



Atopic dermatitis in Indian children: The influence of lower socioeconomic status

Rashmi Sarkar, MD*, Isha Narang, MD

Department of Dermatology, Maulana Azad Medical College, New Delhi, India

Abstract Atopic dermatitis (AD) is a chronic inflammatory condition afflicting children and adults. In developing countries like India, the scenario is slightly different from its western counterparts, where the disease has been commonly described. Despite running a milder course, AD still has a significant negative impact on the quality of life. Environmental factors have a great influence on pathogenesis. While the diagnosis has remained clinical, variations in minor clinical features have been observed worldwide. Many indigenous and herbal agents are used for its treatment in India, in addition to conventional therapies. Treatment modalities in India emphasize less costly therapies and family education. This contribution reviews the epidemiologic issues and therapeutic differences in the Indian population with AD, highlighting important nuances in the care of the Indian patient.

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Introduction

Atopic dermatitis (AD) is a chronic inflammatory condition that has interested pediatricians and dermatologist worldwide due to its rising prevalence and increasing morbidity.

Hospital based studies have indicated a variable incidence of AD in India ranging from 0.24%¹ (0–18 years) to 0.42%² (0–14 years) which is notably lower than that of the Western world. In the International Study of Asthma and Allergies in Childhood (ISAAC) Phase 3 prevalence of current eczema symptoms among the age group 6 to 7 years was lowest from India, that is 0.9% in Jodhpur compared with the highest 22.5% in Quito, Ecuador. Also, in age groups 13 to 14 years, lower prevalence rates (<5%) were found. Overall prevalence of AD in India was as low as 4.4% as opposed to a global total

of 14.2%.³ India has varied climatic conditions owing to its vast extent and topography, but largely it is tropical; hence, there is a wide variation in its prevalence. AD is commonly seen and described in the northern part of India and less frequently in the South (0.01%).⁴ Most of the northern and western parts have hot and dry weather, with wheat being the staple diet, while the southern areas are cooler and wet, with rice and seafood being commonly consumed. The relative variation can be attributed to this complex, poorly understood interplay between climate, dietary habits, and allergens.^{4, 5}

The initial epidemiologic studies (Table 1) on AD in India showed a lower incidence of AD with a later age of onset, possibly explained by the protective effect of breastfeeding, longer weaning, and introduction of solid foods later in the diet that exposes the child to food allergies at a relatively older age. Seasonal flares have been attributed to allergens from flowers, pollens, and farming activities.⁶ Recently, there has been an increased incidence of AD credited to urbanization, greater atmospheric pollution, agricultural chemicals, decline

* Corresponding author.

E-mail address: rashmisakar@gmail.com (R. Sarkar).

in breastfeeding and earlier weaning, and food additives. Also, there is an increased awareness of the disease in both the general public and among doctors. The smaller family unit enhances greater awareness of children which leads to increased detection of AD cases.^{2, 7} The better detection rate can also be attributed to the use of the Hanifin and Rajka Criteria,⁸ along with a growth of dermatology in the past few decades as a specialty in India.

Etiology

Among the various pathogenic factors, environmental factors have particular relevance in the pathogenesis of AD in India compared to hereditary and genetic factors. Most of the Indian studies demonstrate a low incidence of personal and family history of atopy.^{2, 7, 9} Although the role of heredity is strongly established, no studies have been undertaken in India to evaluate these factors in light of the recent development of genes implicated in barrier function (ie, filaggrin) and those involved in immune response.

Having a background that AD in India is milder, a comparison between the severity of AD in Indian children born and brought up in the UK and the United States and that of Indian children born and brought up in India showed significantly higher mean scores of severity in the former group which was 8.64 compared with 6.34 in the latter ($P < .005$).¹⁰ This highlights the importance of environmental factors, such as general measures like oiling practices, massage, hygiene, temperature, allergens, humidity, food habits, clothing, and psychological factors in AD.¹⁰ The tropical climate of India promotes a higher degree of colonization with *Staphylococcus aureus* on lesional and nonlesional skin, where the bacteria were isolated from 92.4% of patients and methicillin-resistant *S. aureus* (MRSA) from 30 (25.2%) patients.¹¹ A higher Eczema Area and Severity index (EASI) score was associated with patients with MRSA.¹¹

Allergic diseases are less common in areas with a high helminthic parasite exposure and more common where helminth exposure is lacking or significantly reduced.¹² India is endemic to parasitic infections, explaining the low allergy risk. The improvement in socioeconomic status and hygiene has reduced the exposure to parasites which may be a plausible explanation for increased burden of AD in India; called the *hygiene hypothesis*.

The warm climate of India provides access to innumerable allergens, few of which have a role in AD and other allergic conditions. The skin prick test (SPT) positivity was 77.8%, with 66.7% positivity toward aeroallergens and 11.1% toward both aeroallergens and food. The most common aeroallergen group to which positivity was seen was dust. Agriculture is the main occupation in India. Wheat and cotton dust are more common aeroallergens.¹³ Serum immunoglobulin E levels, when noted, are positive mainly against apple and hazelnut. Specific antibodies to inhalants are noted more frequently in the older age groups. The Enzyme Allergosorbent Test

(EAST) positivity for the presence of specific antibodies to various inhalants is most common for grass pollens and dust mites.¹⁴ Parthenium appears to be an important aeroallergen in India, aggravating AD along with the dust mite.¹⁵

Even in a resource-rich setting like India, patch and prick tests are not commonly performed. These tests are limited to research centers and are not routinely performed due to high cost. There are very few pediatric allergists (allergologist) or dedicated allergy clinics who are equipped to delineate these allergens. The experience of most of the dermatologists in performing and analyzing these tests is lacking. These tests are valuable in AD patients who are not responding to conventional treatment.

Diagnosis and clinical features

A detailed history and a characteristic clinical picture will aid in establishing the diagnosis of AD. Both Western and Indian studies have shown variation in specificity and sensitivity in the minor clinical features proposed by Hanifin and Rajka.^{16, 17} A statistical advantage for the Hanifin and Rajka Criteria over the UK Working Party's Diagnostic Criteria has been found in Indian patients from the North.¹⁸

Indian studies demonstrate variability in significance of minor clinical features like palmoplantar hyperlinearity (Figure 1), keratosis pilaris, and Dennie-Morgan folds. Diffuse scaling of the scalp is present even after the hair-oiling practices that are so common in India; pityriasis alba (Figure 2) is considered nonspecific as is neck fold and nipple dermatitis or cheilitis. The variation in consistency of minor clinical features is due to age group specificity of individual features (Table 2).^{1, 17, 19} In Indian AD patients, infantile AD has an acute presentation, while childhood AD is chronic in its course.²



Fig. 1 Palmar hyperlinearity.



Fig. 2 Pityriasis alba.

The frequency of facial involvement (Figures 3 and 4) in AD was evident in only 20% of the 100 patients in western India. This is in contrast to much higher values in northern India, where there are prolonged and more severe winters. Other atypical features observed in this population include follicular dermatitis, generalized darkening of the skin, infraauricular fissures, retroauricular fissures, eyelid dermatitis (Figures 4 and 5), genital dermatitis, dermatitis on the posterior aspect of the thigh, and juvenile plantar dermatosis.

Infantile AD (Figure 3) usually begins in India at age 4 months or younger and is more acute in onset, typically affecting the face and scalp initially. Cradle cap has been observed as a commonly associated skin condition in a large Indian series of infantile AD.⁵ Childhood AD begins around 4 years of age, is chronic, and is overall of mild to moderate severity in India. The extensor involvement persists in childhood and is probably attributed to low severity in the population.²

Adult AD (onset >18 years)²⁰ is currently being studied in India. Of the adult patients referred to a contact dermatitis clinic over a period of 1 year, 18% fulfilled the Hanifin and Rajka Criteria for AD. The dermatoses seen included hand dermatitis (52.8%), prurigo-like lesions (30.5%), photosensitive dermatitis (22.2%), nipple dermatitis (22.2%), nummular dermatitis (16.7%), lichenoid dermatitis (11.1%), psoriasiform dermatitis (5.6%), erythroderma (5.6%), eyelid dermatitis (25%), and periorificial dermatitis (13.8%). Clinical features in subjects greater than 65 years old were similar, except that flexural lichenification was uncommon and erythroderma was commonly seen. In India, airborne contact dermatitis or parthenium dermatitis is often indistinguishable from adult AD due to involvement of the face, neck, and flexures of the arms and

legs. Patch testing may be helpful in excluding the diagnosis of airborne contact dermatitis.²¹

Atopic dermatitis and the eye

The eye is less often involved in Indian atopic patients. In a study of 100 patients, only 43% of the patients had ocular involvement which was more common in men. Most of the Indian studies show involvement limited to only the eyelid with conjunctivitis; and none of the Indian studies showed keratoconus, Hertoghe sign, or anterior subcapsular cataract, which may be related to less severe disease. Many of these studies have included younger cohorts who do not necessarily develop complications like cataract at this early stage.²²

Atopic dermatitis and growth

Growth patterns were found to be lower in Indian patients with AD, especially severe AD. Mean values for height and head circumferences were found to be significantly lower in girls probably due to more severe disease in boys. The height was most compromised, with an existing tendency for catch up growth.²³ In India, preferential care and treatment is given to boys in contrast to girls, and this could contribute to the difference in growth in addition to the severity of the disease. Also, various physiologic, psychologic, environmental, socioeconomic and cultural factors, which influence growth attainment, are unfavorable for girls.

Severity grading

Because there is no gold standard measure of severity, the perception of severity will always vary between physicians and patients. In a study using Rajka and Langeland grading, 41.3%, 50%, and 3.7% had mild, moderate, and severe forms of AD, respectively, with mean severity scores of 3.5, 5.7, and 8.3. Patients with moderate AD had a positive personal history of atopy and a prolonged course. Overall, this study showed milder disease in Indian children from northern India.²⁴ Milder disease in the Indian scenario has also been attributed to breastfeeding, vegetarian diets, and the *hygiene hypothesis*.

Differential diagnosis

AD should always be differentiated from two entities: Scabies and seborrheic dermatitis, neither of which is mutually exclusive. In Indian patients, improper hygiene, low socioeconomic status, and overcrowding may lead to a higher prevalence of scabies (Figure 6). Further complications include poor nutrition, a high prevalence of infectious diseases, and immunodeficiency states like HIV/AIDS.

Table 1 Epidemiologic parameters studied in various Indian studies

Study	Sample size	Burden, %	Boy: Girl	Age of onset	Mean duration	Social class, %	Seasonal aggravation, %	H/O Atopy			Other	Severity	Type,%	Clinical features, %
								Personal history, %	Family history, %	Both, %				
Sinha PK, 1972 ³	166 [Inf: -40]	I: -0.38	Inf: 2:1	Distribution, % 0-3 m :12.5 3-6 m: 17.5 6-9 m: 20 9-12 m: 35 1-2 y : 15	0-6 m: 55% 6 m-1 y: 30% >12 m: 15%	Poor: 57.5 Middle: 35 Rich: 7.5	Autumn & Spring: 7.5 Winter: 2.5		66.6 BA: 73.3 AD: 20 AR: 3.3				Cheeks: 80% Forehead: 7.5% Scalp: 5% Ears: 1% Extensor legs: 2.5% Extensor forearms: 2.5%	
Dhar & Kanwar, 1998 ⁴	672 [Inf: -210(31.25%) Ch: 462(68.75%)]	I: 0.42 Among pediatric dermatoses: 28.46	Inf: 2.13:1 Ch: 1.09:1	Mean Inf: 4.2 m Ch: 4.1 y Distribution, % 0-3 m: 4.6 3-6m 34.5 6-9 m : 26.9 9-12 m: 19.9 1-3 y: 9.4 3-6 y: 2.5 6-9 y-1.6 9-12 y-1	Inf: 3.3 m Ch: 1.9 y	Rural: Inf: 35.7 Ch: 32 Urban: Inf: 64.29 Ch: 68	Winter: Inf: 67.14 Ch: 58 Summer: Inf: 23.36 Ch: 32.9 Spring: Inf: 9.5 Ch: 7.4	Atopy Inf: 0.09 Ch: 15.37	Atopy Inf: 36.19 Ch: 36.37	Atopy Ch: 7.36	H/o Drug allergy: Inf: 0 Ch: 3.16	Inf AD: Ac:52.12 SA: 23.35 Chr: 23.35 Follicular: 0.46 Ch: Ac: 28.79 SA: 23.38 Chr: 47.4 Follicular: 0.43	Inf: Face: 79 Flexors: 42 Extensors: 52.31 Flexors & extensors: 5.7 Ch: Face: 74.5 Flexors: 35.53 Extensors: 56.32 Flexors & extensors: 8.24 Juvenile plantar dermatoses: 6.28 Hand Eczema: 13.64 Cradle cap(Inf): 95.24	
Dhar, Mandal, Ghosh, 2003 ⁶	100	Prevalence: 0.55	1.3:1	Mean 4.58 y Distribution, % 0-3 m : 17 3-6 m : 8 6-12 m: 5 1-2 y: 23 2-3 y: 20 3 y: 27			Winter: 15 Summer: 40 Rainy: 12 None: 33	54 BA: 33 AR: 21	65 AD: 40 AR: 18 BA: 7		SCORAD Mi: 54 Mod: 27 Sev: 19	Ac: 42 SA: 41 Chr: 17	Face: 20 Flexors: 39 Extensors: 38 Both: 3	

Sarkar & Kanwar, 2004 ⁵	125 [Inf: 26(20.8%) Ch: 99(79.2%)]	Among pediatric dermatoses: 29.9	Inf: 2.25:1 Ch: 1.6:1	Mean Inf: 4.5 m Ch: 4 y	Inf: 3 m Ch: 6 y	Rural: Inf: 23.1 Ch: 31.31 Urban: Inf: 76.9 Ch: 68.68 Socioeconomic High: Inf: 30.7 Ch: 19.19 Middle: Inf: 53.8 Ch: 57.57 Low Inf: 15.5 Ch: 23.23	Winter: 62 Summer: 17	Atopy Inf: 42.3 Ch: 35.35	Atopy Ch: 7.07	Atopy Ch: 2.02	BF: <6 m: 11.54 >6 m: 88.46 W: <6 m: 15.38 6 m-1 y: 30.77 >1 y: 53.84	Inf: Mi: 30.8 Mod: 57.7 Sev: 11.5 Ch Mi: 44.44 Mod: 56.57 Sev: 3.03	Inf: Ac: 65.4 SA: 7.7 Chr: 26.9 Ch AD: Ac: 27.3 SA: 28.3 Chr: 44.4	Inf: Face: 80.8 Flexors: 15.4 Extensors: 26.9 Ch: Face: 66.7 Flexors: 45.4 Extensors: 37.4 Cradle cap in Inf: 92.3
Kumar MK, Singh PK, Patel PK, 2014 ⁷	132 [Inf: 29(21.97%) Ch: 103(78.03%)]	<i>P</i> : 7.21	Overall: 1.3:1 Inf: 1.4:1 Ch: 1.157:1	Mean Inf: 5.2 m Ch: 3.47 y		Inf Rural: 65.5 Urban: 34.5 Ch Rural: 61.1 Urban: 38.9 Socioeconomic High: 25.8 Middle: 46.2 Low: 28		Atopy 43.18	Atopy 33.34	Atopy 12.1		Overall: Mi: 42.4 Mod: 44.7 Sev: 12.9 Inf Mi: 27.6 Mod: 48.3 Sev: 24.1		Face: 76.8
Sehgal V, Srivastava G, Aggarwal A et al, 2015 ⁸	100	<i>P</i> : 0.98 <i>I</i> : 0.24	1.8:1	3.63 y	1.46 y	Rural: 30 Urban: 70		BA: 37 AR: 42	AD: 14 BA: 43			SASSAD: Mean 38.46		Face: 25 Flexors: 45 Extensors: 30

Abbreviations: Inf, infants; Ch, children; I, incidence; *P*, prevalence; m, months; y, years; Mi, mild; Mod, moderate; Sev, severe; BF, breastfeed; W, weaning; BA, bronchial asthma; AD, atopic dermatitis; AR, allergic rhinitis; SCORAD, Scoring Atopic Dermatitis; SASSAD, Six Area, Six Sign Atopic Dermatitis; Ac, acute; SA, subacute; Ch, chronic. Reproduced with permission from © Jaypee Brothers Medical Publishers (P) Ltd.⁴¹

Table 2 Evaluation of minor clinical features in various Indian studies

Study	Kanwar AJ, Dhar S, Kaur S, 1991 ²¹			Nagaraja, Kanwar AJ, Dhar S, Singh S, 1996 ¹⁵			Sehgal V, Srivastava G, Aggarwal A et al, 2015 ⁸
	50 cases, %	50 controls, %	Significance	100 cases, %	100 controls, %	Significance	100 cases, %
Xerosis	80	20	**	76	14	**	
Ichthyosis/palmar hyperlinearity/ keratosis pilaris	-/54/46	-/20/12	-/*/**	4/23/33	1/4/11	NS/**/**	50
Early age at onset	74	26	**	73	-	-	
Tendency toward cutaneous infections	62	26	**	36	4	**	
Tendency toward nonspecific hand or foot dermatitis	42	18	**	12	0	**	
Nipple eczema	8	0	NS	1	0	NS	20
Chelitis	6	0	NS	3	0	NS	58
Recurrent conjunctivitis	4	2	NS	14	0	**	25
Dennie-Morgan infraorbital folds	82	54	**	63	27	**	
Keratoconus	-	-	-	0	0	NS	
Anterior subcapsular cataracts	-	-	-	0	0	NS	
Orbital darkening	32	8	**	12	2	*	58
Facial pallor/facial erythema	14	0	*	26	6	**	
<i>P. alba</i>	78	56	**	34	28	NS	20
Anterior neck folds	12	2	NS	6	1	NS	
Itch when sweating	66	12	**	35	16	**	
Intolerance to wool or lipid solvents	28	6	**	41	9	**	
Perifollicular accentuation	22	10	NS	39	21	*	
Food intolerance	-	-	-	0	0	NS	72
Course influenced by environmental/emotional factors	26	6	*	S15 W29	-	-	
White dermographism/delayed blanch	12	2	NS	40/64	4/7	**/**	
Infraauricular fissuring	14	0	**	8	0	*	
Diffuse scaling of the scalp	32	8	**	50	11	**	
Hertoghe sign	-	-	-	0	0	NS	

Abbreviations: NS, not significant; S, summer; W, winter. * $P < .05$; ** $P < .01$; - this parameter was not included in the study. Reproduced with permission from © Jaypee Brothers Medical Publishers (P) Ltd.⁴¹



Fig. 3 AD in infants.

Impact

Children with AD in an Indian study had an increased number of psychologic disorders, despite the disease being milder than its western counterparts. More mothers of children with AD were submissive and overprotective which could contribute to a more dependent self-image and maintenance of the



Fig. 4 Eyelid dermatitis and edema with facial involvement.



Fig. 5 Eyelid dermatitis in AD with molluscum contagiosum.

dermatitis in the children of these mothers. Overall, the mothers appeared well-adjusted socially possibly due to a stronger family system and social support, and a less severe form of disease. This indicates that the psychologic dimensions of AD should be taken into account as a part of routine management.²⁵ Psychologic disturbances are higher in girls, possibly due to a greater concern for physical appearance and the associated social stigma.²⁶

In developing countries like India, where mental disorders are considered taboo, psychiatry consults for disorders like AD and associated depression, anxiety etc, are seldom requested not only due to lack of awareness among patients but also the treating physicians. In an era when expensive biologics are being explored for AD, basic counseling and psychiatric consultation can be very beneficial in improving quality of life of patients with AD.

AD causes a considerable drain on finances. In India, in contrast to the West, the treatment is mostly self-funded and generally the insurance policies do not cover outpatient expenses. In addition, health insurance coverage for dermatologic diseases is practically nonexistent. For example, the cost of care amounted to approximately \$93 (Rs 6235) for 6 months and the annual cost is approximately \$179 to \$194 (Rs 12,000-13,000) by extrapolation which is comparable to that of chronic physical illnesses like diabetes mellitus and schizophrenia in India. This cost is even higher in severely ill patients. This study also brings out the fact that monthly income of an average Indian is approximately \$60 (Rs 4000); and the cost of treatment may therefore drain 25% of the total earnings; hence, AD can cause a grave financial burden on patients from developing countries.²⁷



Fig. 6 Scabies in children.

Management

An indispensable aspect in the management of AD is to spend adequate time with the parents explaining the nature of the disease and treatment expectations. The physician should explain and educate the parents about the application of topical preparations, the avoidance of exacerbating factors, and how to care for sensitive skin, including bathing and applying emollients.

In India, like other developing countries, there is a lack of awareness regarding AD among parents. The relapsing-remitting course of the disease and its chronicity has to be explained to the parents. A significant problem in India is that most of the patients do not have access to health services due to various infrastructural problems. When they do come in contact with the primary health care system, the doctors at that level are not experienced enough to diagnose and treat AD. Most of the patients who do seek treatment for this disease come in contact with pediatricians and rarely with a dermatologist. The situation makes the parents and patients vulnerable to misdiagnosis and may even lead to enhanced side effects due to prolonged usage of topical steroids.

In India, bleach baths and Condyl baths (potassium permanganate) are easily available options for reducing crusting and eliminating bacterial superinfection. Other popular additives are oatmeal and sage baths. For oozing, saline compresses and compresses with potassium permanganate, silver nitrate, or hydrogen peroxide are used, being useful to reduce both colonization of *Staphylococcus aureus* and to further antibiotic use. Emollients are the cornerstone of any AD therapy, but in India this also depends on the season. Moisturizing is aggressive in winters but in summers and rainy seasons, it is seldom required.

Vegetable oils like safflower and sunflower oil are frequently used in traditionally practiced oil massages in India which offer many advantages like improving the skin barrier function, thermoregulation, and a positive effect on growth. Natural oils are thought to be antiinflammatory, antimicrobial, safe, and with a lesser chance of allergic reactions than synthetic oils. The caregivers have to be properly instructed to avoid too vigorous a massage that may lead to physical injury and infection.²⁸ Mustard oil is commonly used, despite the possibility of increased pruritus, burning, and pain due to release of substance P in patients with AD.²⁹ Also, there are chances of contact hypersensitivity to some oils especially mustard and almond oil,³⁰ which are better avoided in patients with a history of allergy.

A study to determine the effect of olive oil and sunflower seed oil on the biophysical properties of the skin found that a topical application of olive oil caused a significant reduction in the stratum corneum integrity and induced mild erythema in volunteers with and without a history of AD. In addition, sunflower seed oil preserved the stratum corneum integrity, did not cause erythema, and improved hydration in the same volunteers. In contrast to sunflower seed oil, topical treatment with olive oil significantly damaged the skin barrier and therefore had the potential to promote the development of exacerbated existing AD.³¹

A study undertaken in India compared coconut oil versus mineral oil and placebo (powder) on growth. The coconut oil massage resulted in greater weight gain than mineral oil and powder. Those receiving coconut oil massages showed more length gain velocity than the powder group.³² The proposed benefits to the newborn are twofold, those related to the oil application (improved skin barrier function, thermoregulation) and those related to tactile kinesthetic stimulation due to the

massage, all having a positive effect on growth. This might explain why traditional routine practices of oil massage with coconut and vegetable oils cause less frequency and severity of AD. A changing trend toward the loss of such practices due to urbanization, working mothers, and the diminishing large-family system may be the reason for increased cases of AD in India.

Primrose oil has been assessed for effectiveness and 96% of patients showed improvement.³³ Other essential oils, like lavender and tea tree oil, honey, and aloe vera have also been advocated. One study has even shown equal efficacy for topical human breast milk compared with hydrocortisone 1% ointment.³⁴

Honey has also been popular in India as a natural medicinal remedy for various purposes. It has pharmacological activities, including antiinflammatory, antioxidant, wound healing, antibacterial, antiviral, and antifungal properties. It has been used to treat gastrointestinal diseases, cardiovascular diseases, superficial skin burns, and postsurgical wounds. Topical application of honey has also been effectively used for the treatment of inflammatory skin diseases including psoriasis and AD.³⁵ Clinical evaluation of AD patients indicated that kanuka honey has moderate effectiveness. Topical application of medical-grade kanuka honey was found equally effective as aqueous cream in the management of AD.³⁶ The therapeutic effectiveness of honey has also been demonstrated when used in combination with beeswax and olive oil in adult patients with AD.³⁷

An Indian study advising strict adherence to a diet excluding milk and milk products, nuts and nut products, egg and egg products, shellfish, prawns, brinjal and soybeans for a period of 3 weeks was performed, and a significant reduction in severity scores was found.³³ It is debatable whether dietary restriction should be advised in India keeping in mind that many children are already nutritionally deficient. Inhalation or contact with parthenium, house dust mites, cockroaches, and other insects can trigger or aggravate AD. Improvement can be observed with allergen avoidance and elimination strategies.^{13, 14}

Treatment measures

Topical corticosteroids are a first-line treatment. While an ointment may be the most effective preparation, in hot and humid weather, cream formulations are more useful in avoiding folliculitis. The efficacy, safety, and tolerability of tacrolimus ointment have been evaluated in Indian patients having moderate to severe AD. A statistically significant decrease in the modified Eczema Area Sensitivity Index (EASI) was found along with complete resolution to very good improvement in most of the patients.³⁸ Even though calcineurin inhibitors are more specific than topical corticosteroids and their side effects are less, topical steroids still remain the preferred treatment due to less cost and availability of a cream formulation.

Steroid-antibiotic combinations are less popular. An antibiotic that is not available systemically, such as framycetin sulfate (inexpensive and widely available in India) and mupirocin,

are preferred. One study³⁹ showed that 2 weeks of treatment with a combination of fluticasone and mupirocin led to a significant improvement in 90% of patients and suggested that such a combination is an effective, safe and practical therapeutic regimen in AD. Unfortunately, these combination regimens increase the overall cost making dermatologists hesitant to use them. Resistance to properly administered topical therapy is rare, as the disease is usually not severe. Systemic treatment should be limited to severe cases.

Phototherapy is a second-line treatment and is limited by the availability of the equipment and the inconvenience of traveling to the clinic. While phototherapy is available free of cost in select government institutions, it remains expensive in the private sector. Recent reports have shown that vitamin D plays a role in the pathogenesis of AD through its immunomodulatory properties. There is no dearth of sunshine in a tropical country such as India and the beneficial effect of supplementation is manifold in the overall nutritional status of children in developing countries.

Systemic corticosteroids are rapidly effective for severe acute exacerbations and are used only for a few weeks. If anti-inflammatory therapy is to be prolonged, alternative therapy such as azathioprine or phototherapy should be considered. Methotrexate is the most time-tested immunosuppressive drug in India, as, it is inexpensive, easily available, and safe. It is recognized for its use in the treatment of psoriasis in children although there are no studies regarding its use in AD.⁴⁰ As the disease runs a milder course and is more treatment responsive, there's limited experience with cyclosporine, mycophenolate mofetil and the biological response modifier drugs.

Complete immunization is important in Indian patients where infectious diseases, malnutrition, and overcrowding are major issues. Motivating parents to be in constant touch with the physician is necessary. Time should be given to answer their questions. All measures should be directed to help patients with AD and their parents to lead a normal and healthy life.

Conclusions

AD is on the rise in India with the mild to moderate type of AD being the most common. Environmental factors have been more commonly implicated and studied in the etiopathogenesis of AD. Due to resource-poor settings, there has been more stress on indigenous emollient practices and the use of topical steroids. Parental counseling regarding the disease, adequate immunization, and nutrition play an important contributory role in the overall management of AD.

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