INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Article

Eczema: An Updated Review of Epidemiology, Pathogenesis, and Management

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ARTICLE INFO

Published: 6 Nov 2026

Keywords:
Eczema, Atopic dermatitis, Epidemiology, Pathogenesis, Management

DOI:
10.5281/zenodo.24006294

ABSTRACT

Eczema, also known as atopic dermatitis, is a chronic, relapsing inflammatory skin disorder characterized by intense pruritus, xerosis, and recurrent eczematous lesions. It affects individuals of all age groups and significantly impairs quality of life due to persistent symptoms and frequent exacerbations. The pathogenesis of eczema is multifactorial, involving genetic susceptibility, epidermal barrier dysfunction, immune dysregulation, environmental triggers, and alterations in the skin microbiome. Recent advances have improved the understanding of the molecular mechanisms underlying the disease, leading to the development of targeted therapies. This review provides an updated overview of the epidemiology, risk factors, pathogenesis, clinical manifestations, diagnostic approaches, and current management strategies for eczema. Conventional treatments, including emollients, topical corticosteroids, calcineurin inhibitors, phototherapy, and systemic immunosuppressants, are discussed alongside emerging therapies such as boilogics and Janus kinase (JAK) inhibitors. The review also highlights preventive measures, patient education, and future research directions aimed at improving long-term disease control and patient outcomes. A comprehensive understanding of the evolving concepts in eczema pathogenesis and management is essential for optimizing therapeutic approaches and enhancing the quality of life of affected individuals.

INTRODUCTION:

Eczema is one of the most common inflammatory skin diseases seen by dermatologists. The word "eczema" comes from the Greek word "ekzein," which means "to boil over" or "to break out." Skin conditions similar to eczema

were described more than 3,000 years ago in the ancient Ebers Papyrus, and later Hippocrates also explained

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

eczema-like skin diseases around 400 BC.

The term eczema was officially introduced in 1817 to describe a skin rash with fluid-filled blisters, similar to sunburn. Today, however, the meaning of eczema is much broader and includes different types of itchy, inflamed skin conditions.

The words eczema and dermatitis are often used interchangeably because both refer to inflammation of the skin.

These conditions commonly cause redness, itching, swelling, and small blisters, especially in the acute stage. One of the most common examples is atopic dermatitis (also called atopic eczema). Over the years, the term atopic dermatitis has become more commonly used than atopic eczema.

Generally, the word eczema is used to describe the skin appearance, such as childhood eczema, infantile eczema, flexural eczema, dyshidrotic eczema, and nummular eczema, while dermatitis is more often used as the official name of diseases, such as contact dermatitis and seborrheic dermatitis.

This review explains the traditional and modern understanding of eczema. It discusses its causes, skin changes, and the differences between acute eczema, which is mainly characterized by spongiosis (fluid accumulation between skin cells), and chronic eczema, which is associated with skin thickening and fibrosis due to long-term inflammation. (Tokura et al., 2025)

DEFINATION:

Your skin becomes dry, itchy, and uneven when you have eczema. Your skin's barrier function, which helps your skin maintain moisture and shield your body from the elements, is weakened by this condition.

One kind of dermatitis is eczema. A collection of disorders known as dermatitis result in inflammation of the skin.(“Eczema,” n.d.)

TYPES

1.Atopic Dermatitis

The most widespread kind of eczema is atopic dermatitis.

Between the ages of two months and five years, it usually begins in childhood and either becomes less severe or disappears by maturity. But later in life, symptoms may flare up or appear for the first time. (“Types of Eczema,” 2017)

2.Contact Dermatitis

Allergies to things you touch can cause contact dermatitis. There are two varieties:

i]An immune system response to an allergen, such as latex or metal, is known as allergic contact dermatitis.

ii]Irritant contact dermatitis: This condition begins when your skin is directly harmed by a chemical or other material.(“Types of Eczema,” 2017)

3.Dysdrotic Dermatitis

Water-filled blisters on the skin are an indication of dyshidrotic eczema. Extreme itching and a burning feeling are two possible complication. Stress, perspiration, and extremely high or low temperatures can all exacerbate this disease. (“What does eczema look like?,” 2023)

4.Discoid Dermatitis

Coin-shaped plaques with prominent spots and scaling are the result of this condition. Elderly and individuals with severely dry skin, including those in the winter, are more likely to experience it.(“What does eczema look like?,” 2023)

5.Perioral Dermatitis

With perioral dermatitis, small pus-filled bumps appear around the mouth. This type of dermatitis also can affect

the skin around the nose, cheeks and eyes. The exact cause of perioral dermatitis is unknown, but the corti-costeroid

medicine contained in some inhalers, nasal sprays and creams may play a role. (Staff, n.d.)

6.Neuro Dermatitis

Another name for neurodermatitis is lichen simplex chronicus. It gets more itchy the more you scratch. It

frequently affects the-

- Scalp
- Neck
- Wrists
- Forearms
- Ankles
- Vulva
- Scrotum
- Anus

areas that are accessible for scratching.(Staff, n.d.)

Figure 1:

[1. Clinical presentation of Atopic Dermatitis (AD) 2. Clinical presentation of Contact Dermatitis (CD)

1. Clinical presentation of Dyshidrotic Dermatitis (Pompholyx) 4. Clinical presentation of Discoid Dermatitis

(Nummular Eczema) 5. Clinical presentation of Perioral Dermatitis (POD) 6. Clinical presentation of

Neurodermatitis (Lichen Simplex Chronicus, LSC)] ("DermNet," n.d.)

SYMPTOMS:

Eczema symptoms include:

- Dry skin.
- Skin that itches.
- Skin rash.
- Lumps on your skin.
- Leathery, thick skin patches.
- Crusty, scaly, or flaky skin.
- Swelling.

("Eczema," n.d.)

CAUSES:

Eczema is caused by a number of reasons, including:

- The immune system:

If you have eczema, little allergens or irritants in your surroundings cause your immune system to overreact.

When you come into contact with a trigger, your immune system interprets these minor irritants as potentially

dangerous foreign invaders like bacteria or viruses.

The triggers consequently set off your body's defense mechanism. Inflammation is your immune system's line of

protection. Eczema symptoms are brought on by inflammation.

- The genes:

If dermatitis or eczema runs in your family, you are more likely to develop eczema. You're also at a higher risk

if there's a history of asthma, hay fever and/or allergies.

Common allergies include pollen, pet hair or foods that trigger an allergic reaction. You could also have a genetic

mutation that causes your skin's barrier function to not work as it should.

- The surroundings:

A variety of things in your surroundings might cause skin irritation. Exposure to smoke, air pollution, harsh soaps,

materials like wool, and some skin care products are a few examples.

Your skin may become dry and irritated due to low humidity, or dry air. Sweating brought on by heat and high

humidity can exacerbate your itching.

- Psychological triggers:

Your skin's health may be impacted by your mental state, which may lead to an exacerbation of eczema

symptoms.

Your eczema symptoms may flare up more frequently if you experience high levels of stress, anxiety, or sadness.

(Langan and Williams, 2006)

EPIDEMIOLOGY:

Eczema affects 15% to 30% of children and 2% to 10% of adults at some point in their lives. Within the first year

of life, the condition will manifest in about 60% of instances. Urban areas have a higher prevalence of eczema

than rural ones. This incidence highlights the connection between environmental and lifestyle factors in AD

processes.

Eczema represents a single of the three conditions referred to as "the atopic pulmonary march." This has to do

with how individuals with asthma, allergic rhinitis, and atopic dermatitis are related. Asthma and allergic rhinitis

develop in about 50% and 75% of people with severe eczema, correspondingly.(Nemeth et al., 2026)

Researching the epidemiology of eczema still presents a number of difficulties that have not substantially

improved over the past ten years. Heterogeneous skin appearances, symptoms, lesional intensity, lesional extent,

and longitudinal course are the first characteristics of AD.5,6 78 distinct signs and symptoms of eczema were

found in a systematic review (SR) of 101 research, with significant variations by age and geography.7 Reports of

flexural involvement were less common in Iran, the Americas, and India.(Narla and Silverberg, 2025)

Table 1:

Prevalence of eczema by country :

Patients with atopic dermatitis

Country Total population, n (%) Male (%) Female (%)

Australia 2000 (8.6) 6.6 10.5

Brazil 4001 (10) 8.7 11.2

Canada 2500 (8) 5.8 10.4

China 5000 (15.1) 15.9 14.2

Denmark 1000 (8) 8.4 7.6

France 4000 (7.1) 5.2 8.9

Germany 4000 (5.4) 4.3 6.5

India 3000 (8.3) 7.6 9

Israel 1000 (7.8) 6.8 8.8

Italy 4001 (7.8) 8.8 11

Kenya 500 (5.2) 5.3 5.1

Mexico 2500 (10.7) 6.1 15

Patients with atopic dermatitis

Country Total population, n (%) Male (%) Female (%)

Poland 2500 (8.7) 5.9 11.3

Portugal 1000 (10.7) 9.8 11.5

Senegal 300 (4) 3.3 4.7

South Africa 1000 (7.2) 5.2 9.1

South Korea 2500 (15.3) 13.7 16.9

Spain 4000 (13.1) 10.9 15.1

UAE 760 (10.3) 8.1 15

USA 5000 (7.3) 6.6 8

Total 50 552 (49) (51)

aSkin diseases: n = 17 627 (35%), atopic eczema: n = 4874 (9.6%).

(Skayem et al., 2025)

Atopic dermatitis (AD) is one of the most common chronic inflammatory skin disorders affecting people of all

ages. Although many epidemiological studies have focused on children, information on the global prevalence of

AD in adults has been limited. To address this gap, a worldwide survey was conducted as part of Project ALL,

using the same standardized methodology previously applied in Europe.

The survey was carried out between January and April 2023 and included adults aged 16 years and older from 20

countries across five continents. These countries represented more than half of the world's population. Participants

were selected using proportional quota sampling based on age, sex, place of residence, and income to ensure that

each country's sample reflected its general population. Individuals completed an online questionnaire and only

physician-confirmed cases of atopic dermatitis diagnosed within the previous 12 months were included.

The study reported an overall global prevalence of 9.6% for adult atopic dermatitis. Disease prevalence varied

considerably among countries, ranging from 4.0% in Senegal to 15.3% in South Korea. Higher prevalence rates

were also observed in China (15.1%) and Spain (13.1%), while lower rates were found in Germany (5.4%) and

Kenya (5.2%). In India, the prevalence was reported to be 8.3%.

Regionally, Asia showed the highest prevalence of atopic dermatitis, followed by Latin America and Europe,

whereas North America and Africa reported comparatively lower rates. Across all geographical regions, females

were more frequently affected than males. The study also found that the highest prevalence was commonly

observed among adults aged 41–64 years, suggesting that atopic dermatitis remains an important health concern

beyond childhood.

With respect to ethnicity, the prevalence of AD differed among population groups. Asian individuals showed the

highest prevalence, followed by people of mixed ethnicity, while Black individuals had the lowest prevalence.

Overall, there was no significant global difference between fair- and dark-skinned individuals, although regional

variations were noted.

This international study highlights that atopic dermatitis is a significant global public health problem, affecting

nearly one in ten adults. The use of a standardized methodology and physician-confirmed diagnoses provides

reliable estimates and improves understanding of the worldwide distribution of the disease.(Skayem et al., 2025)

PATHOGENESIS:

Mechanism of Eczema (Atopic Dermatitis)

Eczema develops due to the interaction of genetic factors, skin barrier dysfunction, immune system abnormalities,

and environmental triggers.

2. Skin barrier defect

o Mutations in the filaggrin (FLG) gene and reduced skin lipids weaken the skin barrier.

o This leads to increased water loss (transepidermal water loss) and allows allergens, irritants, and

microbes to enter the skin more easily.

3. Immune system activation

o Allergens and irritants activate immune cells in the skin.

o The immune response is mainly T-helper 2 (Th2) mediated.

o Cytokines such as IL-4, IL-5, IL-13, and IL-31 are released, causing inflammation, itching, and

increased IgE production.

4. Itch–scratch cycle

o IL-31 and inflammatory mediators stimulate nerve endings, producing intense itching.

o Scratching further damages the skin barrier, allowing more allergens and microbes to enter,

which worsens inflammation.

5. Microbial colonization

o Damaged skin is commonly colonized by Staphylococcus aureus.

o Bacterial toxins further activate the immune system and aggravate eczema.

6. Chronic inflammation

o Repeated flare-ups lead to chronic inflammation, skin thickening (lichenification), dryness, and

persistent itching.

(Davis et al., 2025)

Mechanism (Pathophysiology) of Eczema – Flow Chart

Genetic predisposition (e.g., FLG gene mutation)

+

Environmental triggers

(Allergens, irritants, microbes, pollution)

↓

Skin barrier dysfunction

(↓ Filaggrin, ↑ Transepidermal water loss)

↓

Entry of allergens, irritants & microbes

↓

Activation of immune cells

↓

Th2 immune response

(IL-4, IL-5, IL-13, IL-31)

↓

Inflammation + Increased IgE production

↓

Itching (Pruritus)

↓

Scratching

↓

Further skin barrier damage

↓

Microbial colonization

(e.g., *Staphylococcus aureus*)

↓

Chronic inflammation

↓

Dry, itchy, red, thickened skin (Eczema)

(Weidinger et al., 2018)

Figure 2:

MANAGEMENT:

1.Medicated products applied to the skin.

Many options are available to help control itching and repair the skin. Products are available in various strengths

and as creams, gels and ointments. Talk with your health care provider about the options and your preferences.

Whatever you use, apply it as directed (often twice a day), before you moisturize. Overuse of a corticosteroid

product applied to the skin may cause side effects, such as thinning skin.

2.Pills that control inflammation.

For more-severe eczema, your health care provider may prescribe pills to help control your symptoms. Options

might include cyclosporine, methotrexate, prednisone, mycophenolate and azathioprine. These pills are effective

but can't be used long term because of potential serious side effects. (Ständer, 2021)

3.Topical Corticosteroids.

7. Traditionally, topical corticosteroids have been the cornerstone of treatment. Responses to moisturization can

be favorable, particularly in cases of mild to severe illness.

8. It is best to use ointment bases, especially in dry conditions. The first treatment involves applying

hydrocortisone 1% powder in an ointment base twice a day to facial lesions and creases. Trunk lesions are treated

twice a day with a medium-strength steroid ointment (triamcinolone or betamethasone valerate) until the

eczematous lesions go away. When lesions go away, steroids are stopped, and when new patches emerge, they

are started again. ("Atopic Dermatitis Treatment & Management: Medical Care, Complications, Diet," n.d.)

9. Antihistamines

By inhibiting H1 receptors, oral antihistamines reduce histamine-induced itching. Despite being widely

recommended to patients with AE, controlled clinical trials have not demonstrated its efficacy.50,51 Since

histamine is not the only mediator that can produce pruritus, many individuals cannot be treated with

antihistamines alone. Oral antihistamines may be useful for AE patients who also have concurrent allergic rhinitis

or urticaria.52. Sedative antihistamines, like hydroxyzine or chlorpheniramine, may also provide symptomatic

relief for itching that gets worse at nite and prevent scratching while you sleep. But they can make it harder for

adults to drive or for kids to learn.

5.Anti-infectious agents.

AE is often accompanied by bacterial, viral, and fungal infections, and an infection can exacerbate AE symptoms.

Controlling any secondary infection is important. It is well recognized that Staphylococcus aureus contributes

significantly to AE. AE is known to be made worse by toxins from S. aureus, which function as

superantigens.Applying fusidic acid or mupirocin ointment is beneficial in cases of local infection, particularly in

impetiginized characteristics. Cephalosporins or penicillinase-resistant penicillins (dicloxacillin, oxacillin, or

cloxacillin) work well in individuals with widespread superinfection who do not have resistant aureus strains. (Lee

et al., 2016)

Figure 3:

HOW DO YOU TREATCHILDHOOD ECZEMA ?

If your child has skin issues, such as eczema, you can:

10. your child a short, warm bath instead of a long, hot bath, which can dry out their skin.

2.Use moisturizers several times daily. In infants with eczema, moisturizing on a regular basis, like with each

diaper change, is extremely helpful.

3.Keep the room temperature as regular as possible. Changes in room temperature and humidity can dry your

child's skin.

4.Keep your child dressed in cotton. Wool, silk and synthetic fabrics such as polyester can irritate their skin.

5.Use sensitive skin or unscented laundry detergent.

6.Help your child avoid rubbing or scratching at their skin.("Eczema: What It Is, Symptoms, Causes, Types &

Treatment," n.d.)

THERAPY:

- WET DRESSING : dressings that are wet. Applying a corticosteroid ointment and

covering it with a layer of dry gauze and a wrap of moist gauze is an efficient, intensive

treatment for severe eczema. Due to its labor-intensive nature and need for nursing

skills, this procedure is occasionally performed in a hospital for patients with extensive

lesions. Alternatively, find out from your healthcare provider how to safely apply this

method at home.

- LIGHT THERAPY : treatment with light. This medication is administered to patients

who either quickly flare up following treatment or do not improve with topical

therapies. Exposing the afflicted area to regulated levels of natural sunshine is the most

basic type of light therapy, or phototherapy. Other methods employ narrow band

ultraviolet B (UVB) and artificial ultraviolet A (UVA) either by themselves or in

combination with medications.

- Long-term light therapy is beneficial, but it also has negative side effects, such as early

skin aging, hyperpigmentation, and an elevated risk of skin cancer. Due to these factors,

phototherapy is not administered to infants and is used less frequently in young

children. Discuss the benefits and drawbacks of light treatment with your healthcare

physician.

- COUNSELLING : conventional therapy. Speaking with a therapist or other counselor

can be beneficial if your skin problem is causing you embarrassment or frustration.

- RELAXATION : biofeedback, relaxation, and behavior change. Those that scratch out

of habit might benefit from these methods.(“Atopic Dermatitis Treatment & Management:

Medical Care, Complications, Diet,” n.d.)

ESSENTIAL OILS USED IN TREATMENT OF ECZEMA:

Figure 4:

11. TEA TREE OIL:

Tea tree oil, sometimes called melaleuca oil, comes from tea trees that were formerly found in

Australian

swamps. The Aborigines, Australia's indigenous population, have long utilized this oil as a

herbal remedy to cure a wide range of skin conditions, including fungal infections and insect

bites.

Tea tree oil effectively combats bacteria, fungus, and viruses due to its superior antimicrobial

qualities. It aids in preventing infections brought on by eczema's compromised skin barrier.

Additionally, this oil's anti-inflammatory qualities help reduce skin irritation and redness.

12. FLAXSEED OIL:

The nutrient-rich flaxseeds are cold-pressed to produce this oil. Alpha-linolenic acid (ALA),

an omega-3 fatty acid that is good for your skin, is abundant in flaxseed oil. It hydrates, lowers

inflammation, and encourages the healing process of your skin. It's perfect for eczema

treatment.

To help treat eczema, flaxseed oil can be taken orally or applied topically. However, improper

extraction might taint flaxseed oil with contaminants. Therefore, use caution when extracting

flaxseed oil to treat eczema.

13. LAVENDER OIL:

The lavender tree's blossoms yield this fragrant essential oil, which has several therapeutic

uses. It relieves inflamed skin by acting as an analgesic and anti-inflammatory. Additionally,

it possesses antifungal and antibacterial qualities that shield your skin from recurrent infections.

To effectively treat dermatitis, you can either use lavender oil straight to the affected region or

combine it with other essential oils like tea tree oil. After speaking with a doctor, lavender oil

can also be added to lukewarm bathing water for kids.

14. EUCALYPTUS OIL:

This essential oil, which comes from the eucalyptus tree, has a lot of cineol, also known as

eucalyptol, which may have medicinal uses. Depending on the species from which the oil was

derived, there are several types of eucalyptus oil on the market.

Because of its anti-inflammatory and antibacterial qualities, eucalyptus oil can help you avoid

severe rash episodes or flare-ups. To assist mend skin cracks and avoid infection, you can apply

a tiny bit of the oil to the afflicted regions.("The 10 Essential & Plant Oils That Can Treat

Eczema," 2021)

15. ALMOND OIL:

Rich in healthy fatty acids, vitamin E, and other skin-friendly phytochemicals (plant-based

compounds), sweet almond oil is a gentle, non-greasy oil that supports the health of your skin

in a number of ways. Almond oil is a great emollient that retains moisture in your skin due to

its high lipid content. For those who have eczema, it is therefore beneficial.

It prevents eczema-related itching since it is antipruritic. Additionally, it enhances the function

of your skin barrier. It can be applied directly to your skin.

All skin types can safely use almond oil. But don't use it if you have a nut allergy.

16. CASTOR OIL:

Traditionally, a number of medicinal uses have been made of this heavy oil that is derived from

castor beans. This oil has more advantages for skin than just being a great moisturizer.

Additionally, it possesses antibacterial qualities, reduces inflammation, and speeds up the

healing of wounds.

Castor oil can help ease flare-ups of your eczema. Because castor oil is thick, your skin does

not absorb it easily. Leave it overnight for optimal effects, or dilute it with another lighter oil

to improve absorption.("Essential Oils for Eczema," n.d.)

CONCLUSION:

Atopic dermatitis (eczema) is a common, chronic, relapsing inflammatory skin disorder that

affects people of all age groups and can significantly impair quality of life. Its epidemiology

varies with age, geographic region, genetic background, and environmental factors.

Current evidence indicates that eczema develops through a complex interaction between

genetic susceptibility, impaired skin-barrier function, immune dysregulation, environmental

triggers, and alterations in the skin microbiome.

Management of eczema should therefore be individualized according to disease severity, age,

affected body sites, and patient needs. Skin-barrier repair with regular moisturizers, avoidance

of triggering factors, patient education, and appropriate topical anti-inflammatory therapy

remain fundamental components of treatment.

For moderate-to-severe or refractory disease, phototherapy and newer systemic treatments,

including biologic agents and Janus kinase inhibitors, provide additional therapeutic options.

Overall, improved understanding of the pathogenesis of eczema has led to more targeted and

effective therapies. However, long-term disease control requires early diagnosis, continuous

management, good treatment adherence, and patient-centered care.

Further research is needed to better understand disease heterogeneity, identify reliable

biomarkers, develop safer long-term therapies, and establish personalized treatment strategies.

Recent Indian guidelines also emphasize the importance of region-specific, evidence-based

management of atopic dermatitis.

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HOW TO CITE: Vaishnavi Borate, Shruti Rokade, Komal Adsure, Eczema: An Updated Review of Epidemiology, Pathogenesis, and Management, Int. J. of Pharm. Sci., 2026, Vol 4, Issue 11, 1412-1422. https://doi.org/10.5281/zenodo.24006294