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RESEARCH ARTICLE
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HIBISCUS ROSA-SINENSIS AND AZADIRACHTA INDICA HEALING FOR GETTING SKIN INFLAMMATION NATURALLY: A REVIEW

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Abstract
Hibiscus rosa-sinensis, commonly known as China rose, is a member of the *Malvaceae* family and is widely distributed across the world. In Indian traditional medicine, its leaves, bark, roots, and flowers have been extensively used to treat various ailments. This plant has significant medicinal value, particularly for treating wounds, inflammation, fever, coughs, diabetes, bacterial and fungal infections, hair loss, and gastric ulcers, especially in tropical countries.
Phytochemical studies have identified that the primary bioactive compounds responsible for its medicinal properties include flavonoids, tannins, terpenoids, saponins, and alkaloids. Numerous research studies have shown that different parts of Hibiscus rosa-sinensis possess antioxidant, antimicrobial, antidiabetic, antiulcer, hepatoprotective, antifertility, and anti-inflammatory properties, making it effective in treating a wide range of diseases. Flavonoids, in particular, are known to aid in wound healing due to their astringent and antimicrobial properties. Additionally, Hibiscus rosa-sinensis is often used in various herbal mixtures and beverages. This review seeks to emphasize the therapeutic potential of Hibiscus rosa-sinensis in modern medicine.

Key words: Skin inflammation, Anthocyanins, azadirachtin, Azadirachtin

Introduction

The skin forms the continuous external surface of the body. [(10)] Skin is a largest organ of the body, complete cover the body. skin continues with the membrane lining the orifice. Surface area of the skin is 15-2^{2}m (Adult). In certain area it contains of gland, hair and nails. Account 16% of body weight skin.
Skin protects underline structure like organ. Heat loses also occur by skin or it regulate the temperature of the body. Skin also knows as a first line protection, when any microorganism (foreign partial) entry in to the skin it acts like a barrier. Skin acts like a storage, it stores water, fat, glucose and vitamin-D. Sensory nervous are present in the skin, detect the sensation like thought, temperature, pain and blood pressure.

1.1 Anatomy of the skin

Human skin made by three layers:
1. Epidermis
2.Dermis
3.Hypodermis

1. Epidermis

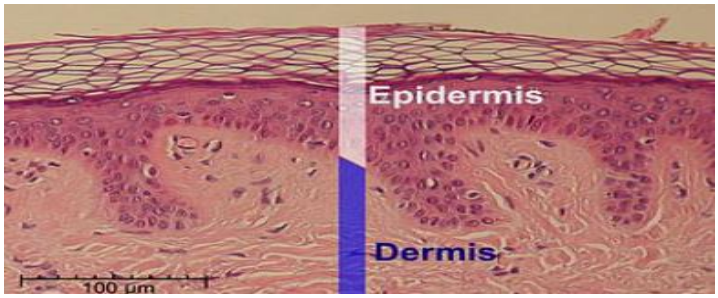

Figure 1: Epidermis of the skin

Epidermis is most superficial and visible layer of skin. it composed of stratified squamous epithelial (keratinases). In the epidermis there is presents keratin cell which produce keratin protein, keratin provide strength and hardness to nail and hair, it also makes skin water proof.

Epidermis has further sub layer; at the palm of the hand and soul of the feet the epidermis is thick because there is more chance of damage as copier to other part of body. There are no blood vessels present in the epidermis. Cells are present at the deepest layer of the epidermis which nourished by diffused oxygen or by blood capillary extending to dermis.

Epidermis also contains the opening of hair shaft and pours of sweat gland. there is 5 sublayer of epidermis that's known as a stratum. From superficial to deep theses layer are

- Stratum corneum
- Stratum lucidum (present in palms of hand & sole of feet)
- Stratum granulosum
- Stratum spinosum
- Stratum Basale (germinative layer)

Stratum Basale contain Basale cell which develop and form keratinocyte cell which produce keratin protein. Keratinocytes also contribute to calcium regulation by enabling UVB light absorption in the skin, which is critical for vitamin D activation. Epidermis also contains melanocytes, Langerhans and Merkel cell

The viable epidermis is typically 50–100 µm thick [30] and devoid of blood capillaries and sensory nerve endings. The viable epidermis is typically 50–100 µm thick [30] and devoid of blood capillaries and sensory nerve endings. [(11)]

2. Dermis

Dermis is a second layer of skin after epidermis. All of connective tissues, nerve endings, sweat glands, oil glands and hair follicles present in dermis. Sedation gland located in this layer which secret sebum make skin soft.

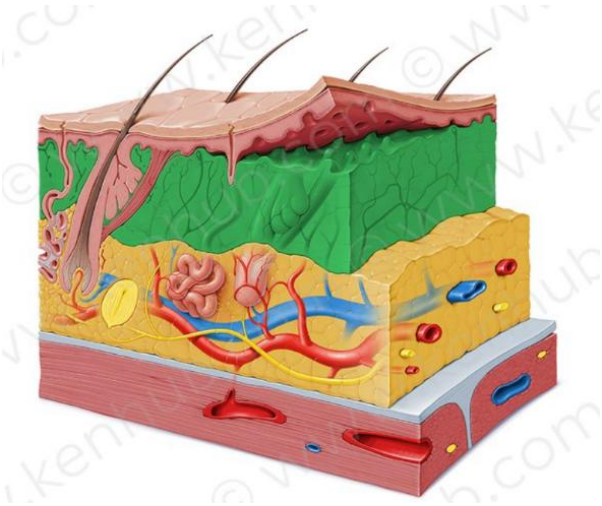

Figure 2: Dermis layer of the skin

Thickness of the dermis varies and can range from 0.6mm to 3mm. Dermis is a tough and elastic because of collagen. Embedded in a tough fibroelastic tissue consisting of collagen and elastic fibers, surrounded by an amorous ground support. Fibroblast tissue of the dermis is composed of many different cells type which include fibroblast, macrophages, adipocytes, mast cell and stem cell.

Dermis made by two layers
A) Papillary layer:
Papillary layer is upper part of dermis layer. Collagen and elastic fibrate form a loose mesh. Fibroblast, few adipocytes and small blood vessels present in this layer.
B) Reticular Layer:
It is much thicker as compare to papillary layer. Collagen and elastic fiber form tight mesh. Well vascularized and sympathetic nerve are located in this layer

3.Hypodermis
The hypodermis is the innermost or subcutaneous layer of the skin. Most of the body's fat is stored in this layer. It provides insulation, protection, temperature regulation and connection between the bones and muscles.
The hypodermis layer provides shaping and contouring. The hypodermis is thickest in the abdomen and Sholders.

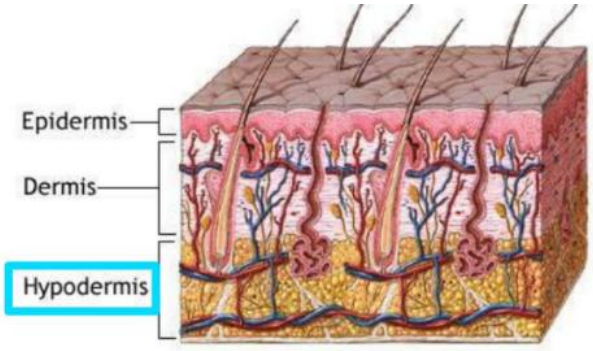

Figure 3: Hypodermis layer of the skin

Component of hypodermis is **fibroblast, adipose tissue, connective tissue, blood vessel, hair follicles, sweat gland, nerves.**
Fibroblast - This is a type of cell that produce collagen, the primary building block of skin, muscles, bones, ligament and hair

Adipose Tissue - also known as body fat, these are fatty tissue found under the skin, Around organ, in the breast and between muscle
Connective Tissue – these are dense, fibrous tissue made up of collagen and elastic that support, protect and give structure to other tissue and organ in the body
Blood Vessels – these are the arteries, capillaries, and veins that delivery blood and oxygen to vital organs and remove west product.
Lymphatic Vessels – These vessels help regulate fluid levels in the body, receive waste product from tissue, and transport a fluid called **lymph** that defends the body against infection.
Hair Follicle – these tube like structure house each hair strand and extend into the hypodermis where the hair root is located.
Sweat Gland – these tiny organs secrete sweat to keep the body at a normal temperature whenever it is overheated.

1.2 Physiology of the Skin

1. protection – skin act as a protective barrier. Skin a water proof layer (keratinized epithelium) skin prevents from dehydration. Skin protects inner structure of the body (organ)from injury. It also protects from harmful chemical and radiation (UV rays). Melanin present in the skin which is responsible for protection against the UV rays. skin color depends on the level of melanin. Skin also acts as a decency from microorganism (first line defend). Epidermis contain Langerhans cell (macrophages).
2.Sensation – sensory nerve ending is present in the dermis; it locates the internal and external sensations.
3.Biochemical function - In human skin 7- dehydrocholesterol is present is covert in to vitamin – D.
4.Thermoregulation – To maintain the constant temperature of 37 a negative feedback system regulates the balance between heat produced in the body and heat lost to the environment.
Temperature regulating center in hypothalamus is sensitive to the temperature of circulating blood this center responds to temperature change by sending nerve impulse to arteries in the dermis.
Heat loss is taking place by four methods **radiation, evaporation, conduction, convection.**

1.3. Skin Inflammation

Response of a tissue to injury (toxic injury, radiation injury, microorganism injury).
These are 5 clinical signs of inflammation

- Rubor - redness
- Calor - heat
- Tumor – swelling
- Dolor - pain
- Function lease – loss of function

This forest the person injured to immobilize the effect area which help to reduce further damage.
There are two types of inflammation
1. Acute Inflammation
2. Chronic Inflammation

1. Acute Inflammation

Acute inflammation also knows as a short-term, inflammation. Its stats with in min and end with in 1 or 2 days. Mainly neutrophils are involved in the acute inflammation.

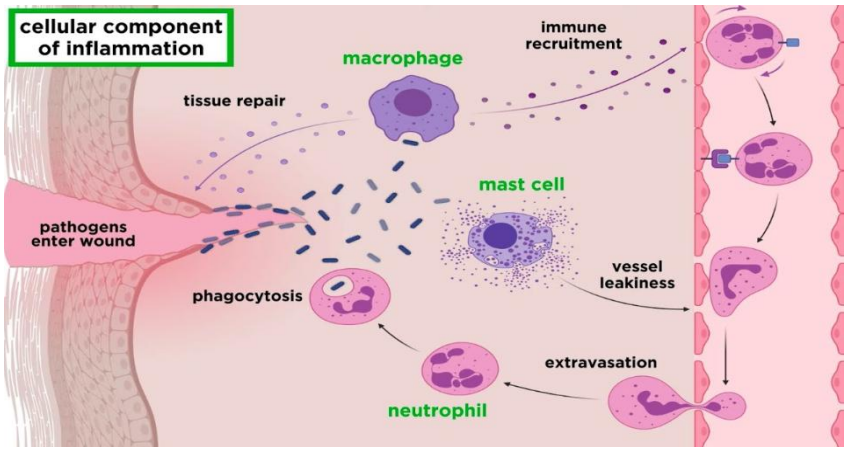

Figure 3: cellular component of inflammation

There are two types of events in acute inflammation A) Vascular Event
B) Cellular Event

A) Vascular Event:

In the vascular phase, small blood vessels adjacent to the injury dilate and blood flow to the area increase. The endothelial cell initially swells, then contract to increase the space between them, thereby increasing the permeability of the vascular barrier. This process is regulated by chemical mediators.

There are four stages involved in the vascular event

- Vasocontraction
- Vasodilation
- Increase vascular permeability
- Stasis

B) Cellular Event:

In the cellular event, there are many types of cell and chemical mediators involved to engulf and destroy the bacteria there are six steps involved in the cellular event.

- Margination
- Rolling
- Adhesion
- Transmigration/ Diapedesis
- Chemotaxis
- Phagocytosis

2. Chronic Inflammation

Chronic inflammation is long time inflammation. Chronic inflammation mainly occurs due to chronic diseases e.g: rheumatoid arthritis. Chronic inflammation symptoms are usually much more subtle, common symptoms of chronic inflammation include.

- **Fatigue,**
- **Body pain,**
- **Depression or anxiety,**
- **Gastrointestinal complications,**
- **weight loss,**
- **persistent infections.**

These symptoms can range from mild to severe and last for several months or year.
There are two types of chronic inflammation

1. Granulomatous chronic inflammation
2. Non- granulomatous chronic inflammation

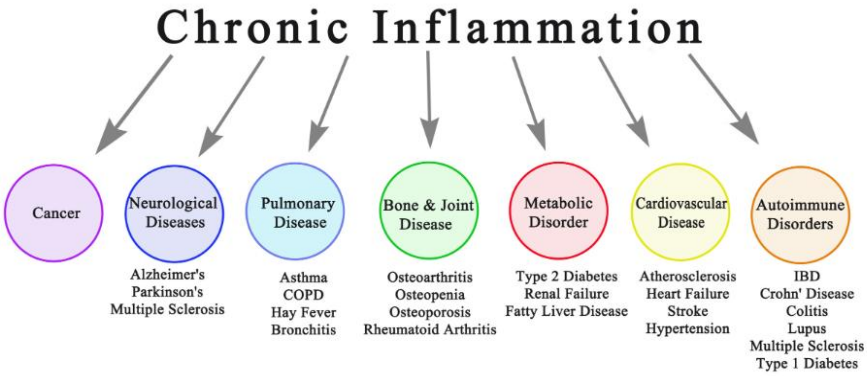

Figure 4: Consequences of chronic inflammation

Chronic inflammation can cause by untreated of acute inflammation, like an infection or injury. Chronic inflammation can also occur due to autoimmune disorder, which involves immune system mistakenly attacking healthy tissue. Some other factors are smoking, alcohol intake, chronic stress, age.

LITERATURE REVIEW

1. Hibiscus

Hibiscus sabdariffa also known as **roselle**. The leaves of H sabdariffa often lobed and may be smooth or covered in trichomes. The flowers can be bore single or in cluster, and the flowers of many species last only a single day. An epicalyx is particularly common, and the stamens are typically fused into a tube. Membrane of the genus characteristically have spiny pollen, and their fruits are capsules. H sabdariffa is an ideal crop for developing countries as it is relatively easy to grow, can be grown as part of multi-cropping systems and can be used as food and fibre. it is an ideal crop for developing countries as it is relatively easy to grow, can be grown as part of multi-cropping systems and can be used as food and fibre. [(14)] In history, the medicinal plants are widely used for the various purposes. The plants have identified as medicinal plants because of the ability to synthesize chemical compounds which play major role to prevent different diseases like cancer, diabetes, etc. [(15)]

Figure 5: Hibiscus flower

Many species of hibiscus are grown for their showy flowers. It is a shrub widely cultivated in the tropics. e (Hibiscus sabdariffa) is an edible plant used in various applications including foods. Among them, the most popular are the fleshy red calyces used for making wine, juice, jam, syrup, pudding,

cakes, ice cream or tea. Roselle flower and calyces is also known for its antiseptic, diuretic, antioxidant and antimutagenic properties. [17] H sabdariffa is an important source of vitamins, minerals and bioactive compounds, such as organic acids, phytosterols, and polyphenols, some of them with antioxidant properties.

Taxonomy

- Botanical name: Hibiscus
- Kingdom: Plantae-Plants
- Subkingdom: Tracheobionta-Vascular plants
- Super division: Spermatophyta-Seed plants
- Division: Magnoliophyte-Flowering plants
- Class: Magnoliopsida-Dicotyledons
- Subclass: Dilleniidae
- Order: Malvales
- Family: Malvaceae-Mallow family
- Genus: Hibiscus L.-Rosemallow
- Species: Hibiscus rosa sinensis L.-Shoeblackpla

Biological source

The Hibiscus plant belongs to the Malvaceae family, which includes over 200 species. It's known for its large, colourful flowers and is native to tropical and subtropical regions worldwide. Key species include:

1. Hibiscus rosa-sinensis: Also known as the Chinese hibiscus or shoeblack plant, it's widely cultivated for its stunning flowers and is often used in traditional medicine and as an ornamental plant.
2. Hibiscus sabdariffa: Commonly referred to as Roselle, this species is particularly noted for its edible calyces, which are used to make herbal teas, jams, and other products. It's also known for its medicinal properties.
3. Hibiscus Syriacs: Known as the Rose of Sharon, it's a deciduous shrub popular in gardens and landscaping.

Hibiscus plants are prized for their beauty and versatility, contributing to various cultural, culinary, and medicinal practices around the world.
cultivation Hibiscus plants prefer warm climates and are commonly grown in tropical and subtropical regions. They require well-drained soil and full sunlight to thrive.

Geographical source

Hibiscus is commonly cultivated in garden ornamental from sea level to 500m altitude. It is frost sensitive and will freeze in mild winters but will resprout from the base in spring. [15] Hibiscus plants are native to various parts of the world, primarily tropical and subtropical regions. Some of the key geographical sources include:

1. Asia: Particularly Southeast Asia, China, and India. Hibiscus rosa-sinensis, also known as the Chinese hibiscus, is widely cultivated in these regions.
2. Africa: Hibiscus sabdariffa, commonly known as roselle, is native to West Africa and is also grown in other parts of the continent.
3. The Caribbean: Various species of hibiscus are found in the Caribbean islands, where they are often used in traditional medicines and as ornamental plants.
4. Pacific Islands: Many Pacific islands, including Hawaii, are home to different hibiscus species. In Hawaii, the hibiscus is the state flower and holds significant cultural importance.
5. The Americas: Some species are native to the tropical and subtropical regions of the Americas, including parts of Mexico and Central America.

These regions provide the warm climates and conditions that hibiscus plants thrive in.

Morphology

1. General Appearance:

Neem trees can grow up to 15-30 meters (50-100 feet) tall. The tree has a broad, dense, and spreading crown, which provides ample shade.

2. Trunk and Bark:

The trunk is straight and can be up to 1.2 meters (4 feet) in diameter. The bark is rough, fissured, and greyish-brown in colour. It exudes a reddish-brown gum when cut.

3. Leaves:

Neem leaves are pinnately compound. Each leaf is 20-40 cm (8-16 inches) long. Each leaf typically has 20-31 dark green, serrated leaflets, each about 3-8 cm (1.2-3.1 inches) long. Leaflets are arranged alternately on the rachis (central stem of the leaf).

4. Flowers:

Neem flowers are small, fragrant, and white. They grow in drooping, axillary panicles (clusters) that are 10-25 cm (4-10 inches) long. Each flower has five petals and is about 5-6 mm (0.2-0.24 inches) in diameter.

5. Fruits:

The fruit is a smooth, oval to round drupe. Each fruit is 1.4-2.8 cm (0.55-1.1 inches) long. Fruits turn from green to yellowish-green when ripe. Each fruit contains a single seed, which is surrounded by a fibrous husk.

6. Seeds:

Neem seeds are elongated and have a hard coat. Seeds are rich in oil, known as neem oil, which has various uses.

Chemical constituent

Constituent Category	**Specific Compounds**	**Description/Functions**
Anthocyanins	Delphinidin, Cyanidin	Provides red-purple color, antioxidant, anti-inflammatory
Flavonoids	Quercetin, Kaempferol, Anthocyanins	Antioxidant, anti-inflammatory, contributes to color
Polysaccharides	Mucilage, Pectin	Provides soothing effect, used as an emollient
Organic Acids	Citric acid, Malic acid, Tartaric acid	Contributes to acidity, antioxidant properties
Volatile Oils	Terpenoids, Aldehydes	Contributes to fragrance, potential therapeutic properties
Vitamins	Vitamin C, Vitamin E	Antioxidant, supports immune function

Uses

Hibiscus flowers and leaves are used for the abortion, antifertility, contraceptive, Diuretic, Menorrhagia, Bronchitis, Emmengogue, Demulcent, Cough. [(15)] . The study also revealed that the antibacterial effect was independent from temperature, as shown by a heat treatment. [(13)] In Africa and neighbouring tropical countries has lengthy history, Hibiscus flowers have been used in sachets and perfumes. [(15)] An 80% ethanol extract of H. sabdariffa was effective in reducing about 60%–90%

of the mutagenicity induced by heterocyclic amines at a concentration of 12.5 mg/plate in the salmonella mutation assay. [16] hibiscus commonly used for make herbal teas, such as the popular hibiscus tea and beverages.
Medicinal use of hibiscus is mainly antioxidant, blood pressure regulation, cholesterol management, digestive health and relieve constipation. Hibiscus also contain anti-inflammatory and anti-microbial properties. Hibiscus extract also used in skin care product or hair care product.
Hibiscus flower attract pollinators like bees and butterflies, supporting biodiversity and ecosystem health.

2. Neem

Azadirachta indica commonly known as neem has been well known in the Indian subcontinent for more than 2000 years. [22] Azadirachta indica grows in tropical and semi-tropical regions of the world, and the different parts of this tree such as seeds, leaves, flowers, and the bark are widely used for different purposes. [23] Neem is the most versatile, multifarious trees of tropics, with immense potential. It possesses maximum useful non-wood products (leaves, bark, flowers, fruits, seed, gum, oil and neem cake) than any other tree species. [21] Different phytochemicals such as quercetin and azadirachtin and liminoids such as nimbin, nimbinin, and nimbidin have been purified from the different parts of the plant. [23]
It Demonstrated by earlier studies that crude extract of neem leaves possesses significant hypoglycaemic as well as hypolipemic activities in addition to hepatoprotective and hypertensive activities. [23]

Figure 6: Neem leaves

Traditional plant medicines are used globally for different inflammatory disorders. Currently, neem has attained a place of pride in the international scientific research and literature with the upsurge of interest among the Indian scientific community for which it caught the fascination of the eminent international scientists. [18]

Taxonomy

- Botanical name: Azadirachta indica
- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Super division: Spermatophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Subclass: Rosidae
- Order: Sapindales
- Family: Meliaceae

- Genus: Azadirachta
- Species: Azadirachta indica

Biological source

The biological source of Azedaraches indica, commonly known as Neem, is the Neem tree. This tree is botanically classified as Azedaraches indica and belongs to the family *Meliaceae.* It is an evergreen tree native to the Indian subcontinent and can also be found in other tropical and subtropical regions around the world. [23]

Geographical source

The geographical origin of *Azadirachta indica*, commonly known as Neem, is the Indian subcontinent, particularly the Indian peninsula. Neem trees are indigenous to this region and have been cultivated for thousands of years due to their diverse applications. They thrive in tropical and subtropical climates and are naturally found in countries such as India, Bangladesh, Sri Lanka, Pakistan, and parts of Southeast Asia.Optimal Growing Conditions:

- **Climate:** Neem flourishes in tropical and subtropical climates, with ideal temperature ranges between 21°C to 32°C (70°F to 90°F). The tree is drought-resistant and can endure arid conditions, although it is not well-suited to prolonged cold weather.
- **Soil:** Neem prefers well-drained sandy or loamy soils but is adaptable to various soil types, including poor and rocky soils.
- **Sunlight:** Full sunlight is essential for the optimal growth of Neem trees.

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6. Seeds:

Neem seeds are elongated and have a hard coat. Seeds are rich in oil, known as neem oil, which has various uses. Neem seeds are known for their oil content, which is extracted and used for various purposes, including in cosmetics, soaps, and pharmaceuticals.

Chemical constituent

Chemical Constituent	Category	Function/Properties
Azadirachtin	Limonoid	Insecticidal, pesticidal
Nimbin	Triterpenoid	Anti-inflammatory, antifungal, antibacterial
Nimbidin	Triterpenoid	Anti-inflammatory, antifungal, antibacterial
Nimbosterol	Steroid	Anti-inflammatory, antimicrobial
Nimbidic acid	Fatty acid	Anti-inflammatory, antibacterial
Tannin	Polyphenol	Astringent, antioxidant, antimicrobia

Uses

- Anti-inflammatory – neems anti -inflammatory properties help in reducing inflammation and pain, useful in treatment Ing condition like arthritis (chronic inflammation)
- Skin care – Neem oil and neem-based product are commonly used to treat dry skin, and other Skin conditions. It also helps in healing wounds and reducing scares.
- In agriculture neem use as a fertilizer, tis oil extraction used as an organic fertilizer. Neem- based products are used to protect crops from various pets and diseases without harming beneficial insects.
- Hair- skin – Neem is used in shampoos and conditioners to treat dandruff and promote healthy hair.
- Neem tree help in purifying the air and reducing pollution levels.
- Antibacterial and Antifungal Properties: Dermatitis-prone skin is often susceptible to bacterial and fungal infections, which can exacerbate the condition. Neem's antibacterial and antifungal properties help in preventing and controlling such infections, promoting a healthier skin environment.

CONCLUSION

Anthocyanins have shown considerable anti-inflammatory effects across numerous studies, suggesting they could be effective natural agents for managing inflammation. By blocking pro-inflammatory cytokines, lowering oxidative stress, and influencing immune cell function, anthocyanins may offer therapeutic advantages in preventing and treating chronic inflammation-related conditions like cardiovascular diseases, arthritis, and certain types of cancer.

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