e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2025; 15(1); 157-165

Original Research Article

A Review on Herbal Approaches to Eczema: Active constituents, Mode of action and Therapeutic Potential

Akanksha Ghodke[1], Raghvendra Dubey[2]

[1,2]Institute of Pharmaceutical Sciences, Department of Pharmaceutics, SAGE University, Kailod Kartal, Indore-Dewas By-Pass, Road, Indore, Madhya Pradesh, India

Received: 11-12-2024 / Revised: 12-01-2025 / Accepted: 25-01-2025
Corresponding Author: Akanksha Ghodke
Conflict of interest: Nil

Abstract

Eczema, a chronic inflammatory skin condition affects millions worldwide, causing significant discomfort and reduced quality of life. It is characterized by dry scaly skin, itchiness, rashes, infection and blisters. Conventional treatments like corticosteroids and immunosuppressant offer temporary symptoms relief but are associated with side effects like skin thinning, resistance and life-threatening diseases like cancer, driving interest in alternative therapies. This review systematically explores the therapeutic potential of various herbs in treating eczema, gathere through comprehensive literature search using databases such as PubMed, Scopus, ScienceDirect and Google Scholar. Each herb is evaluated for its bioactive constituents and pharmacological actions, particularly focusing on anti-inflammatory, antioxidant, and immunomodulatory properties. Our findings suggest that herbs like Aloevera, Licorice calendula, chamomile, colloidal oat meal, Turmeric, marshmallow and hypericum contain bioactive constituents which offer natural, safer and more efficacious treatment with fewer adverse effects, enhancing patient compliance and outcomes in eczema care.

Keywords: Eczema, herbal treatment, anti-inflammatory, antioxidant, immunomodulatory.

Introduction

Eczema is the chronic inflammatory skin disorder characterized by inflammation, itchiness, dry scaly skin, rashes, blisters and infections[1]. It causes discomfort and can significantly impact a person's quality of life due to persistent and recurring symptoms. The global prevelance of eczema varies by region, age and environmental factors. Studies suggests that around 15-30 % of children and 2 to 10 % of adults are affected by this condition, making it one of the most common skin disease.

The primary cause of eczema involves the complex interaction between genetic predisposition, immune dysfunction and environmental triggers.[2] Genetic predisposition plays a significant role, particularly mutations affecting skin barrier proteins, such as filaggrin, which weaken the skin's protective barrier. Immune dysfunction also contributes to the condition by increasing skin sensitivity to environmental triggers. Common environmental factors that worsens the eczema symptoms include exposure to allergens, irritants, temperature changes, and stress.

Eczema includes the range of symptoms, including persistent dryness, inflammation, severe itching, and the development of red, scaly patches on the skin. In some cases, scratching due to itching can lead to open wounds and secondary infections, further worsening the condition. By understanding its causes, symptoms, and contributing factors, effective management strategies can be developed to manage the discomfort associated with eczema.

Types of Eczema: Depending on the unique triggers, it can be classified into seven types.[3]

Atopic Dermatitis: Atopic dermatitis is characterized by pruritis and lesions causing skin discoloration, itchy and scaly skin. It is the most common type of eczema, covering about 80-90% of all eczema cases.[4, 5] It starts at childhood and flares up with growing age. Symptoms of atopic dermatitis include dry skin, itching, swelling, rashes, small fluidy bumps.[6] It also disturbs the sleep due to intense itching at night.[5, 6] The main trigger for atopic dermatitis is the failure of skin barrier's function which makes skin more sensitive to irritants, allergens and other environmental factors.[7, 8]

Contact Dermatitis: Contact dermatitis can be defined as the skin's reaction to direct contact of allergens that causes itchy rashes and redness on affected area. It is classified into two types: allergic contact dermatitis and irritant contact dermatitis. Allergic dermatitis is caused by Type 4

hypersensitivity occurring due to common allergens like metals (nickel, gold) and chemicals, whereas Irritant dermatitis occurs when skin comes in contact with irritants like soap, detergents, rubber gloves, pesticides, fertilizers etc.[9, 10]

Dyshydrotic Eczema: Dyshidrotic eczema is also known as Pompholyx. It causes intense itchy blisters. Commonly, it occurs around the fingers of hands, palms, soles and feet. The main causes of dyshydrotic eczema are immune system over activation, allergic reactions, improper skin barrier function[11].

Neurodermatitis: Neurodermatitis or Lichen Simplex Chronicus occurs due to neurological impairment trigerred by itch-scratch cycle where itching leads to scratching and scratching further worsens the condition. Feeling of itching is more often while sleeping or in relaxing state. It is more common in adults aged between 30 to 50 years and mainly affects female[12-14].

Numular Eczema: It is also known as discoid eczema and is characterized by coin shaped lesions with red or brown scaly inflamed or patchy skin. [15] It can occur at any age and males are more prone to nummular eczema than females. Its exact cause is unknown but allergens such as chemicals or metals can trigger nummular eczema[15,16].

Seborrheic Eczema: It is characterized by yellowish to pinkish oily papule mainly affecting the area having lot of sebaceous glands like scalp, nose and upper back. It can cause excessive dandruff or rashes on the affected area. The main cause associated with seborrheic dermatitis is overproduction of sebum, fungal infection through Malassezia yeast, stress, hormonal changes, allergens like detergents chemical or soaps or adverse weather[17-19].

Stasis Dermatitis: Stasis dermatitis is also known as gravitational dermatitis or venous eczema. It is caused by poor blood circulation in lower legs (venous insufficiency). Due to weakened valves in legs, veins become loses their ability to push blood back to the heart. This results in fluid buildup in lower legs. It is more common in people aged above 50.[20] Fig. 1 shows different types of eczema.

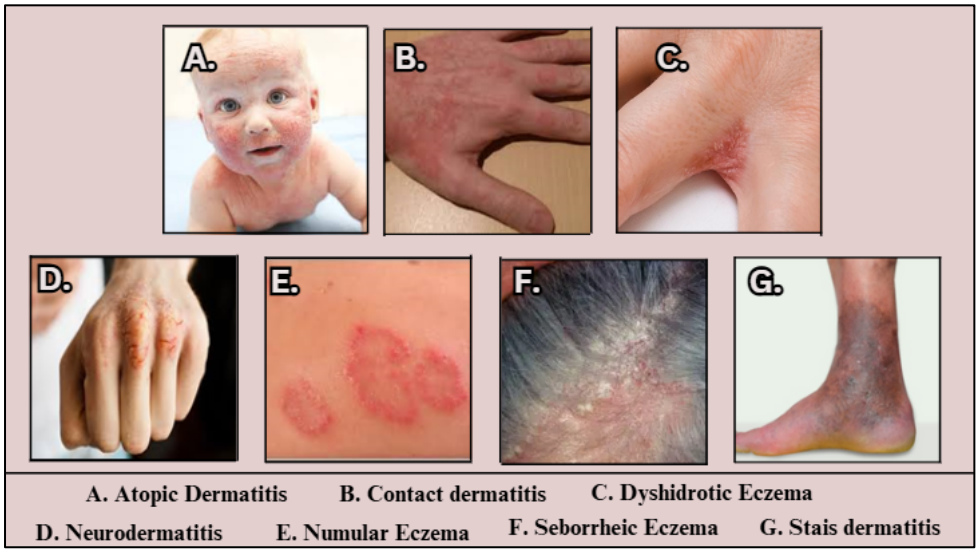


Fig.1: Types of dermatitis

Pathogenesis of Eczema: The pathogenesis of Eczema is influenced by three main factors:

Immune Dysregulation: Immune dysregulation plays a key role in the pathogenesis of eczema. Both innate and adaptive immune systems contribute to the chronic inflammation. Immune dysregulation is characterized by an overactivation of Th2 (T-helper type 2) immune pathways during the acute phase, and a shift towards Th1 (T-helper type 1) pathways in the chronic phase of the disease[21-22].

The Th2-dominated response leads to the production of cytokines such as IL-4, IL-5, IL-13 which promote IgE production, eosinophil recruitment, mast cell activation and inhibition of the skin's barrier function. Activation of mast cells promotes the secretion of histamine leading to increased inflammation.[23-25] This also weakens the skin's defense against external irritants, allergens and pathogens making skin more susceptibility to bacterial and fungal infections and increased penetration of allergens.[22,23] Furthermore, alarmins like thymic stromal lymphopoietin (TSLP), IL33 and IL 25 produced by keratinocytes in epidermis also amplifies Type 2 inflammatory response.[24, 25]

Additionally, improper working of innate immune system, leads to reduced expression of antimicrobial peptides (AMPs) and increased vulnerability to

microbial infections, particularly from Staphylococcus aureus.[24-26] The mechanisms involved in pathogenesis of eczema is shown in Fig. 2

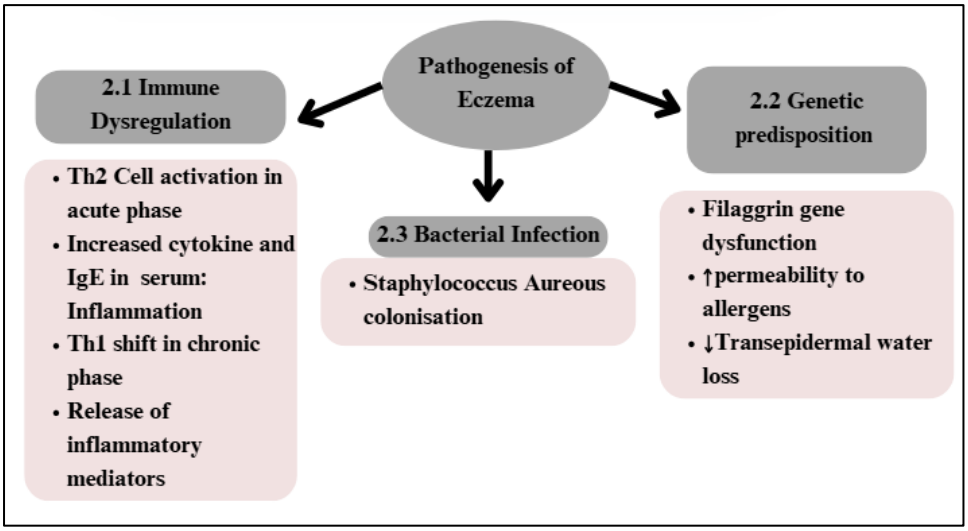
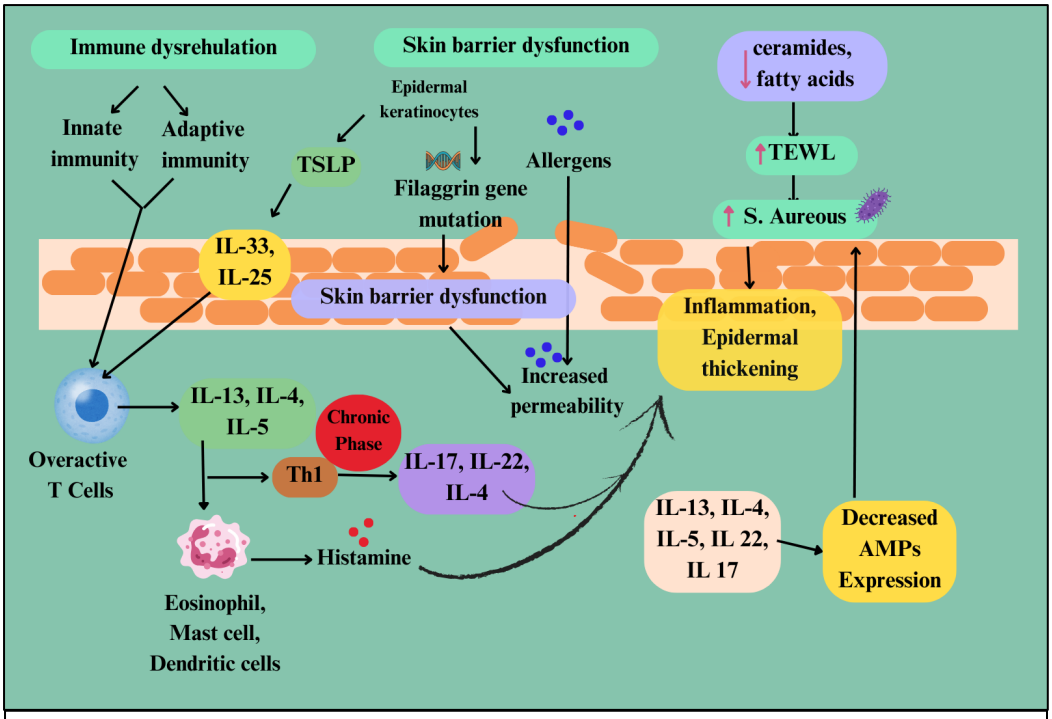


Fig. 2: Pathogenesis of Eczema

Skin Barrier Dysfunction: The disruption of skin barrier significantly impacts the management of eczema. It is characterized by increased transepidermal water loss which makes skin more susceptible to allergens. It consists two phases: Acute phase and chronic phase.

During acute phase, allergens trigger immune system to release chemokines and cytokines which suppress the synthesis of ceramides and fatty acids which are the key components of skin barrier. This results in an infiltration of CD4+ cells at the site of lesion that further triggers the immune system leading to inflammation.[27] This leads to barrier disruption, increased permeability and susceptibility to microbial contamination.[23,30] Also infilteration of CD4+ cells at the site of lesion further triggers the immune system leading to inflammation. Persistent inflammation triggers Th1 cells to releaseIL-17, IL-22, IL-4 leading to chronic phase. Furthermore, mutation in filaggrin gene also leads to skin barrier dysfunction. About 10 % of eczema patients carry mutation in filaggrin gene.[24, 27-29]

Bacterial Infection: The damaged skin barrier increases the transepidermal water loss which disturbs the balance between helpful and harmful bacteria making skin more prone to bacterial infection like Staphylococcus Aureous. This loses the skin's ability to retain moisture and protect skin against external pathogens.[31,32] The pathogenesis of Eczema (at molecular level) is shown in Fig. 3



TSLP: Thymic stomal lymphopoetin, **IL:** Interleukin, **TEWL:** Transepidermal water loss

Fig. 2: Pathogenesis of Eczema at molecular level

Role of Herbs in the Treatment of Eczema: Herbal medicine has become increasingly popular as a promising alternative for managing eczema, as it has the potential to ease symptoms and address the root causes with fewer side effects. Various herbs have been recognized for their anti-inflammatory, antimicrobial, and antioxidant properties, which can help soothe irritated skin, reduce inflammation, and promote healing. In contrast to conventional treatment of eczema that uses corticosteroids and antihistamines, herbs have been found to be beneficial with minimum or no side effects. In Table No. 1, some important herbs for eczema are discussed along with their active constituents and mode of action.

Table No. 1: Active constituents available in herbs with their mode of action.

S. No.	Herbs	Plant part used	Active Constituents	Mode of Action
	Aloevera/ Aloe barbadensis	Leaf	Emodin, Aloin	Immune regulation, Anti-inflammatory, anti-bacterial Effective against Staphylococcus aureus[27].
	Coconut oil/ Cocos nucifera	Seed	Caprylic acid, Lauric acid, Stearic acid, Oleic acid	Maintains TEWL, Increases the amount of Filaggrin[28,29]
	Turmeric/Curcuma Longa	Rhizome	Curcumin	Anti-inflammatory and anti-oxidant properties[30]
	Jojoba Oil	Flower	Sterols and vitamins with few Triglyceride esters, Flavonoids	Maintains TEWL, Antiinflammatory[31]
	Rosemary/ Rosmarinusofficinalis	Flower	Carnosol, Carnosic, Rosmarinic, Ursolic, Oleanolic, And Micromeric Acids	Anti-inflammatory, Soothes skin[32]
	Evening Primerose/ Oenothera Biennis	Flower	Gamma linolenic acid	Antiinflammatory, Antibacterial[33,34].
	Argan Oil/ Arganiaspinosa	Fruit, Seeds, Leaves	Sterol, Tocopherol	Effective against Staphylococcus bacteria, Antiinflammatory[35].

	Oat fruit/ Avenaefructus	Whole grains	Fatty acids, Vit. E, Linoleic acid, Stearic acid, Triterpenes	Effective against Staphylococcus bacteria, Antiinflammatory[36,37].
	Sunflower Seed Oil	Seed	Leinoleic acid, Fatty acids, Isosorbidediesters	Antiinflammatory[38].
	Shea butter/ Vitellaria paradoxa	Nuts	Fatty acids, Vit. E, Linoleic acid, Stearic acid, Triterpenes	Repair skin barrier function/ Antiinflammatory[28, 39]
	Olive oil/ Olea europaea	Fruits	Sterols, Phenolic compounds, Lignans, Flavanoids, Carotenoids, Triterpenic alcohols, Seccoirridoids	Antioxidant,anti-inflammatory [40]
	Neem/ AzadirachtaIndica	Leaves, Seeds, Bark	Nimbidin, Nimbolide	Antiinflammatory, Antibacterial[28,41,42]
	Borage/ Boragoofficinalis	Leaves, Flowers, Seeds	Gamma-linolenic acid (GLA) and Linoleic acid	Antiinflammatory, improve skin barrier function [43]
	St. John's wort/ Hypericumperforatum	Flowers	Hypericin, Hyperforin, Flavanoids	Antiinflammatory, antimicrobial, soothing[44,45]
	Sage leaf Salviae folium	Leaves	Menthol, Camphor	Hydrates skin, anti-inflammatory, increases collagen[46]
	Comfrey/ Symphytumofficinale	Leaves	Allantoin, Rosmarinic acid, Chlorogenic acid, Caffeic acid, Glycopeptides and Amino acids, Triterpenes	Promotes new skin cell growth, antiinflammatory and analgesic effects[47,48]
	Witch hazel/ Hamamelisvirginiana L.	Bark, Leaves	Gallotannins, Flavanoids, Sesqueterpin, Catechins	Antiinflammatory, antimicrobial, soothing[49]
	Licorice/ Glycyrrhiza glabra	Root	Glycyrrhizin, isoliquiritigenin, Glycyrrhetinic Acid	Anti-inflammatory and soothing effects, antibacterial against staphylococcus aureus[50,51,52]
	Calendula/ calendula Officinalis	Flowers	Triterpene and Terpenoids (bisabolol, faradiol) Saponins and Flavonoids (quercetin)	Antiinflammatory, antimicrobial, soothing[53,54]
	Chamomile/ *Matricariarecutita*	Flowers	Sesqueterpenes, Flavonoids(apigenin, leutolin), Terpenoids (bisoprolol)	Antiinflammatory, antimicrobial, soothing[34,55, 56]
	Fig/ Ficus Caria	Fruits, Leaves, Latex	Nicotinic acid, Glycosides, Furanocoumarins	Antiinflammatory, antimicrobial, recover hysdration, collagen biosynthesis[57,58]
	Marshmallow root/ Althaeae radix	Root	Vitamins, Aminoacids and Carbohydrates	Antioxidant, Antiinflammatory, antimicrobial[59]
	Gotu kola/ Centella asiatica	Leaves	Asiatiiccoside, Asiatic acid, Quercetin	Anti-inflammatory, repair skin barrier, antioxidant[60]
	Fenugreek seed/ Trigonellaefoenugraeci semen	Seeds	Mucilage, Trigonelline, Steroidal saponins	Anti-inflammatory, soothing and anti-itching effects[61]
	Burdock root/ Arctium lappa	Root	Arctigenin, Lignans, Quercetin and Phenolic acids	Improves blood cierculation to skin, purifies blood[62,63]
	Milk thistle (Silybum marianum)	Flower	Silymarin	antioxidant, anti-inflammatory, and antimicrobial effects.[64]
	Moringa/ Moringa oleifera	Leaves, Seeds	Vitamins A, C, and E, Quercetin, Chlorogenic acid, and beta-carotene	Antiinflammatory, Antimicrobial[65]

	Hempseed/ Cannabis sativa	Seeds	Omega-3 and omega-6 fatty acids, particularly alpha-linolenic acid (ALA) and linoleic acid (LA)	Hydrates skin, anti-inflammatory[66]
	Basil/ Ocimumbasilicum	Leaves	Flavonoids and Polyphenols	Antiinflammatory, antimicrobial, skin regeneration, antioxidant[67]
	Tea tree/ Melaleuca alternifolia	Leaves	Terpinen-4-ol	Antiinflammatory, antimicrobial, antioxidant, skin regeneration[68]
	Willowbark/ Salix alba	Bark	Salicin, azelaic acid	anti-inflammatory, remove dead skin cells, Improve skin barrier function[69, 70, 71]
	Black Cumin/ Nigella sativa	Seeds	Thymoquinone, beta-sitosterol	anti-inflammatory, antimicrobial properties, antioxidants[72]
	Peppermint/ Mentha piperita	Leaves	Menthol	anti-inflammatory, antimicrobial properties, antioxidants[73]
	Dandelion/ Taraxacum officinale	Root, Leaves	Luteolin and Quercetin, Vitamin C, beta-Carotene, and Polyphenols,	anti-inflammatory, antimicrobial properties, antioxidants, strengthen the skin barrier[74]
	Linseed/ Lini semen	Seeds	α-linolenic and linoleic acids, Mucilage polysaccharides, Galacturonic acid	Anti-inflammatory, emollient

Conclusion

Herbal treatments offer promising alternative and complementary therapies for eczema, leveraging natural anti-inflammatory, antioxidant, and immune-modulating properties. While several herbs, such as Turmeric, Licorice, Aloevera, calendula, chamomile, colloidal oat meal, marshmallow and hypericum have demonstrated beneficial effects in managing eczema symptoms, the evidence varies in terms of study design, sample size, and quality. Standardization of herbal preparations, as well as rigorous clinical trials, are needed to establish clear safety profiles, dosage guidelines, and efficacy. As interest in plant-based therapies continues to grow, further research is crucial to validate these approaches and integrate them into clinical practice for eczema management.

This conclusion emphasizes the potential and need for further study while stressing the importance of safety and professional guidance.

References

1. Nemeth V, Syed HA, Evans J. Eczema. In: StatPearls, Edited by StatPearls Publishing. Treasure Island (FL): StatPearls Publishing; 2024 Jan. Updated 2024 Mar 1.
2. Odhiambo JAet alGlobal variations in prevalence of eczema symptoms in children from ISAAC Phase Three. *Journal of Allergy and Clinical Immunology*. 2009; 124(6): 1251-1258.
3. Barbarot S et al Epidemiology of atopic dermatitis in adults: Results from an international survey. *Allergy*. 2018; 73(6): 1284-1293. doi:10.1111/all.13401
4. Weidinger S, Novak N. Atopic dermatitis. *Lancet*. 2016; 387(10023):1109-22. doi:10.1016/S0140-6736(15)00149-X
5. Nutten S. Atopic dermatitis: Global epidemiology and risk factors. *Ann NutrMetab*. 2015;66(Suppl. 1):8-16.
6. Lee JH, Son SW, Cho SH. A Comprehensive Review of the Treatment of Atopic Eczema. Allergy Asthma Immunol Res. 2016 May;8(3):181-190. doi: 10.4168/aair.2016.8.3.181. PMID: 26922927; PMCID: PMC4773205.
7. Kantor R et al Atopic dermatitis, atopic eczema, or eczema? A systematic review, meta-analysis, and recommendation for uniform use of 'atopic dermatitis'. Allergy. 2016 Oct;71(10):1480-5. doi: 10.1111/all.12982.
8. Spergel JM, Paller AS. Atopic dermatitis and the atopic march. J Allergy ClinImmunol. 2003 Dec;112(6 Suppl):S118-27. doi: 10.1016/j.jaci.2003.09.033.
9. Litchman G et al Contact Dermatitis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459230/
10. Gordon R. Skin disorders. Edited by Timothy L. Kauffman, Ron Scott, John O. Barr, Michael L. Moran. A Comprehensive Guide to Geriatric Rehabilitation. Churchill Livingstone, 2014; 3rd ed: pp 369-378.

11. Lomas AL, Holt PJ. Dyshidrotic eczema: Epidemiology, clinical characteristics, and treatment. *Clin Dermatol*. 2018;36(6):579-83. doi:10.1016/j.clindermatol.2018.08.003
12. An JG et al. Quality of life of patients with neurodermatitis. Int J Med Sci. 2013;10(5):593-8. doi: 10.7150/ijms.5624.
13. Krebs M, et al. Sleep disturbances in patients with atopic dermatitis and neurodermatitis: A study on the influence of itch. *Dermatology*. 2015;231(1):13-21. doi:10.1159/000430067
14. Yang L et al The Efficacy and Safety of Acupuncture in the Treatment of Neurodermatitis: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2022 Sep 1;:8182958. doi: 10.1155/2022/8182958.
15. Tyler K, Zirwas MJ. Nummular dermatitis: Diagnosis and management. *Am J Clin Dermatol*. 2019;20(4):527-34. doi:10.1007/s40257-019-00442-8
16. Jiamton S, Tangjaturonrusamee C, Kulthanan K. Clinical features and aggravating factors in nummular eczema in Thais. *Asian Pac J Allergy Immunol.* 2013;31:36–42.
17. Tucker D, Masood S. Seborrheic Dermatitis.In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024 Jan.
18. Kamamoto CSL et al Cutaneous fungal microbiome: *Malassezia* yeasts in seborrheic dermatitis scalp in a randomized, comparative and therapeutic trial. Dermatoendocrinol. 2017 Oct 23;9(1):e1361573. doi: 10.1080/19381980.2017.1361573.
19. Yosipovitch G, Papoiu A, & Hantash B. Seborrheic dermatitis: A comprehensive review. *Journal of Clinical Dermatology*. 2012;10(1):48-53. doi:10.1007/s13671-012-0014-4
20. Yosipovitch Get al Stasis Dermatitis: An Overview of Its Clinical Presentation, Pathogenesis, and Management. Am J ClinDermatol. 2023 Mar;24(2):275-286. doi: 10.1007/s40257-022-00753-5.
21. Kim J, Kim BE, Leung DYM. Pathophysiology of atopic dermatitis: Clinical implications. Allergy Asthma Proc. 2019 Mar 1;40(2):84-92. doi: 10.2500/aap.2019.40.4202. PMID: 30819278; PMCID: PMC6399565.
22. Heng TS &GoldrathAW. The development of functionally mature T helper 2 cells. *Nature Reviews Immunology*. 2015; 15(7): 478-487.
23. Ong PYet al Endogenous antimicrobial peptides and skin infections in atopic dermatitis. *The New England Journal of Medicine*. 2002;347(15): 1151-1157.
24. Brown SJ, Mc Lean WH. One remarkable molecule: filaggrin. J Invest Dermatol. 2012 Mar; 132:751-62. doi: 10.1038/jid.2011.393.
25. Clausen ML et al Staphylococcus aureus colonization in atopic eczema and its association with filaggrin gene mutations. Br J Dermatol. 2017 Nov;177(5):1394-1400.
26. Gong JQ et al Skin colonization by Staphylococcus aureus in patients with eczema and atopic dermatitis and relevant combined topical therapy: a double-blind multicentre randomized controlled trial. Br J Dermatol. 2006 Oct;155(4):680-7.
27. Arora P et al Curative Potency of Medicinal Plants in Management of Eczema: A Conservative Approach, Phytomedicin e Plus. 2022; 2(2): 100256**.**
28. Varma S et al. In vitro anti-inflammatory and skin protective properties of Virgin coconut oil. Journal of Traditional and Complementary Medicine. 2019; 9(1): 5-14.
29. WangY et al The effects of topical application of coconut oil on the skin barrier function in atopic dermatitis. *Clinical, Cosmetic and Investigational Dermatology*. 2018; 11:159-166.
30. Yoshino T et al Curcumin, a major component of turmeric, inhibits the production of pro-inflammatory cytokines in human keratinocytes. *Experimental Dermatology*. 2013; 22(10): 680-683.
31. Matsumoto Y et al Acute Effects of Transdermal Administration of Jojoba Oil on Lipid Metabolism in Mice. *Medicina.* 2019;55:594. doi: 10.3390/medicina55090594.
32. Altinier G et al Characterization of Topical Antiinflammatory Compounds in *Rosmarinus-officinalis* L. *J. Agric. Food Chem.* 2007; 55:1718–1723. doi: 10.1021/jf062610+.
33. Schalin-Karrila M, Mattila L, Jansen CT, Uotila P. Evening primrose oil in the treatment of atopic eczema: effect on clinical status, plasma phospholipid fatty acids and circulating blood prostaglandins. Br J Dermatol. 1987 Jul;117(1):11-9.
34. Kerscher MJ, Korting HC. Treatment of atopic eczema with evening primrose oil: rationale and clinical results. ClinInvestig. 1992 Feb;70(2):167-71. doi: 10.1007/BF00227362.
35. lsatari ES et al Effects of arganspinosa oil in the treatment of diaper dermatitis in infants and toddlers: A quasi-experimental study. J TaibahUniv Med Sci. 2023 May 22;18(6):1288-1298.
36. Reuter J, Merfort I, & Schempp CM. Oat: A plant-based option for topical use in the treatment of atopic dermatitis. Phytotherapy Research. 24(4): 587-594.
37. Cerio R et alMechanism of action and clinical benefits of colloidal oatmeal for dermatologic practice. *Journal of Drugs in Dermatology. 2010; 9(9),* 1116-1120.
38. Nadora D et al Prospective Randomized Double-Blind Vehicle-Controlled Study of Topical Coconut and Sunflower Seed Oil-Derived

IsosorbideDiesters on Atopic Dermatitis. Dermatitis. 2024 Jan-Feb;35(S1):S62-S69. doi: 10.1089/derm.2023.0329. PMID: 38394048.
39. TanojoH et al In vitro human skin barrier studies: Model development and initial results on the barrier function and moisturizing properties of shea butter. Journal of Pharmacy and Pharmacology. 1999; 51(5): 499-507.
40. Taheri M, Amiri-Farahani L. Anti-Inflammatory and Restorative Effects of Olives in Topical Application. Dermatol Res Pract. 2021 Jun 26;2021:9927976. doi: 10.1155/2021/9927976.
41. Biswas K et al Biological activities and medicinal properties of neem (Azadirachta indica). *Current Science.*2002; 82(11): 1336-1345.
42. Kale M & Gaikwad R. Therapeutic Uses of Azadirachta indica (Neem) in Traditional Medicine. *Journal of Natural Remedies*. 2011; 12(2): 124-129.
43. Takwale A et al Efficacy and tolerability of borage oil in adults and children with atopic eczema: A randomized, double-blind, placebo-controlled, parallel group trial. British Journal of Dermatology. 2003; 148(3): 533-540.
44. Schempp CMet al Topical treatment of atopic dermatitis with St. John's Wort cream–A randomized, placebo-controlled, double-blind half-side comparison. *Phytomedicine*. 2003; 10(2-3): 31-37.
45. Schempp CM, & Müller K. St. John's Wort (*Hypericum perforatum*): The Herb with High Anti-inflammatory Potential. *Journal of Ethnopharmacology*. 2014; 152(1): 50-55.
46. Dawid-Pać R. Medicinal plants used in treatment of inflammatory skin diseases. Postepy Dermatol Alergol. 2013 Jun;30(3):170-7. doi: 10.5114/pdia.2013.35620. Epub 2013 Jun 20. PMID: 24278070; PMCID: PMC3834722.
47. Frost R, MacPherson H, O'Meara S. A critical scoping review of external uses of comfrey (Symphytum spp.). Complementary Therapies in Medicine. 2013; 21(6): 724-745.
48. Staiger C. Comfrey: a clinical overview. Phytother Res. 2012 Oct;26(10):1441-8. doi: 10.1002/ptr.4612.
49. Piazza S, Martinelli G, Magnavacca A, Fumagalli M, Pozzoli C, Terno M, Canilli L, Angarano M, Maranta N, Dell'Agli M, et al. Unveiling the Ability of Witch Hazel (*Hamamelis virginiana* L.) Bark Extract to Impair Keratinocyte Inflammatory Cascade Typical of Atopic Eczema. *International Journal of Molecular Sciences*. 2022; 23(16):9279.
50. Yu H, Li H, Li Y, Li M, Chen G. Effect of isoliquiritigenin for the treatment of atopic dermatitis-like skin lesions in mice. Arch Dermatol Res. 2017 Dec;309(10):805-813. doi: 10.1007/s00403-017-1787-3. Epub 2017 Oct 12. PMID: 29026975.
51. Yang R, Yuan BC, Ma YS, Zhou S, Liu Y. The anti-inflammatory activity of licorice, a widely used Chinese herb. Pharm Biol. 2017 Dec;55(1):5-18. doi: 10.1080/13880209.2016.1225775. Epub 2016 Sep 21. PMID: 27650551; PMCID: PMC7012004.
52. Oyama K, Kawada-Matsuo M, Oogai Y, Hayashi T, Nakamura N, Komatsuzawa H. Antibacterial Effects of Glycyrrhetinic Acid and Its Derivatives on Staphylococcus aureus. PLoS One. 2016 Nov 7;11(11):e0165831. doi: 10.1371/journal.pone.0165831. PMID: 27820854; PMCID: PMC5098735.
53. Mahmoudi M, Adib-Hajbaghery M, Mashaiekhi M. Comparing the effects of Bentonite & Calendula on the improvement of infantile diaper dermatitis: A randomized controlled trial. Indian J Med Res. 2015 Dec;142(6):742-6. doi: 10.4103/0971-5916.174567.
54. Silva Det al Anti-Inflammatory Activity of *Calendula officinalis* L. Flower Extract. *Cosmetics*. 2021; 8(2):31. https://doi.org/10.3390/cosmetics8020031
55. Wang W et alThe Mechanism Action of German Chamomile (*Matricariarecutita L.*) in the Treatment of Eczema: Based on Dose-Effect Weight Coefficient Network Pharmacology. Front Pharmacol. 2021 Sep 30;12:706836. doi: 10.3389/fphar.2021.706836.
56. McKay DL & Miller AL. A review of the bioactivity of chamomile. *Phytotherapy Research*. 2004; 18(7): 519-530.
57. Fazel MF, Abu IF, Mohamad MHN, Mat Daud NA, Hasan AN, Aboo Bakkar Z, Md Khir MAN, Juliana N, Das S, Mohd Razali MR, Zainal Baharin NH, Ismail AA. Physicochemistry, Nutritional, and Therapeutic Potential of *Ficus carica* - A Promising Nutraceutical. Drug Des Devel Ther. 2024 May 30;18:1947-1968. doi: 10.2147/DDDT.S436446. PMID: 38831870; PMCID: PMC11146627.
58. Abbasi S et al A new topical treatment of atopic dermatitis in pediatric patients based on Ficuscarica L. (Fig): A randomized, placebo-controlled clinical trial. Complement Ther Med. 2017 Dec;35:85-91. doi: 10.1016/j.ctim.2017.10.003.
59. Naseri V et. al Effect of topical marshmallow (Althaea officinalis) on atopic dermatitis in children: A pilot double-blind active-controlled clinical trial of an in-silico-analyzed phytomedicine. Phytother Res. 2021 Mar;35(3):1389-1398. doi: 10.1002/ptr.6899.
60. Park JH, Choi JY, Son DJ, Park EK, Song MJ, Hellström M, Hong JT. Anti-Inflammatory Effect of Titrated Extract of Centella asiatica in Phthalic Anhydride-Induced Allergic Dermatitis Animal Model. Int J Mol Sci. 2017 Mar

30;18(4):738. doi: 10.3390/ijms18040738. PMID: 28358324; PMCID: PMC5412323.
61. Visuvanathan T, Than LTL, Stanslas J, Chew SY, Vellasamy S. Revisiting *Trigonella foenum-graecum* L.: Pharmacology and Therapeutic Potentialities. Plants (Basel). 2022 May 29;11(11):1450. doi: 10.3390/plants11111450. PMID: 35684222; PMCID: PMC9182856.
62. Chan YS, Cheng LN, Wu JH, Chan E, Kwan YW, Lee SM, Leung GP, Yu PH, Chan SW. A review of the pharmacological effects of Arctium lappa (burdock). Inflammopharmacology. 2011 Oct;19(5):245-54. doi: 10.1007/s10787-010-0062-4. Epub 2010 Oct 28. PMID: 20981575.
63. Pérez-Rojas JM&Sánche SF. Burdock root (Arctium lappa): A review of its potential benefits in skin health. *International Journal of Molecular Sciences.* 2013; 14(10): 19314-19325.
64. Kumar R & Sharma A. Milk thistle: A review of its pharmacological properties and potential benefits for skin health. *Journal of Cosmetic Dermatology*. 2016; 15(4): 456-462.
65. Rabiu, Abdulaziz & Hasan, Md & Jahan, Md. (2018). Antimalarial, antioxidant, antimicrobial properties of Moringa Oliefera Lam: A review. Australian Journal of Crop Science. 12. 905-908. 10.21475/ajcs.18.12.06.PNE920.
66. Vitorović J, Joković N, Radulović N, Mihajilov-Krstev T, Cvetković VJ, Jovanović N, Mitrović T, Aleksić A, Stanković N, Bernstein N. Antioxidant Activity of Hemp (Cannabis sativa L.) Seed Oil in Drosophila melanogaster Larvae under Non-Stress and H2O2-Induced Oxidative Stress Conditions. Antioxidants (Basel). 2021 May 22;10(6):830.
67. Jana S & Sinha SK. Evaluation of antioxidant and antimicrobial activities of basil (*Ocimumbasilicum*) extracts. *International Journal of Pharmacy and Pharmaceutical Sciences. 2019; 11(2): 113-117.*
68. Carson CF, Hammer KA, Riley TV. Melaleuca alternifolia (Tea Tree) oil: a review of antimicrobial and other medicinal properties. Clin Microbiol Rev. 2006 Jan;19(1):50-62. doi: 10.1128/CMR.19.1.50-62.2006. PMID: 16418522; PMCID: PMC1360273.
69. Laura Vasilica Arsenie, Ioana Lacatusu, Ovidiu Oprea, Natalita Bordei, Mihaela Bacalum, Nicoleta Badea, Azelaic acid-willow bark extract-panthenol – Loaded lipid nanocarriers improve the hydration effect and antioxidant action of cosmetic formulations, Industrial Crops and Products, Volume 154, 2020, 112658.
70. Wang Yet al Salix alba (willow) extract enhances wound healing through modulation of inflammation and collagen deposition. *Journal of Ethnopharmacology.* 2017; 209: 117-127.
71. Watanabe H& Yamashita K. Effects of Salix alba extract on skin barrier function and inflammatory cytokines in vitro. *Journal of Dermatological Science*. 2016; 83(2): 156-158.
72. Salem ML. Immunomodulatory and therapeutic properties of Nigella sativa L. seed and its possible role in eczema management." Immunopharmacology and Immunotoxicology. 2005; 27(3): 569-575.
73. McKay DLm& Blumberg JB. A review of the bioactivity and potential health benefits of peppermint tea (Mentha piperita L.). Phytotherapy Research. 2006; 20(8): 619-633.
74. Hu C& Kitts DD. Dandelion (Taraxacum officinale) flower extract suppresses both reactive oxygen and nitrogen species and prevents lipid oxidation in vitro. *Phytomedicine*. 2005; 12(8): 588-597.