

## ATOPIC DERMATITIS: A REVIEW

Muhammad Amjad Chishti<sup>1</sup>, Halima Nazar<sup>2</sup>, Ejaz Mohiuddin<sup>1</sup>, Allah Nawaz<sup>3</sup>

**Abstract:** Atopic dermatitis (AD) is the frequent dermatological disorder in children. It's a chronic dermis inflammation that's typically non-contagious and has a greater recurrence rate. It appears as painful papules or vesicles that merge to develop excoriations or Lichenification. It commonly affects the back of the knees and the flexural sites of the elbows. Inherited predisposition, allergies, immunologic, and environmental variables have all been identified as causal causes. Clinically, it appears as heated, reddened, itchy skin. There are several tests used as diagnostic tools, but none of them is a dependable golden standardized test. The tests include serum IgE levels and a skin prick test, among other things. Treatment options include antihistamines, anti-inflammatory drugs, corticosteroids, and antibiotics.

**Keywords:** Atopic dermatitis, atopy, lichenification, serum IgE levels

### INTRODUCTION

Atopic dermatitis (AD) is one of the most common and chronic inflammatory condition of skin. This inflammatory disorder is associated with itchiness which usually begins in infancy and having signs of Lichenification, eczematous lesions and skin dryness (1, 2). The main finding is that itching and rubbing occur on a regular basis, aggravating inflammatory reactions (Figure 1&2) (3). The AD symptoms may vary but the hall mark in all the presentation is severe itch. The affected skin is red, hot having multiple lesions. The lesions may be crakes, swelling, crust over and simply a rash that worsened on itching and formed a good colonial space for secondary infections (4, 5). AD has a link with other IgE antibodies associated illnesses like food allergies, asthma and allergic inflammation of nose. Deep studies indicates that both structural skin abnormalities and dysregulation of immune system take part in the pathophysiology of this dermatological inflammation.

It is a specific form of eczema which frequently effect children about 10-20 % of the population and effects 1-3% adults of the population (6, 7). Although there is no

1. Department of Basic Clinical Sciences, Faculty of Eastern Medicine, Hamdard University, Karachi, Pakistan.

2. Department of Eastern Medicine, Jinnah University for Women, Karachi, Pakistan.

3. Graduate School of Medical & Pharmaceutical Sciences, University of Toyama, Toyama 930-0194, Japan.

**Corresponding Author Email:**

[Muhammadamjadchishti@gmail.com](mailto:Muhammadamjadchishti@gmail.com)

permanent treatment for Atopic dermatitis, it may be managed with medications described in detail by Schneider, L. et al., 2013 (3). Insufficient treatment, reappearance, itching might have unpleasant impact archived as with patients and families reporting the itch-scratch cycle and ultimately sleep problem to be the most troublesome part as well as psychological disturbances including presence of folds on flexor sites of body parts, sleep disturbances, pruritus worsens the mood, behavior, stress and various other problems in childhood. Effective and prompt treatment strategy can be helpful for permanent cure; however, few cases may evolve asthma, allergic rhinitis; this cascade of occurrence is then mentioned to as the 'atopic march'. The prevalence of AD has grown in numerous countries. It reduces the quality of life and also leads to depression (8, 9- 13).

### EPIDEMIOLOGY

Atopic Dermatitis (AD) is a very frequent skin ailment that is becoming more prevalent across the world. Atopic dermatitis affects approximately one-fifth of all people at several spot in their lives, however the disease's occurrence varies

widely throughout the globe (14). AD is quite widespread all across the world, especially in industrialized countries. It has been claimed that 10-20% of instances are seen in youngsters by different dermatologists, whereas 1-3 percent of adults are affected (15). Furthermore, 45 percent of cases in children were recorded between the ages of 1-6 months, 60 percent between the ages of one and five years, and 85 percent between the ages of one and five years. 70 percent of these people are likely to carry the virus throughout puberty (16). Furthermore, in children 45% cases reported in infancy 1-6 months, 60% cases up to year and 85% seen from 1-5 years age. Out of them 70% cases may carry this infection in adolescence (17). The significant era when this disease has worsened widely is 20<sup>th</sup> century. It is usually seen that it is common in those countries where environment is hot and there is less humidity. The correct epidemiological figures are difficult to investigate due to un-standardized applied measures (16). Recent epidemiological figures displayed a rise in AD case in industrialized nations (18, 19).

### **PATHOPHYSIOLOGY**

Atopic Dermatitis has a complex link of factors that contribute in its occurrence. It involves familial or genetic history, allergies, environmental situations, immunological factors. In case of atopic dermatitis, the pathological changes may produce due to the following factors; skin barrier dysfunction, immune dysregulation, decreased protection against infection, aeroallergen, scratching, food allergy and infections. The atopic dermatitis is the disorder that mainly results from dysfunction of skin barrier and other associated conditions. Mainly involved (approx. 90%) microorganism includes *Staphylococcus aureus*. When the natural immunity is affected then it is more prone to

contract bacterial and viral infection. The immunoglobulin E (IgE) released in response to inflammatory cascades that releases the T-cell in the skin as helper-2-[Th2] reaction and release of chemokines and pro-inflammatory cytokines i.e., interleukin [IL] -4, 5 and tumor necrosis factor which cause intense itching in the cell (20, 21).

### **CLINICAL MANIFESTATIONS**

AD affects children in different ways both in term of onset and manifestation of disease. In early age of the life from birth to 02 years of age it usually affects cheeks and chin as patchy pruritic rash later it extends to limbs at crawling stage. Similarly in childhood age from 02 -10 years it involves folds of the joints, flexor sites of upper and lower arms and in adolescence chronic lichenified eczema on the face, neck and trunk predominate. The classic symptoms of atopic dermatitis are: itching, redness, a grainy appearance to the skin, weeping, crusts, scaliness, pigmentation (Table 1) (22, 23).

### **DIAGNOSTIC APPROACHES**

There are no specific diagnostic approaches for the assessment of atopic dermatitis. Specific criteria based on the history of patient and clinical presentation should be taken into account for the diagnosis of this dermatological illness. Even though numerous diagnostic criteria have been set for the assessment of Atopy dermatitis but application of most of the criteria is time taking. Table drawn below discuss the diagnostic criteria given by William et al. Which is easy to use and for this invasive testing is also not required and also have high specificity and sensitivity for the assessment of Atopy dermatitis. Utilization of this criteria for the assessment of Atopy dermatitis requires itching on skin along with 3 or more minor criteria, which may vary with the age of patient (Table 2) (24-27). Sometimes it become very difficult

to differentiate atopic dermatitis from other inflammatory skin condition like psoriasis, seborrheic dermatitis and scabies etc. But having a family history of Atopic Dermatitis (AD) and lesions distribution assist in diagnosis this disease (Table 3) (28).

### TREATMENT

For the management of AD, the following approaches are to be taken management involves educating and instructing the patients and their relatives about AD, decreasing disease occurrence, reducing relapse, changing the whole infection course for good results (28)

A therapeutic strategy should be set by Physicians on the basis of their accessible treatment choices. It is necessary that doctor should be aware of parent's anxiety and any potential adverse effects of the treatment (29, 30).

### EDUCATION

For the proper management of disease, a proper education about the chronicity of the disease, about the proper skin care and proper use of topical application should be provided to the patient and his/her caregivers (28).

### SKIN CARE

Emollients and moisturizers are commonly used to alleviate the xerosis related with atopic dermatitis (31). In comparison to creams or liniments, ointments have an high concentration of lipids which are more helpful and effective in retaining moisture of the affected skin.

Ceramide-rich products have also been shown to be beneficial (32). The US Food and Drug Administration (FDA) have approved a few innovative products such as 510 (k), that treat itching, burning, and discomfort associated with atopic dermatitis.

The patient should apply fragrance-free and dye-free emollients or moisturizers twice a day to get optimal effects (33-36).

### TOPICAL CORTICOSTEROID

Topical corticosteroids are the first-line pharmacological treatment available for Atopic Dermatitis. These agents effectively control atopic lesions through their anti-inflammatory, anti-proliferative, and immunosuppressive actions. Topical corticosteroids are applied to the red, itchy or inflamed areas on the skin before the use of emollients. They inhibit the discharge of inflammatory cytokines (37). Topical corticosteroids are used to delicate skin parts like the face and neck. Local corticosteroids are regarded the first-line of treatment for atopic flares. The widespread use of local corticosteroids in general practice is supported by study data, which provided useful recommendations for corticosteroid treatment. Topical corticosteroids are very safe and considerably effective. Skin decay, striae, telangiectasia, hypopigmentation, rosacea, perioral dermatitis, skin break out, waterfalls, and glaucoma are all known side effects of topical corticosteroids.

### LOCAL CALCINEURIN INHIBITORS

Tacrolimus and pimecrolimus are FDA-approved substitutes to topical corticosteroids for the cure of AD in individuals with low immunity (37, 38). Proinflammatory cytokines were prohibited by TCIs (39, 40). Tacrolimus and pimecrolimus have been revealed to be safe as well as efficient in experimental trials (41,42). Pimecrolimus lowers the intensity of flares AD, according to clinical studies (43-46).

### WET WRAPS

Wet wraps moisturizes the skin by providing a more comfortable night's sleep. Based on currently available evidence, wet wraps with one time every day use of topical corticosteroids is an effective as well as safe intervention for kids to manage the AD (47,48). Wet wraps can cause maceration of the skin with other problems if they are worn inappropriately (49).

## SYSTEMIC TREATMENTS

Phototherapy, cyclosporine, azathioprine, and mycophenolate are examples of systemic immunomodulatory medications that have recently gained acceptance as treatments for AD that does not respond to topical treatments (50). Phototherapy, that was developed as a cure for Atopic Dermatitis based on the examination that several patients' symptoms get better in the late spring months when they are exposed to more regular light, has shown to be an effective technique. Similarly, UV radiation is linked to premature skin ageing along with cutaneous cancers. Although additional research in the pediatric population is needed, it appears that phototherapy is a cost-effective as well as secures treatment choice for certain children whose diseases do not respond to conventional medications (51). Cyclosporine can be utilized as a one-time therapy. The long-term therapy is limited by hypertension and renal risk (52).

Azathioprine is also used as a potent monotherapy. Platelet counts and hepatic tests should be closely observed (53,54). Mycophenolate mofetil, a purine amalgamation inhibitor, has a good safety profile and appears to be a viable treatment option for AD (55).

## OTHER THERAPIES

In adults UV Phytotherapy can be consider a beneficial way of treatment of atopic dermatitis. However the toxicity of its long term use is still undiscovered.

## CONCLUSION

Atopic dermatitis (AD) is a disease which has now emerged as challenge for the dermatologist because of its continuous increase in prevalence and failure of complete cure. This is a disease which has affected the quality of life very badly so prompt strategy should be adopted to control it and there is strong need to focus on development of new alternative treatment.

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Figure 1: Clinical picture of atopic dermatitis



Figure 2: Clinical picture of atopic dermatitis

Table 1: Age wise presentation of clinical features of Atopic dermatitis

<p><b>0 to 2 years of age</b> Outer surfaces of extremities Scalp Face Neck Trunk</p>	<p><b>Adulthood</b> Inner surfaces of extremities Hands Feet</p>
<p><b>2 years up to puberty</b> Inner surfaces of extremities Ankles Wrists Neck</p>	



**Table 2: Diagnostic criteria for Atopic dermatitis**

<p><b>Major diagnostic criteria</b>                  Patient must present with pruritic skin condition ( or report of rubbing and scratching in child)</p>
<p><b>Minor diagnostic criteria</b>  <b>Older adults</b>                  History of itchiness in folds of elbow, around the neck, behind the knees and front of ankle.                  History of rhinitis and asthma                  History of skin dryness                  Skin inflammation in the folds of elbow, knees and wrist etc.                  Onset under the age of two years</p> <hr/> <p><b>Children less than 4 years</b>                  History of itching on skin                  History of AD in first degree relative                  Eczema of forehead, cheeks and outer limb</p>

**Table 3: Differential diagnosis of Atopic Dermatitis**

<p><b>Other types of skin inflammation or dermatitis</b>  <b>Seborrheic dermatitis</b>                  Present with salmon-red scaly and greasy lesions                  Often affect the scalp and napkin areas                  Usually appear in the first six weeks of life                  Typically resolve on its own</p>
<p><b>Nummular dermatitis</b>                  Scaly patches of coin shape                  Mostly effects the legs and buttocks                  Usually not present with itching                  Common in children and adults</p>
<p><b>Allergic contact dermatitis</b>                  Eczematous rash appear on site of direct exposure which can might spread                  History of locally applied an irritant                  Might coexist with atopic dermatitis                  Common in children and adults</p>
<p><b>Congenital immunodeficiencies</b>                  Omenn syndrome                  Hyper-IgE syndrome                  Wiskott- Aldrich syndrome</p>
<p><b>Infectious diseases of skin</b>                  Scabies                  Impetigo</p>

Dermatophyte infection
<b>Keratinization diseases</b> Netherton syndrome Ichthyosis vulgaris
<b>Nutritional deficiency</b> Zn deficiency
<b>Neoplastic disorder</b> Cutaneous T- cells lymphoma