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Research

Formulation and Evaluation of Ointment from hydro-alcoholic leaf extract of *Cassia auriculata* for psoriasis

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Abstract

Aim: The purpose of the current study was to assess the anti-psoriatic properties of ointments containing hydro-alcoholic extract of *Cassia auriculata* leaves at 1% and 2% (w/w).

Introduction: Ointments are preparations that are homogeneous, transparent, viscous, and semi-solid and are applied externally to the skin or mucous membranes. The plant *Cassia auriculata* L., a member of the Leguminosae family of plants, is used in the Ayurvedic medical system to cure leprosy, diabetes, and other skin conditions. A persistent, inflammatory skin condition that affects millions of individuals worldwide is psoriasis.

Materials and Methods: Because of their ability to alter the immune system and lessen inflammation, natural ingredients have drawn attention as a psoriasis treatment. Wool fat, hard paraffin, Ceto-stearyl alcohol, and white soft paraffin were used to make a herbal ointment for psoriasis.

Results: The produced ointments' physical properties were evaluated, and the findings were satisfactory and the consistency was suitable for application.

Conclusion: Psoriasis is a chronic inflammatory skin disease that affects millions of people worldwide. The use of natural products to treat psoriasis has gained interest due to their ability to modulate the immune system and reduce inflammation. Traditional medicinal plants of India represent a promising source of natural products for the treatment of psoriasis.

Keywords: *Cassia auriculata,* Ointment, Psoriasis, hard paraffin.

INTRODUCTION

Psoriasis is a chronic skin condition that has no known cure and significant morbidity, yet typically not being life-threatening.[1] Even while psoriasis has always been common, it wasn't until the end of the eighteenth century that

it was identified as a distinct skin condition. One million out of the estimated seven million [2] Americans suffer from psoriasis, and 1.5 million of them visit a doctor annually for treatment. In 1993, the psoriasis yearly cost in the United States was estimated to be between $1.6 and $3.2 billion. The characteristics of classic psoriasis include aberrant skin maturation, inflammation, vascular alterations, and epidermal hyperproliferation due to defects in the normal cycle of epidermal formation[3] These four traits are frequently seen as patches of reddish, thickened, scaly, dry, and silvery white skin. The psoriatic lesions may bleed, pain, or itch. [4] The purpose of the current study was to assess the anti-psoriatic properties of ointments containing hydro-alcoholic extract of *Cassia auriculata* leaves at 1% and 2% (w/w).

Pathogenesis

The skin's primary purpose is to protect the body thanks to a strong epidermal layer. The stratum Basale, stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum are the five layers that comprise the epidermis. These layers are organized from deepest to most superficial. The four cell types that comprise these layers are: keratinocytes, which account for 90% of the cells; Langerhans' cells, which make up 8% of the cells; and tactile menisci, also known as Merkel cells. During the epidermal cell cycle, new cells that start in the stratum Basale move into the stratum corneum. As the cells move nearer the surface, keratin accumulates within them and the organelles disappear.

The cells are fully loaded with keratin and have perished by the time they reach the stratum corneum. The skin's protective layer is this smooth, keratinous outer layer.[4] The cells beneath take over as the surface cells exfoliate and slough off. Usually, the epidermal cell cycle takes four weeks. In the basal layer, keratinocytes divide roughly every two weeks. The epidermal cell cycle is accelerated in psoriatic skin.

Pathology

Excessive activation of parts of the adaptive immune system is thought to be a central element in the pathogenesis of psoriasis. In the early stages of psoriasis, various cell types, including plasmacytoid dendritic cells, keratinocytes, natural killer cells, and macrophages, secrete cytokines that activate myeloid dendritic cells.[5] Upon activation, myeloid dendritic cells secrete IL-12 and IL-23. IL-12 induces the differentiation of naive T cells into TH1 cells. IL-23 is responsible for the proliferation of TH17 and TH-22 cells. TH1 cells secrete gamma and alpha interferons. These cytokines induce downstream keratinocyte proliferation, increased expression of angiogenic mediators and endothelial adhesion molecules, and infiltration of immune cells into damaged skin [6]

Causes

- Cold, dry weather
- Stress
- Some medicines
- Infections
- Skin Injury
- Alcohol

Signs and symptoms

- Hack or bleed skin with sudden pain.
- A small bleeding area where the related skin is striped.
- Problems with fingernails and toenails, including discoloration and pitting.
- Nails may also begin to crumble or lift away from the nail bed.
- Scalp scaled plate.

Treatment

- **Topical Therapy**
- **Corticosteroids** such as hydrocortisone, triamcinolone or clobetasol (Cormax, temovate, etc.)
- **Vitamin D analogues: synthetic forms such as calcipotriene (Dovonex, Sorilux, etc.)**
- **Retinoids:** Tazatotene (Tazorac, Avage etc.)
- **Calcineurin Inhibitors:** such as Tacrolimus (Protopic) and pimecrolimus (Elidel) etc.
- **Salicylic acid:** shampoos
- **Coal tar**
- **Anthralin:** It is a tar cream that slows skin cell growth.

Plant morphology

Tree Abaram or Casia Aurikratalin belongs to Caesalpiniae. The leaves are adolescent, thin, slightly RID laughter, alternative, rules, and transportation, very large, close intervals, and vertical lines between each part of the 8.8 to 12.5 cm spine leaflet. It has a gland [7] Leaflet 16-24 is very short, 2-2.5 cm in length, 1 to 1.3 cm width, slightly

riding, oval, insensitive, and mucus in both limbs. They are dull green below and paler above. The stipules are very large, kidney-shaped and rounded, and they are persistent. The leaflets are glabrous or minutely downy. Its huge, irregular, bisexual, bright yellow blooms measure almost 5 cm wide. The flowers are displayed on 2.5 cm long glabrous pedicels. Except for the stipules which are suppressed at the upper nodes, the racemes are short, erect, and sparsely flowered, forming a massive terminal inflorescence crowded in the axils of the upper leaves.[8]

Fig 1: ***Cassia auriculata***

Taxonomy:[9]
Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Fabales
Family: Leguminosae
Genus: Senna Mill
Species: *Cassia aurticulata L*.
Vernacular name: Telugu – Tamgedu
Hindi- Tarwar
Tamil- Avaria

Composition of ointment

Ointment is a semi -produced drug designed for external applications of skin or mucous membranes for protection or emollient effects. The process of making ointments involves employing several techniques to combine medications or other active ingredients with an ointment base.
The basic raw materials required for formulation are classified as:

- Wool fat
- Hard Paraffin
- Ceto-stearyl alcohol
- White or yellow soft paraffin

Woolfat

Animals that produce wool secrete a wax called lanolin, which is derived from the Latin words lāna, which means "wool," and oleum, which means "oil." It is also known as mutton tallow, sheep tallow, wool wax, mutton fat, and sheep tallow. Domestic breeds of sheep raised for their wool are an essential source of lanolin for humans.[10]

Hard paraffin

One of the byproducts of the refining process of petroleum is hard paraffin, or paraffin wax. Paraffin wax is removed and refined further to reach different grades while crude oil is being distilled. Paraffin wax, also known as petroleum wax, is a soft, colourless substance extracted from petroleum, coal, or oil shale, consisting of a mixture of hydrocarbon molecules containing 20 to 40 carbon atoms.

Ceto-stearyl alcohol

Ceto stearyl alcohol, also known as cete aryl alcohol or cetylstearyl alcohol, is a type of combination of fatty alcohols that consists mainly of cetyl alcohol (16C) and stearyl alcohol (18C). It is a surfactant that increases foam, opacifies, stabilizes emulsions, and increases both aqueous and nonaqueous viscosity.[11]

White paraffin

Originally sold as a topical ointment with therapeutic properties, petrolatum, also known as petrolatum, white petrolatum, soft paraffin, or multi-hydrocarbon, is composed of a combination of semi-solid hydrocarbons. (with the majority of carbon values higher than 25). Its CAS number is 8009-03-8. Since 1870, the petroleum jelly brand Vaseline has been sold in the United States. [12]

METHODOLOGY

Extraction Procedure

The following procedure was adopted to prepare the shade-dried herbal extract and powder.

Defatting of plant material

After being coarsely ground, 50 grams of powdered Cassia auriculata leaves were extracted using petroleum ether using the Soxhlet extraction method.

Extraction by maceration process

After being defatted and dried, Cassia auriculata powder was filtered and dried at 40ºC in a vacuum evaporator using hydroalcoholic (ethanol: water: 70:30v/v) as a solvent for 72 hours.

Fig 2: Soxhlet apparatus

Fig 3: Extracted drug

Fig 4: C*assia auriculata* leaf powder

Table 1: Formulation -1

Ingredients	Standard formula	Required formula (1%w/w)
Wool fat (lanolin)	50g	0.5g

Hard paraffin	50g	0.5g
Ceto-stearyl alcohol	50g	0.5g
White soft paraffin	850g	8.5g
Hydro-alcoholic extract	25g	0.1g

Table 2: Formulation -2

Ingredients	Standard formula	Required formula (2%w/w)
Wool fat	50g	0.5g
Hard paraffin	50g	0.5g
Ceto-stearyl alcohol	50g	0.5g
White soft paraffin	850g	8.5g
Hydro-alcoholic extract	25g	0.2g

Procedure for preparation of Herbal ointment

- Every ingredient is weighed exactly in accordance with formula.
- The hot plate is reached a temperature of 70^0 c after being turned on.
- Each and every ingredient is weighed and added at a time to the China dish and placed on hot plate until it forms a thick liquid.
- And stir it until it is cold.
- Triturate the hydro-alcoholic extract of Cassia auriculata with a portion of the simple ointment until smooth ointment is prepared.
- Add the remaining simple ointment and mix thoroughly.

Fig 5: Heating of waxes

Evaluation of herbal ointment

The evaluation studies are crucial for figuring out the final product's uniformity, stability, and efficiency. The following are the tests used to evaluate the lipsticks.

Organoleptic Parameters

The creams were evaluated using a thorough assessment that considered their look, texture, and odour, among other organoleptic properties. In addition, an examination of the physicochemical characteristics of the creams was carried out to guarantee a comprehensive assessment of their general quality.

Homogeneity

Both tactile and visual examinations were used in the evaluation process to determine the homogeneity of the prepared ointments. A tiny amount of cooked creams and gels was advanced between the thumb and forefinger to evaluate homogeneity and texture. This made it possible to determine any rough particles and evaluate how consistent the compositions were. Based on these results, attempts were made to reduce the overall texture and uniformity of the formulation.

After Feel

The ointments' greasiness and emollience were evaluated by dabbing a fingertip-sized portion onto the skin. The objective of this evaluation was to determine the emollient properties of the ointment, its soothing and moisturizing abilities, and its tendency to cause an oily feeling on the skin.

PH determination

To perform the pH test, the ointment was transferred into a glass. The pH of the ointment was measured using a pH meter and the recorded pH value was kept on file for further study.

Spread ability

Following Multimer's recommendations, the spread of the compositions was evaluated using a modified device consisting of a glass blade fixed to a wooden block, one end of which was fitted with a pulley. To begin the test, three grams of additional ointment were placed on the base plate.

The ointment was then applied between this floor plate and another glass plate equipped with a hook and of the same dimensions as the fixed floor plate. A 1 kg weight was placed on the two plates and pressed evenly for 5 minutes, a process that removes air and creates an even layer of ointment between the plates. After this, the excess ointment around the edges was scraped off.

After the above steps, 240 grams of spray was applied to the top plate. A spring-loaded hook mechanism made this process easy. The time it took to move the top plate 10 cm was recorded. Reducing the time interval indicates improved spreading of the ointment. This method highlights the effective spreading properties of the ointment. The following formula was used to determine ductility:

$$S = M \times \frac{L}{T}$$

Where,

S = distribution
M = weight on the pan (tied to the upper slide)
L = length, moved by glass slide and
T = time (per second), taken to completely separate each other's slide

Loss of drying

The determination of losses during drying included the placement of the ointment in the Petri cup located above the water bath and dried it at 105 ° C.

Melting point

A small amount of ointment was carefully heated, and the melting temperature was determined using the standard melting apparatus

Extrudability

For this experiment, a simple methodology was used. The ointments were moved into collapsible tubes after they had solidified in the containers. The purpose of the study was to assess the extendibility of different ointment formulations. The weight in grams required to extrude an ointment ribbon measuring 0.5 cm during a period of 10 seconds was tested in order to evaluate extrudability. This measurement gave information on how simple it was to dispense the ointment from the tubes, which was a useful indicator of the formulation's use and practicality.

Irritancy Study

In this evaluation, the cream was thoroughly examined in terms of all of its characteristics. These included remarks about its general condition, colour, texture, and odor. The test method was to mark a specific location on the dorsal surface of the left hand, one centimetre in diameter. The ointment was then applied to the designated region, and the application time was noted. For up to 24 hours after the application, the area was constantly observed for any signs of irritation, such as erythema (redness) or oedema (swelling). All reactions that were noticed were carefully recorded and reported. This testing procedure provided information on the ointment's possible irritating effects on the skin.

RESULTS AND DISCUSSIONS

Table 3: Phytochemical screening of hydro-alcoholic leaf extract of *Cassia auriculata*

Phytoconstituents	+
Alkaloids	+
Flavonoids	+
Carbohydrates	+
Proteins	+
Triterpenoids	+
Saponins	+
Steroids	+
Tannins	+
Resins	+
Anthocyanins	-
Cyanogenic glycosides	-
Thio-glycosides	-
Capsaicinoids	-

+ : present, - : Absent

Table 4: Evaluation of *Cassia auriculata* ointment

S. No	Parameter	Formulation-1	Formulation-2
1	Colour	Cream	Cream
2	Odour	Pleasant	Pleasant
3	Consistency	Smooth	Smooth
4	Ph	6.7	6.9
5	Spread ability	9.6	9.8
6	Extrudability	5g	5g
7	Irritancy	Non-irritant	Non-irritant
8	Stability	Stable	Stable

The goal of the study is the formulation and assessment of herbal ointment with hydro-alcoholic extract of *Cassia auriculata* leaves. Using various ingredients we created two formulations. All two formulations contain same waxes or ingredients and the formulations contain different concentration of the extract. The formulations were assessed with various evaluation tests and it was discovered that both the formulations show better results. No formulation was caused skin irritation.

CONCLUSION

Psoriasis is a chronic inflammatory skin disease that affects millions of people worldwide. The use of natural products to treat psoriasis has gained interest due to their ability to modulate the immune system and reduce inflammation. Traditional medicinal plants of India represent a promising source of natural products for the treatment of psoriasis.

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