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Clinico - Pathological Spectrum of Atopic Dermatitis

[1]Dr. Thejasvi Krishnamurthy, [2]Dr. Sayantani Sarkar

[1]Associate Professor, Department of Pathology, Kempegowda Institute of Medical Science and Rajiv Gandhi University, Bangalore, Karnataka, India

[2]Postgraduate, Department of Pathology, Kempegowda Institute of Medical Science and Rajiv Gandhi University, Bangalore, Karnataka India

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Corresponding Author: Dr. Sayantani Sarkar, Postgraduate, Department of Pathology, Kempegowda Institute of Medical Science and Rajiv Gandhi University, Bangalore, Karnataka, India.

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ABSTRACT

Context

Atopic dermatitis (AD) is a common inflammatory skin disease. Prevalence of AD is estimated to be 15-30% in children and 2-10% in adults characterized by variety of clinical presentation ranging from itching ,erythematous to lichenoid reaction pattern. Histological findings of these usually overlap.

Aims

To study the histological spectrum of skin biopsies in Atopic Dermatitis.

To Correlate the clinical presentation with histological findings.

Settings and Design: Retrospective study, observational study

Methods and Material

This is a retrospective analysis of clinicopathologic spectrum of Atopic Dermatitis conducted in the Department of Pathology in a tertiary care centre from January 2020 to June 2021. All the slides stained with haematoxylin and eosin were reviewed and analysed. Relevant history and clinical details were collected from the dermatology records and documented in the proforma. The patients were divided into seven categories based on their predominant clinical presentation and corresponding histopathological findings was recorded.

Statistical Analysis Used

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY:

IBM Corp. used to perform statistical analyses. Descriptive analysis was done using frequency and proportions for categorical variables, whereas in Mean & SD for continuous variables.

Chi Square test was used to correlate the clinical findings with histopathological findings among atopic dermatitis patients.

The level of significance was set at $p<0.05$.

Results

This study consists of 65 cases. Male to female ratio was (1:1.2). The majority patients with AD were between 11-20years with the mean age of 33.5yrs. Most common site involved was extremities, forearm (34,52.3%) and elbow (14,21.5%) followed by Head (7,10.7%) and neck (2,3.07%). The patients were divided into 7 categories which were based on the predominant clinical presentation including Erythema, Itching, Pigmentation, Excoriation, Scaling, H/O atopy and Lichenification. The predominant histopathological finding was evaluated.

Conclusion

Studying and correlating individual clinical features with the predominant histopathologic finding contributed to reduction of ambiguity to some extent and minimize the use of non-specific blanket terminologies.

Keywords

Atopic dermatitis, histopathology, ambiguity

INTRODUCTION

Atopic dermatitis (AD) is known to be chronic or frequently relapsing/remitting hypersensitive manifestation of the skin which presents with itching as one of the most predominant feature.[1] AD is associated with a wide range of other associated features that are seen in a proportion of patients which includes asthma, allergic rhinoconjuctivitis and atopic eczema.[1,5] The Prevalence of AD is estimated to be 15-20% in children and 1-3% in adults worldwide.[2]Though there are numerous studies present in literature there is no general agreement regarding the primary site (epidermis/dermis) or predominant histological feature of the disease.[3]Correlation of clinical presentation with a specific histological finding may reduce ambiguity. It has been observed recently that there is gradual and extensive increase in the prevalence of AD which can be attributed to environmental changes consequent to rapid development worldwide. The upward trend is also true in Indian context.[1] The basic concept in pathogenesis of AD is that the patients have an elevated Th2 response reflected by an increased frequency of allergen specific T-cells producing interleukin 4, 5, and 13 while a preferential apoptosis of Th1 cells, at least in the acute stages.[4]Gender ratio has varied greatly between different studies on AD and majority has reported a male predominance.[4]

This study was done to study the histological spectrum of skin biopsies in cases of atopic dermatitis and to correlate the clinical presentation with the histological findings.

MATERIALS AND METHODS

This study was conducted in Kempegowda Institute of medical sciences, Bengaluru during a period of 18months from January 2020 to June 2021.It was a retrospective study with a total of 65 cases who were clinically diagnosed as Atopic Dermatitis. Relevant history and clinical data were documented from case files and requisition forms. Paraffin blocks of embedded skin biopsies received in the department of pathology (Jan 2020 to June 2021) were retrieved and fresh sections of 3mm thickness using a rotatory microtome were taken and stained with hematoxylin

and eosin. These slides were examined under light microscope and the histopathological observations and diagnosis were correlated with clinical features. This data was analysed.

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp. used to perform statistical analyses. Descriptive analysis was done using frequency and proportions for categorical variables, whereas in Mean & SD for continuous variables.

The patients were divided into seven categories based on their predominant clinical presentation including Erythema, Itching, Pigmentation, Excoriation, Scaling, H/O atopy and Lichenification. and corresponding histopathological findings was recorded.

RESULTS

A total of 65 cases were included in this study the most common age group was 11-20years(mean age 33.5yrs)

Table-1: Distribution of age among study patients

Age distribution among study patients			
Variable	Category	N	%
Age	≤10 yrs.	10	15.2%
	11-20 yrs.	14	21.2%
	21-30 yrs.	8	12.1%
	31-40 yrs.	11	16.7%
	41-50 yrs.	10	15.2%
	51-60 yrs.	3	4.5%
	61-70 yrs.	3	4.5%
	> 70 yrs.	7	10.6%
		Mean	SD
	Mean	33.5	22.4
	SD	04 – 85	

The study had female preponderance and comprised of 35 Females and 30 males.

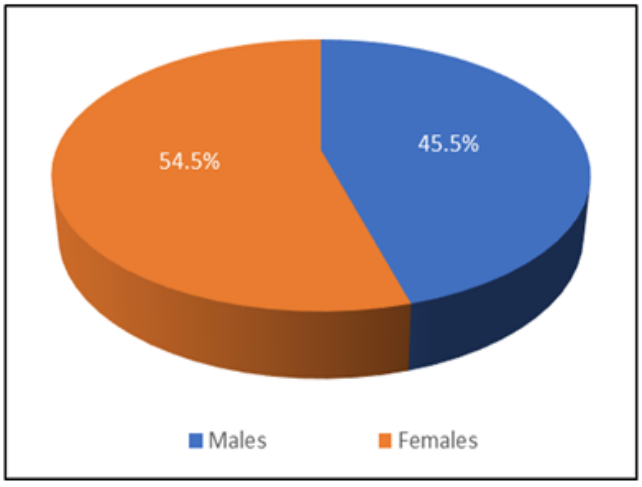

Fig 1: The Gender wise distribution of patients with Atopic Dermatitis.

Out of 65 patients a majority of them had lesions in the foream i.e 34 patients,14 had lesions in elbow followed by 7 in neck,2 in face and 8 in the knees. The skin biopsies from representative area was taken.

Site of lesion/Biopsy site	Number of patients(N=65)
Forearm	34
Elbow	14
Neck	7
Face	2
Knees	8

Table 2: Distribution of Lesion amongst the patients

The patients were divided into **seven categories** based on their predominant clinical presentation and corresponding histopathological findings was recorded.

CATEGORY	CLINICAL PRESENTATION	CHIEF HISTOPATHOLOGICAL FINDING	p value
CATEGORY 1	Erythema	Perivascular inflammation rich in Lymphocyte	0.04
CATEGORY 2	Itching	Inflammation rich in eosinophil	0.008
CATEGORY 3	Pigmentation	Pigment incontinence	<0.001
CATEGORY 4	Excoriation	Parakeratosis and plasma trapping	0.008
CATEGORY 5	Scaling	Parakeratosis	0.04
CATEGORY 6	H/O atopy	Inflammation rich in eosinophil.	<0.001
CATEGORY 7	Lichenification	Basal cell Vacuolar degeneration	<0.001

Table3: 7 categories of clinical presentation with the predominant histological findings.

CATEGORY 1: included patients with chief clinical feature of **ERYTHEMA** on histology Perivascular inflammation rich in Lymphocyte was the predominant feature seen. Erythema is redness of the skin caused by injury or inflammation causing condition.

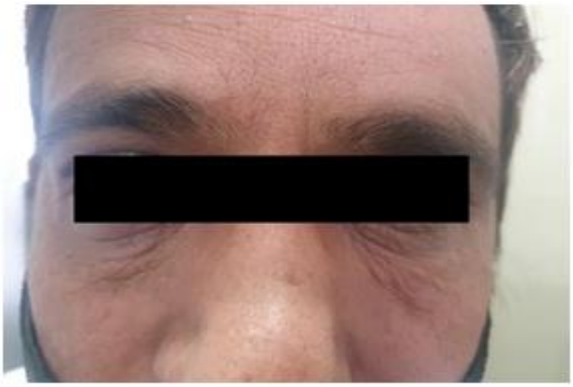

Fig 2: Category 1 patient with chief complains of Erythema

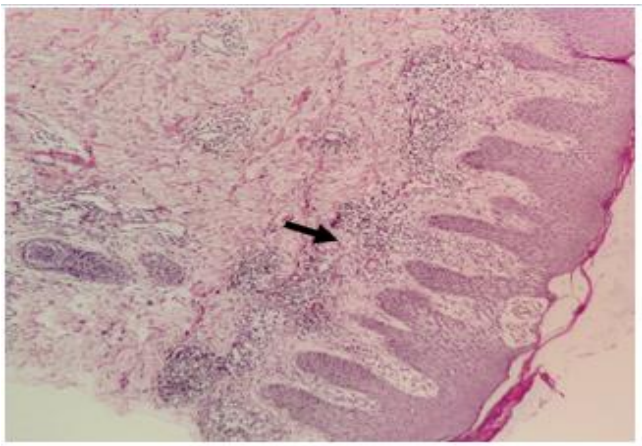

Fig 3 : Category 1,Histopathology showing Perivascular inflammation rich in Lymphocyte.

CATEGORY 2: included patients with chief clinical feature of **itching** which on histology showed inflammation rich in eosinophil in the papillary dermis.

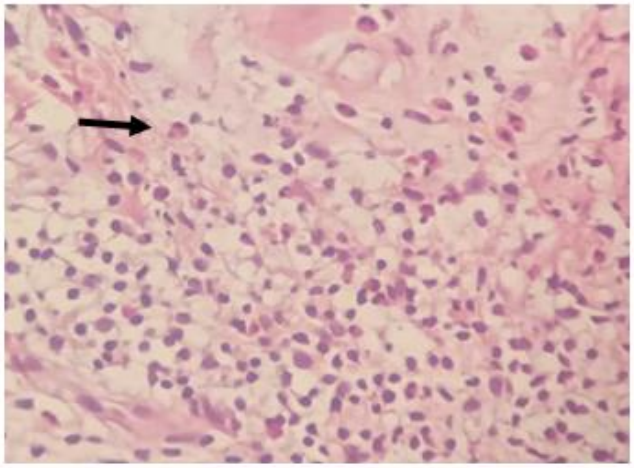

Fig 3: Category 2: Patient with itching showing histopathological features of inflammation rich in eosinophils.

CATEGORY 3: included patients with chief clinical feature of **pigmentation,** on histology the majority patients had melanin pigment incontinence

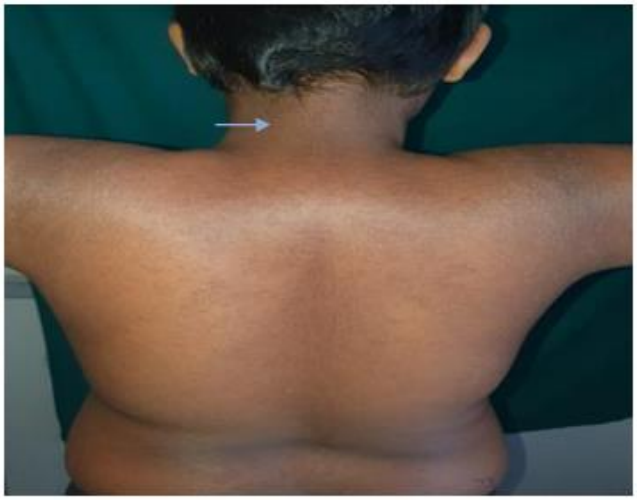

Fig 4 : Category 3:Patient presenting with pigmentation around the neck with dirty neck sign.

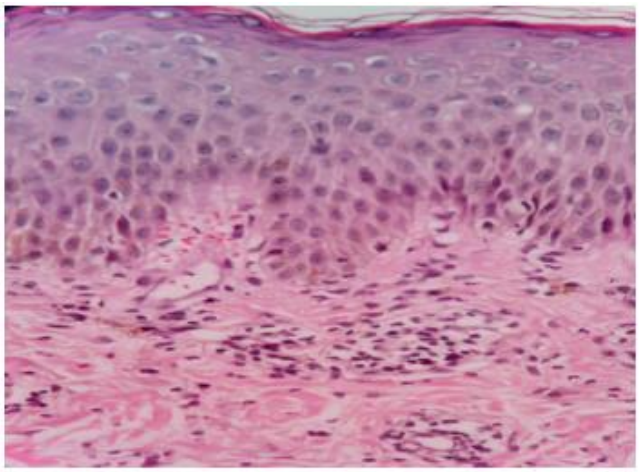

Fig 5: Category 3 :Patients with pigmentation shows increased Melanin pigment incontinence on histology

CATEGORY 4: included patients with chief clinical feature of **excoriation** ,on histology parakeratosis and plasma trapping in the Epidermis was the predominant histological feature.

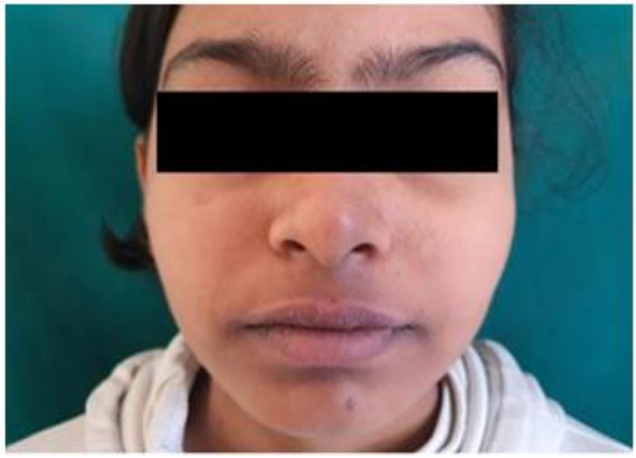

Fig 6: Category 4- Patient presenting with excoriation. Perioral dermatitis noted.

Excoriation is repetitive compulsive picking and scratching of the skin.

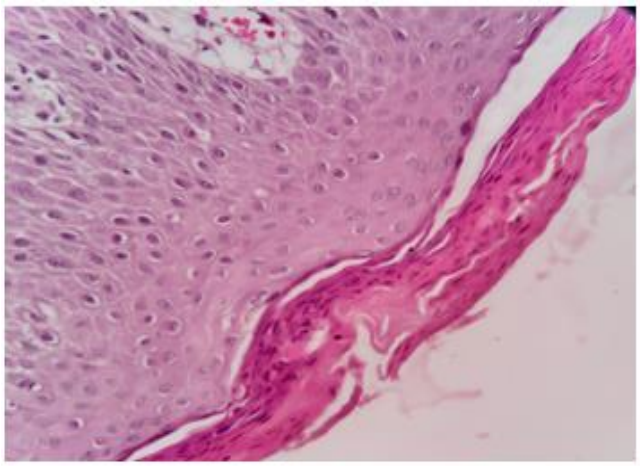

Fig 7: Category 4: Histopathological features of Parakeratosis and Plasma trapping noted.

Category 5: included patients with chief clinical feature of scaling,on histology parakeratosis was noted

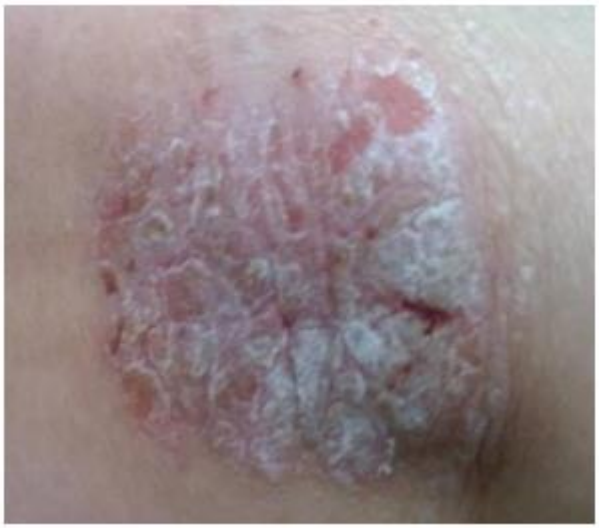

Fig 8: Category 5: Patients presenting with Scaling

Scaling is the loss of the outer layer of the epidermis in large scale like flakes

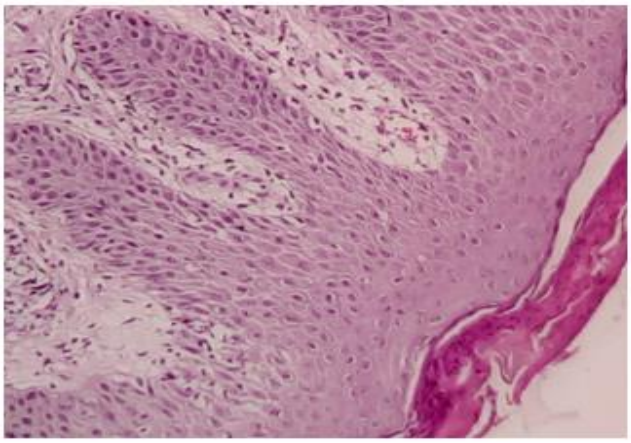

Fig 9: Patients with scaling showed parakeratosis in stratum corneum

Category 6: Included patients with **history of Atopy** histology was suggestive of inflammation rich in Eosinophils.

Category 7: Patients with chief c/o of **Lichenification**, on histology basal cell vacuolar damage was seen.

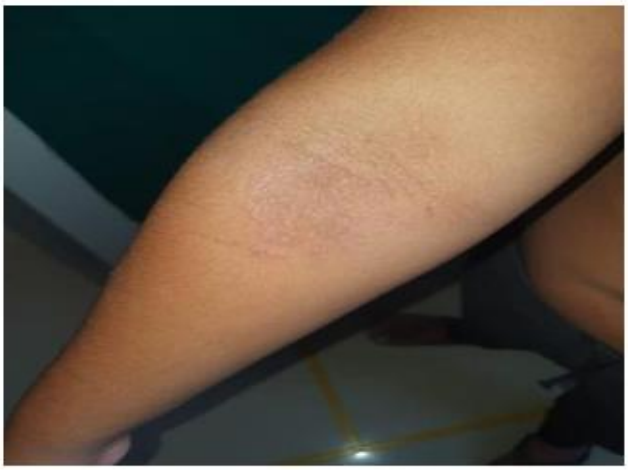

Fig10: Category 7 - Patients with chief clinical feature of Lichenification.

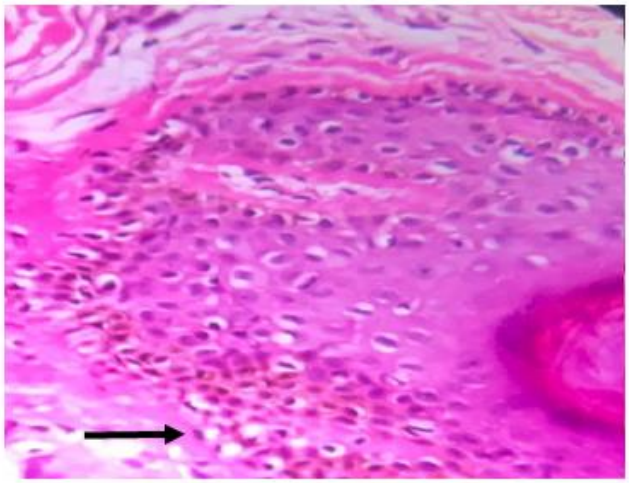

Fig 11: Category 7: The histology basal cell vacuolar damage was seen.

Lichenification is a secondary skin lesion wherein the characteristic features of skin thickening, hyperpigmentation and exaggerated skin lines are noted.

DISCUSSION

Atopic dermatitis is an eczematous disease of characteristic distribution usually associated with family history. Diagnosis of AD relies primarily on the patient's and family's history as well as on clinical findings.[1,12] As far as histological features are concerned few usual observations made, like; parakeratosis, plasma trapping within the stratum corneum, spongiosis and with or without extensive acanthosis. The above histological features are not always pathognomonic of atopic dermatitis as pointed out by Sulzberger.[6] In the present study, an attempt has been made to correlate the predominant clinical presentation with a specific histological feature.

On literature review, lot of debate has been found, Pros and sedlis concluded that there is no single, specific histological entity that can be correlated with atopy.[7] Solomon pointed out that itching is the predominant clinical presentation in atopy and the lesion is an erythematous papule[8] and histologically these coincide with the predominant epidermal changes like acanthosis and spongiosis with some showing lymphocytic exocytosis and dermal perivascular lymphocytic infiltrate very much similar to our category 1 of erythematous lesions.[8] Schmitt et al in their study have tried to analyse various scoring systems for atopic dermatitis based on clinical signs, like Eczema area and severity Index (EASI) and Scoring atopic dermatitis Index(SCORAD) [9] but due to the prevalent non-specific findings on histology a correlation between the clinical and a specific histological finding has been a challenge. The present study has tried to divide the lesions into seven categories based on the predominant clinical feature and an attempt has been made to correlate the specific histologic finding. Out of which maximum correlation was obtained in three categories, these were, pigment incontinence correlating with hyperpigmented lesions, history of atopy correlating with increased dermal eosinophils and basal cell vacuolar degeneration correlating with features of lichenification. All these features reflected a significant p value, thorough literature search revealed hardly any such attempts. Instead, there are studies which have tried to correlate the disease progression from an erythematous papule,

which is the earliest lesion to the lichenified stage secondary to chronic itching[10] and histological correlation is found to be correlating similar to the present study.

The other features like erythema, excoriation and scaling were found to have some correlation with perivascular dermal lymphocytic inflammation, plasma trapping and parakeratosis respectively.

Schmitt et al have pointed out that there are various histological features which do have a direct correlation clinically, but the stress that it is basically the evolution of the disease from an acute to chronic phase.[11]

The diagnosis of AD is based on variable combination of signs and symptoms. There is no laboratory "gold standard" for the diagnosis of AD. SCORAD, eczema area and severity index and SASS AD are the three scales that have been most widely employed and tested. Some inter-observer variation has been demonstrated with all three indices and is likely to be a problem with all scoring systems involving visual assessment by physicians. Each has advantages and disadvantages, making it difficult to recommend one index as superior, although the SCORAD index has been most widely used in trials.[13]

CONCLUSION

Correlation of specific histopathological finding with the corresponding clinical presentation is necessary to reduce ambiguity. However overlapping histological features still continue to pose a challenge. In the current study we have attempted to categorize the spectrum of AD based on clinical presentations and specific histopathological findings

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