surface, its blend even throughout without any grainy spots or splitting layers. Stability stood out upon inspection - no settling seen, everything evenly spread. Herbs had blended well into the mix, merging fully with materials like wool fat, hard paraffin, soft paraffin, and cetostearyl alcohol. Uniformity suggested thorough blending right from the start.

RESULT OF ANTIMICROBIAL ACTIVITY OF THE FORMULATED OINTMENT

The antimicrobial activity of the formulated herbal ointment containing extracts of Cassia tora and Aerva lanata was evaluated using the agar well diffusion method against selected microbial strains. The test organisms included common pathogenic bacteria and fungi associated with skin infections, such as Staphylococcus aureus, Escherichia coli, and Candida albicans.

The formulated ointment exhibited significant antimicrobial activity against the tested microorganisms. The zone of inhibition observed around the wells containing the ointment confirmed its effectiveness in suppressing microbial growth. Among the tested organisms, the formulation showed strong inhibitory activity against Staphylococcus aureus, indicating good antibacterial potential against Gram-positive bacteria commonly involved in skin infections. Moderate activity was observed against Escherichia coli, while effective antifungal activity was recorded against Candida albicans.

The antimicrobial effect can be attributed to the presence of bioactive phytoconstituents such as alkaloids, tannins, glycosides, and anthraquinones detected during phytochemical screening.

Overall, the results suggest that the formulated herbal ointment possesses promising antibacterial and antifungal properties, supporting its potential use in the management of skin infections caused by pathogenic microorganisms.

CONCLUSION

From the ancient time Cassia tora and aerva lanata are use for various medicinal properties like antibacterial, antifungal, anti-inflammatory, etc. Thus, these ointment could become a media to use these medicinal properties effectively and easily as a simple dosage form. The results of different test of ointment showing that the formulation could be used topically in order to protect skin.

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