

# FORMULATION AND EVALUATION OF ANTI-CRACK FOOT CREAM CONTAINING ALOE BARBADENSIS



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## ABSTRACT

Feet are also important organ of our body used to perform activities like walking, running and jumping but are often neglected. The skin on our feet is dry as compared to skin on the rest of the body because it has no oil glands and it relies on hundreds of thousands of sweat glands to keep the feet moisturized, therefore feet need special care for protection, beautification and comfort. The main motive of our formulation was to prepare and develop the Anti-crack Foot Cream containing Aloe barbadensis and Centella extract having healing and antimicrobial activities. Various ingredients having anti-inflammatory property were incorporated and evaluation tests are carried out for the effectiveness of the cream. It was found that developed product is safe and effective against cracked heels without any side effect. These studies suggest that the composition of extract and base of cream are more stable and safe, it may produce synergistic action.

**KEYWORDS:** Aloe barbadensis, Centella extract, Beeswax, Ginger

## INTRODUCTION

Skin is the largest organ in the body. It also known as the integument it has a surface area of  $1.8\text{m}^2$  and comprises of 16% of the total body weight. it covers the body's entire external surface, serving as a first-order barrier against pathogens, UV light and chemicals, and provides a mechanical barrier to injury. It also regulates temperature and amount of water released into the environment. The skin is made up of three distinct layers viz., epidermis, dermis and hypodermis. <sup>[1][3]</sup>

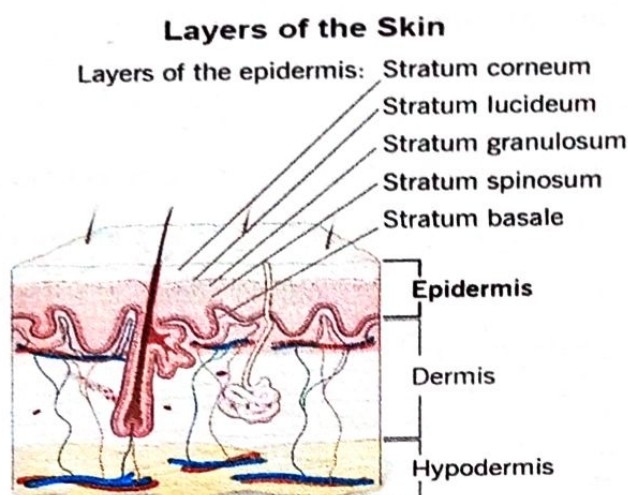


Fig 1: Layers of the skin <sup>[2]</sup>

### **LAYERS OF THE SKIN**

- **Epidermis:** It is the outermost covering of stratified squamous epithelial tissue, lacking blood vessels. Major portions are made up of keratinocytes, it synthesizes the protein called keratin. The layers of epidermis are; stratum basale, stratum spinosum, stratum granulosum and stratum corneum.
- **Dermis:** It is the layer between epidermis and hypodermis. It contains network of sweat gland, blood vessels, sebaceous gland and hair follicles. It provides resilience and structure to the skin.
- **Hypodermis:** It is the deepest section of the skin. It generally refers to the fat tissue below the dermis that insulates body from cold temperature and shock absorption.

## **FUNCTIONS OF THE SKIN**

- Barrier to harmful exogenous substance and pathogens
- Prevent loss of water and proteins
- Sensory organs protect against physical injury
- Regulate body temperature
- An immune organ to detect infections
- Production of vitamin D
- Provide protection against ultraviolet radiation from the sun <sup>[4]</sup>

## **CRACKED HEELS**

Cracked heels are the most common foot problem it refers to a condition produced by the occurrence of fissures in abnormally hard, dry skin over the heels. For most people, cracked heels are a cosmetic problem, however, when the fissures or cracks are deep, they are painful to stand on and the skin may bleed, which can become infected in severe cases. <sup>[5]</sup>



Fig 2: Cracked Heels <sup>[6]</sup>

## **CAUSES OF CRACKED HEELS:**

- Overweight – causes more pressure on the heels due to the body weight.
- Skin conditions like psoriasis and eczema.
- Prolong standing, particularly on hard floor.
- Constantly wearing shoes that are open backed. <sup>[5]</sup>

## **RISK FACTORS OF CRACKED HEELS**

- Obesity
- Diabetes and thyroid issues
- Eczema and psoriasis
- Long periods of standing or walking on hard surfaces
- Vitamin and mineral deficiencies
- Genes
- Peripheral neuropathy is a condition that affects the peripheral nerves

## **COMPLICATIONS OF CRACKED HEELS**

- Discolorations can occur due to the thick skins.
- Yellow or dark brown skin will instead appear around the border of your heels.
- Unsightly when paired with your favourite footwear.
- If left untreated, cracked heels can cause bleeding it leads to an infection. <sup>[5]</sup>

## **CREAM**

Creams are homogenous, semi-solid or viscous preparation that possess a relatively fluid consistency and are intended for external application to the skin or certain mucous membranes for protective, therapeutic or prophylactic purposes especially where an occlusive effect is not necessary.

They are semisolids usually consisting of solutions or dispersions of one or more medicaments in suitable bases. They are formulated using hydrophilic or hydrophobic bases to provide preparations that are essentially miscible with the skin secretions. <sup>[7]</sup>



Fig 3: Cream <sup>[8]</sup>

## **IDEAL PROPERTIES OF CREAM**

- It should be physically and chemically stable
- It should be easy to apply
- It should be non-irritant to the skin
- It should be non-inflammatory
- It should melt at body temperature
- It should be non-toxic
- It's viscosity should be low enough to permit easy spreading
- It should penetrate the epidermis (via natural opening) <sup>[9]</sup>

## **TYPES OF CREAM**

On the basis of phase

- ❖ Oil-in-water type cream  
Example: vanishing cream
- ❖ Water-in-oil type cream  
Example: cold cream

On the basis of function

- ❖ Cleansing and cold cream
- ❖ Foundation and vanishing cream
- ❖ Night and massage cream
- ❖ Head and body cream
- ❖ All purpose and general cream

## **ADVANTAGES OF CREAM**

- Convenient and easy to apply
- Avoidance of first-pass metabolism
- Easy to water washable
- Less greasy
- Non-irritating when applied to skin

## DISADVANTAGES OF CREAM

- Stability is not good as ointment
- Eczema may be caused by improper usage
- Hypopigmentation may occur
- Poor permeability of some drugs through the skin <sup>[7]</sup>

## PHARMACOGNOSY:

### ALOE VERA



Fig 4: Aloe vera <sup>[10]</sup>

#### Scientific Classification

Kingdom	:	Plantae
Division	:	Magnoliophyta
Order	:	Asparagales
Family	:	Asphodelaceae
Subfamily	:	Asphodeloideae
Genus	:	Aloe
Species	:	<i>A. vera</i>

The Aloe vera plant has been known and used for centuries for its health, beauty, medicinal and skin care properties. The name Aloe vera derives from the Arabic word “Alloeh” meaning shining bitter substance, while vera in Latin means “true”.

Aloe vera has been used for medicinal purposes in several cultures for millennia: Greece, Egypt, India, Mexico, Japan and China. By the early 1800s, Aloe vera was in use as a laxative in the United States, but in the mid-1930s, a turning point occurred when it was successfully used to treat chronic and severe radiation dermatitis. It grows mainly in the dry region of Africa, Asia, Europe and America. In India, it is found in Rajasthan, Andhra Pradesh, Gujarat, Maharashtra and Tamil Nadu. <sup>[11]</sup>

The colorless mucilaginous gel from Aloe vera leaves has been extensively used with pharmacological and cosmetic applications. Traditionally, this medicinal plant has been employed to treat skin problems such as burns, wounds and anti-inflammatory processes. Moreover, Aloe vera has shown other therapeutic properties including anticancer, antioxidant, antidiabetic and antihyperlipidemic. Aloe vera containing more than 75 different compounds including vitamins (vitamine A, C, E and B12), enzymes (amylase, catalase, and peroxidase), minerals (zinc, copper, selenium and calcium), sugars (monosaccharides and polysaccharides), anthraquinones (aloin and emodin), fatty acids and hormones. <sup>[12]</sup>

Numerous studies worldwide indicate that Aloe vera is a general tonic for the immune system, helping it to fight illness of all kinds. Various research studies are underway to explore the potential of Aloe vera components to boost immunity and combat the HIV virus, and to treat certain types of cancer particularly leukemia. When Aloe vera is used externally, almost no adverse effects are seen. Oral use of Aloe vera may cause colic and diarrhoea have been reported with oral use of aloe vera. The purgative property of the plant may reduce the absorption of other drugs. Application of aloe to skin may increase the absorption of steroid creams such as hydrocortisone. It reduces the effectiveness and may increase the adverse effects of digoxin and digitoxin, due to its potassium lowering effect. Combined use of Aloe vera and furosemide may increase the risk of potassium depletion. It decreases the blood sugar levels and thus may interact with oral hypoglycemic drugs and insulin. <sup>[13]</sup>

## Pharmacological actions of Aloe vera

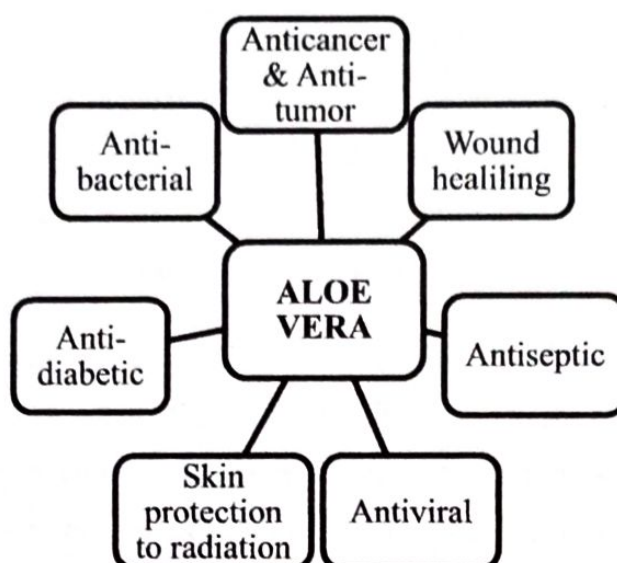


Fig 5: Therapeutical Actions of Aloe vera

## CENTELLA ASIATICA



Fig 6: Centella <sup>[14]</sup>

### Scientific Classification

Kingdom	: Plantae
Division	: Magnoliophyta
Order	: Apiales
Family	: Apiaceae
Genus	: Centella
Species	: <i>C.asiatica</i>

*Centella asiatica* (CA), a clonal, perennial herbaceous creeper belonging to the family Apiceae (Umbellifere). CA is a very important medicinal herb used in the orient, which is also becoming popular in the west. Commonly known as mandukparny or Indian pennywort or jalbrahmi. It is found throughout india upto an altitude of 1800m. It is found in tropical and subtropical countries including parts of India, Pakistan, Sri Lanka, Madagascar and Eastern Europe.

*Centella asiatica* containing small fan shaped green leaves with white flowers and it bears small oval fruits. The whole plant is used for medicinal purposes. In the nineteenth century, CA and its extracts were incorporated into the Indian pharmacopoeia, wherein in addition to wound healing, it was recommended for

The treatment of various skin conditions such as leprosy, lupus, varicose ulcers, eczema, psoriasis, diarrhoea, fever, amenorrhea, and diseases of the female genitourinary tract.

The primary active constituents of CA are saponins (triterpenoids), which include asiaticosides, in which a trisaccharide moiety is linked to the aglycone Asiatic acid, madecassoside and madasiatic acid. These triterpene saponins and their sapogenins are mainly responsible for the wound healing and vascular effect by inhibiting the production of collagen at the wound site. Centelloside and its derivatives are found to be effective in the treatment of venous hypertension.

[15][16]

#### **Pharmacological activity of centella asiatica:**

- Wound healing
- Anti-oxidant
- Anti-diabetic
- Antidepressant
- Neuroprotective
- Anti-inflammatory
- Anti-fungal
- Anti-cancer
- Cognitive function
- Anti-bacterial