



MANAGING ECZEMA WITH OENOTHERA BIENNIS OIL: BENEFITS AND APPLICATION

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Abstract:

Eczema is a chronic inflammatory skin condition, presents with red, itchy, and dry patches that can lead to severe discomfort and secondary infections. This disorder, often associated with atopic dermatitis, is linked to genetic, environmental, and immunological factors. *Oenothera biennis* oil, which is derived from seeds, has potential benefits in managing eczema. It contains gamma-linolenic acid and other essential fatty acids, which have anti-inflammatory properties and support skin barrier function. The special benefits of *oenothera biennis* oil, such as to improve skin moisture and reduce inflammation, both can help with common eczema symptoms.

Key points: Eczema, Atopic dermatitis, *Oenothera biennis* oil, Gamma-linolenic acid, Essential fatty acids, Anti-inflammatory properties, Skin barrier function

Introduction:

1.1 Eczema

Eczema is a chronic inflammatory skin condition, which typically affects the insides of joints, but in extreme circumstances, it can spread to other parts of the body, including the face. Many different types of allergens and irritants cause skin to respond, resulting in a red, itchy, dry and inflammatory rash that typically appears in patches. Weeping and bleeding sores can result from the severe scratching that eczema includes. Skin inflammation is referred to as “dermatitis,” which is frequently used to characterize eczema. So eczema is also known as atopic dermatitis.⁽¹⁾

It is commonly linked to elevated serum IgE levels and a family history of eczema, allergic rhinitis and asthma. This condition affects both sexes, typically manifests in early life and over the past few decades, its frequency has been gradually increasing.^(2,3)



Fig 1: Chronic inflammatory skin condition

In the terms of clinical presentation, eczema is varied according to age. Infants (birth to less than 2 years old) usually show up as erythematous papules and vesicles on the cheeks, forehead, and scalp, while children (older than 2 years old) show up as dry skin with lichenized papules and plaques in the limb's external areas. In the adult eczema is caused on face, neck, upper arms, back, hands, feet, fingers and toes.^(4,5) This is because of inherent leakiness and transient deficiency of IgA.⁽⁶⁾

Eczema is a chronic inflammatory disease which is mainly caused due to the imbalance of T-helper cells, The primary source of the hypersensitive reaction to 4 pollen grains is the aeroallergens found in pyrethrum or dactylisglomerata plants. Eczem, which comprises crucial characteristics such as pruritus, atopy, and acute, subacute, and chronic eczematous alterations.^(7,8)

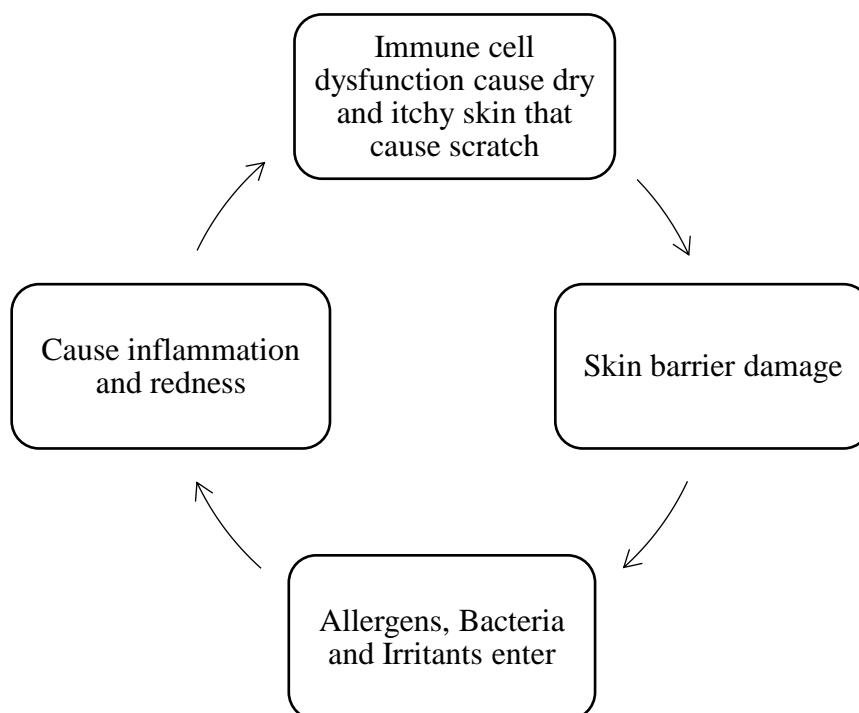


Fig : 2 Eczema cycle

The most important problems in the skin barrier, which is the epidermis role as a physical and functional barrier. The main proteins in charge of epidermal function include intercellular proteins, keratins, transglutaminases, and filaggrin (FLG). These proteins flaws make it easier for germs and allergens to enter into the skin, which cause inflammation and redness.^(9,10)

1.2 Risk factors of eczema :

Genetic predisposition, compromised skin barrier, exposure to allergens (food, pollen, dust, etc.), cutaneous hypersensitivity, compromised immune system, and superficial bacterial skin infections, the most common of which is staphylococcus aureus.^(11,12)

Although the exact origins of eczema are unknown, it is likely that a combination of genetic, socioeconomic, and environmental variables play a role.⁽¹³⁾ For instance, it has been discovered that eczema development is linked to mutations in FLG. The frequency of eczema has been rising recently.⁽¹⁴⁾

Genetic factors : Allergies typically run in families.⁽¹⁵⁾ A child will experience eczema in one or both of its parents is 60% and 80% respectively, if both parents have experienced eczema.⁽¹⁶⁾ People with family history of eczema, asthma, or high fever are have a higher risk of this condition.

Environmental factors : The rise in eczema prevalence is influenced by environmental factors. The rise in eczema may be attributed to factors such as small family size, higher income, education, migration from rural to urban areas, and greater usage of antibiotics.⁽¹⁷⁾

Recent studies have shown that among the environmental influences include ambient tobacco smoke, outdoor allergen exposure and interior air pollution.⁽¹⁸⁾

Skin barrier dysfunction : The people who have mutations in the filaggrin gene have a higher chance of getting atopic dermatitis. Filaggrin is used to encode structural proteins in the stratum corneum and stratum granulosum that help bind keratinocytes together. That help to hydrate stratum corneum. If less filaggrin produced that lead to skin barrier dysfunction, which cause eczema. This cause dry skin, asthma, high fever etc.^(19,20)

Immune system dysfunction : The symptoms of eczema may be exacerbated by an overreactive immunological response, where by the body overreacts to allergens or irritants.

In certain instances, food allergies, food additives, and house dust mites are identified as contributing factors to allergies. Other non-allergic factors that are implication are infections caused by staphylococcus aureus, bacterial superantigen, rough clothing, early exposure to germs, high heat and perspiration, dry air, and irritants that interfere with the skin's ability to serve as a barrier.^(21,22) Excessive intake of tea, coffee, alcoholic beverages, aerated drinks, acidity and constipation also cause eczema.⁽²³⁾

1.3 Symptoms of eczema :

Usually, severe itching is the initial sign of the eczema. Later the rash show up. It is patchy and initially appears as dry, flaky, or scaly skin top red, irritated skin. The rash burns or itches. It can leak and get crusty if gets scraped, especially on small toddlers.

Development of red or transparent fluid filled pimples that appear bubbly and when scraped, contribute to the overall wet appearance. Although the rash appear anywhere on the body, it most frequently observed on face, legs, arms, hands and feet.⁽²⁴⁾

1.4 Types of Eczema :

There are various types of eczema, but the most prevalent kind is atopic dermatitis. The remaining forms of eczema consist of following

- (1) **Asteatotic eczema :** This kind of eczema results in tiny skin cracks. Older adults are typically affected in low humidity environments.⁽²⁵⁾
- (2) **Nummular eczema :** Nummular eczema, sometimes referred to as discoid eczema . It is a clinical condition with coin-sized, well defined, roundish edges. It cause skin trauma or injury, including bites, burns and abrasions.⁽²⁶⁾

- (3) **Dyshidrotic eczema** : This type is also known as pompholyx is a vesicobullous eczema that affect hand and feet. It results in extremely itchy little blisters on the hands and feet.⁽²⁷⁾
- (4) **Neurodermatitis** : Typically, this kind of eczema manifests as one or two really irritating areas. The arms, legs, and back of the neck are the most often affected areas.
- (5) **Lichen simplex chronicus** : This type of dermatitis is brought on by repeatedly touching or scratching a particular spot.
- (6) **Contact dermatitis** : Any inflammatory reaction of skin occurs by allergens or irritants is referred to as contact dermatitis.⁽²⁸⁾
- (7) **Seborrhoeic dermatitis** : It affects oily areas, this type of dermatitis usually has a greasy rather than dry rash. This cover the area around the nose, hairline, and scalp.
- (8) **Stasis dermatitis** : This type is also known as gravitational eczema, varicose eczema, and venous eczema. It cause swelling and inadequate blood flow in the lower legs.^(29,30)

2.0 *Oenothera Biennis* :



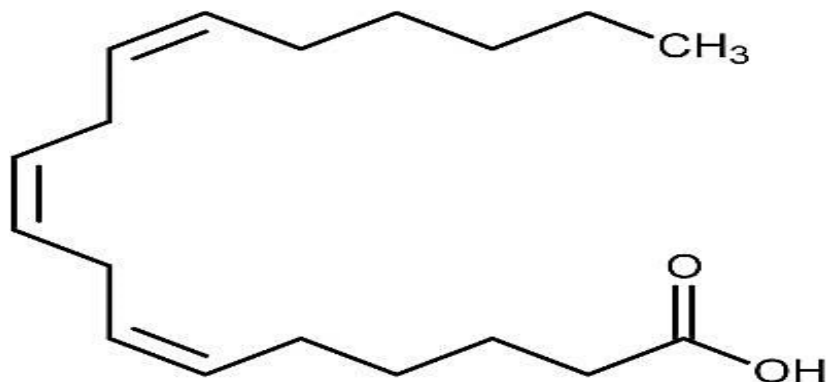
Fig : 3 Oenothera biennis plant, flower and seeds

- **Common Name** : Evening primrose
- **Biological Source** : It is mainly produced from the seeds of herbaceous biennis plant.
- **Family** : Onagraceae⁽³¹⁾
- **Habitat** : Native to north america it thrives in a variety of environments including prairies, meadows, and disturbed areas.⁽³²⁾
- **Morphological characteristics** : Evening primrose available in many colours like white, pink, yellow and red flowers.
 - Stem of this plant is single erect, spherical, cylindrical, ascending, appressed terminal unicellular dermal hairs, green to reddish with presence of red blotches.
 - Leaves of this plant is narrowly oblanceolate to ovate, simple, pinnate, sessile, pubescent.
 - Seeds are numerous, 2-3 rows per locule, irregular shape, brown to dark brown.
 - Fruits are denticidal capsule, green with red stripe when fresh and brown when dried, bluntly 4 angled.^(33,34)

• **Chemical Constituents :**

Essential fatty acids : gamma-linolenic acid, linolenic acid, oleic acid.

Gamma-linolenic acid is a omega -6 fatty acid, which have anti-inflammatory properties that can help to reduce eczema. It overcome symptoms of eczema, such as itching, redness and dryness.



Gamma-linolenic acid

Flavonoids : quercetin, kaempferol.

Flavonoids give anti-inflammatory and antioxidant properties, may be beneficial in managing eczema. Flavonoids may enhance the skin barrier function, helping to retain moisture and protect against irritants.

Tannins : oenothain A, oenothain B, tetramethylellagic acid and glucuronic acid.

Tannins can help to reduce the permeability of the skin, which may reduce fluid loss in eczema affected areas.

Phenolic acid : gallic acid, salicylic acid, caffeic acid, Ferulic acid, ellagic acid.

Phenolic acids have antimicrobial properties that might help prevent secondary infections in eczema prone areas. It also have anti-inflammatory and antioxidant properties.

Saponins : oenotherasaponins.

Saponins have anti-inflammatory properties can help to reduce inflammation, which may alleviate symptoms such as redness, swelling, and itching. It can also improve skin barrier function.^(35,36)

- **Uses :** *Oenothera biennis* oil Used in skin health (eczema, psoriasis, acne), Hormonal Balance (premenstrual syndrome, menopause), Anti inflammatory effects (rheumatoid arthritis), Cardiovascular health (blood pressure and cholesterol) etc.⁽³⁷⁾

Oenothera biennis plant's seeds are extracted to produce an oil that is frequently used as a topical therapy, health supplement, and component of cosmetics and it also consist of fatty acids of omega 6 series, which promote the immune cell with a health balance.⁽³⁸⁾

- **Pharmacological action of *oenothera biennis* in eczema :** *Oenothera biennis* is a natural source of linolenic acid (LA) and gamma-linolenic acid (GLA). *Oenothera biennis* contains GLA, which have anti-inflammatory property due to the blood levels of both GLA and DGLA increase.^(39,40) Dihomo-gamma linolenic acid is used to convert GLA into prostaglandin E1 (PGE1) and 15-hydroxyeicosatrienoic acid (15-HETrE), which have anti-inflammatory properties. Also arachidonic acid is a precursor to the 2 series prostaglandins (PGs) such PGE2 and leukotriene (LT) B4, which have hyperproliferative and anti-inflammatory effect. 15-HETrE enhances skin barrier function.⁽⁴¹⁾

Conclusion :

Oenothera biennis used has herbal remedy for various conditions, including skin issues and hormonal imbalance. Oenothera biennis has shown potential benefits in managing eczema due to its high content of essential fatty acids like gamma-linolenic acid, which have anti-inflammatory and skin barrier repairing properties. By increasing blood levels of GLA and dihomogamma-linolenic acid (DGLA), oenothera biennis oil helps to convert these substances into prostaglandin E1 (PGE1) and 15-hydroxyeicosatrienoic acid (15-HETrE), which play critical roles in reducing inflammation and improving skin barrier function. The oil's role in supporting skin barrier integrity can be particularly struggling with eczema-related skin damage and inflammation. It can help to reduce symptoms such as itching, redness, and dryness associated with eczema. Regular application of this oil may improve skin hydration and support overall skin health.

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