International Journal of Current Research in Medical Sciences
ISSN: 2454-5716
P-ISJN: A4372-3064, E -ISJN: A4372-3061
www.ijcrims.com

Original Research Article

Volume 4, Issue 1 -2018

DOI: http://dx.doi.org/10.22192/ijcrms.2018.04.01.014

A role of a hematological profile in assessing the severity of Atopic dermatitis

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Abstract

Background:
Atopic dermatitis (AD) is a chronic relapsing eczematous skin disease characterized by pruritus and inflammation. A thorough analysis of relevant object tools like differential leucocyte count can help substantially in assessing AD severity.

Objective:
This cross-sectionalcase-control study analyzed the correlation between the percentage of eosinophils in differential leucocyte count and severity of AD.

Material and Methods:
For this study, forty patients with clinical diagnosis of AD based on U.K diagnostic criteria were enrolled. A detailed history and salient presentations were recorded in prestructured proforma. Scoring AD (SCORAD) index was used to evaluate the severity of the disease. Laboratory tests included the differential leucocyte count along with other hematological parameters. All other causes of raised eosinophilia were excluded.

Results:
In our study, out of 40 patients with atopic dermatitis, 7(17.5%) had elevated eosinophil percentage (>4%) in differential leucocyte count. Out of these 7 patients, 5 were suffering from the severe AD and 2 patients were suffering from themoderate AD. The post-hoc test was conducted for inter-level comparisons where the p-value of comparison between, level 1&3 and level 2&3, was 0.001(highly significant).

Conclusion:
This study identifies that routine laboratory investigations like differential leucocyte count can serve as an indicator of the severity of atopic dermatitis.

Keywords: hematological profile,differential leucocyte count,atopic dermatitis.

Introduction

Atopic Dermatitis (AD) is a chronic relapsing inflammatory skin disease with specific immune and inflammatory mechanisms characterized by pruritus and accompanied by cutaneous physiological dysfunction.[1]The main immunological abnormalities include theexcessive formation of IgE, predisposition to anaphylactic sensitivity, some decrease in susceptibility to delayed hypersensitivity, abnormalities in expression of surface molecules in antigen presenting cells, and dysregulation of cytokine mediators.[2]The presence of eosinophils in the inflammatory infiltrate of theAD has long been established. In most of the AD patients, eosinophil numbers, as well as eosinophil granule protein levels in peripheral blood, are elevated. These observations are suggestive of a role of eosinophils in the pathogenesis of AD.[3]Eosinophilsconstitute up to 5% of WBC %.[4]SCORAD is a tool to calculate the severity of AD.[5]Our aim was to evaluate the correlation between the severity of AD and the percentage of eosinophils in differential leucocyte count.

Materials and Methods

It was a cross-sectional case-control study conducted in the Department of Dermatology, Govt. Medical College Amritsar after taking approval from the ethical committee.80 patients of either sex between age group 2 to 18 years attending the outpatient department of skin and STD were enrolled. Forty patients of the AD were taken according to the UK refinement of the Hanifin and Rajka diagnostic criteria for atopic dermatitis.

Detailed history, comprising age, sex, occupation, residence, the total duration of disease, associated itching, seasonal variation, asthma, allergic rhinitis, atopy and family history of the AD was recorded in a pre-set proforma. General physical and complete dermatological examination was carried out in every case.

Assessment of severity was carried out by SCORAD score, in which area of distribution of disease is assessed as per rule of nine, intensity of signs like redness, swelling, oozing/crusting, scratch marks, lichenification, and dryness is assessed as none, mild, moderate and severe subjective symptoms like itch and sleeplessness are measured on scale of 0-10 where 0 is no itch or sleeplessness and 10 is the worst itch or sleeplessness and score is determined using formula A/5 + 7B/2 + C. The SCORAD criteria is divided into 3 categories mild, moderate and severe.

The differential leucocyte count was obtained in each patient.

Statistical analysis

The findings thus obtained were analyzed to study the correlation between severity of AD and percentage of eosinophils in DLC. Categorical variables were presented as absolute numbers and percentages. The observations were tabulated in the form of mean ± standard deviation (SD), ANOVA test and POST HOC test for intra-group comparison. The level of significance was determined as its ‘p’ value with $p>0.05$ as insignificant, $p<0.05$ as significant<0.001 as highly significant.

Results

Out of 40 patients with Atopic Dermatitis, 29 patients had a history of allergic disorders. Of these, 27(67.5%) patients gave a history of Allergic Rhinitis. In the patients with a history of allergic rhinitis, 5(55.6%) were suffering from a mild disease (level 1 severity),17(68.0%)from moderate(level 2 severity) disease and 5(83.3%) from severe disease(level 3 severity).Only 2(8.0%) patients gave a history of allergic rhinitis as well as bronchial Asthma and were suffering from the moderate AD. This data was statistically non-significant.

In our study, out of 40 patients with atopic dermatitis, 7(17.5%) had elevated eosinophil percentage (>4%) in differential leucocyte count. Out of these 7 patients, 5(suffering from Atopic Rhinitis) were found to be suffering from severe atopic dermatitis, 2(suffering from both atopic rhinitis and bronchial asthma) from moderate

disease but none from the mild disease. Statistically, this value was highly significant (p value=.001).

Table 1: Number of AD patients with normal and elevated eosinophil percentage among different severity levels

Severity	Normal eosinophil %	Elevated eosinophil % (>4%)	Total
Level 1	9(100.0%)	0(.0%)	9(100.0%)
Level 2	23(92.0%)	2(8.0%)	25(100.0%)
Level 3	1(16.7%)	5(83.3%)	6(100.0%)
Total	33(82.5%)	7(17.5%)	40(100.0%)

The comparison of the mean percentage of neutrophils, eosinophils, and lymphocytes in differential leucocyte count among cases was made. The mean percentage of eosinophil was 4.26±2.490 in cases. This data was found to be statistically highly significant (p-value is 0.001).The data for the neutrophils and lymphocytes were not significant.

Table 2: Comparison of mean percentage of neutrophils, eosinophil,and lymphocytes in cases.

Variable	Cases Mean±SD	't' value	p-value
Neutrophils	62.90±9.06	0.182	0.856^{NS}
Eosinophils	4.26±2.490	3.68	0.001*
Lymphocytes	32.93±8.908	1.901	0.061^{NS}

The mean percentage of eosinophils in patients with mild atopic dermatitis was 4.25±1.16, in moderate disease was 3.29±2.10 and in severe disease was 8.40±0.54. This value was statistically highly significant as the p-value was 0.001.The post-hoc test was conducted for inter-level comparisons where the p-value of comparison in case of eosinophils between level 1 and 2 was more than 0.005, therefore non-significant but the p-value of comparison between, level 1&3 and level 2&3, was 0.001(highly significant).

Table 3: Comparison of mean percentage of neutrophils, eosinophils, and lymphocytes among different severity levels of cases.

For comparison of mean among different severity levels of cases:

Variable	Level 1 (n=9)	Level 2 (n=25)	Level 3 (n=6)	P value	Level 1 vs. 2 P value	Level 1 vs. 3 P value	Level 2 vs. 3 P value
Eosinophils	4.25 ± 1.16	3.29 ± 2.10	8.40 ± 0.54	0.001*	0.406^{NS}	0.001*	0.001*

NS: p > 0.05; insignificant; *p<0.05; Significant; **p<0.001; highly significant

Discussion

The AD is an inflammatory skin disease with early onset, with a lifetime prevalence of approximately 20%.Interactions between susceptibility genes, the host's environment, and immunologic factors have been proposed to play a role in the pathogenesis of AD.[6] The disorder results in significant morbidity and adversely affects quality of life as the intense itching characteristic of the disease often leads to significant sleep disturbances The patients are affected by the social stigma of a visible skin condition.[7]Statistics have shown a rising trend in the occurrence of AD in India in last four decades. It is seen both in the rural and urban areas of India and across all socioeconomic and geographic strata.[8, 9] Most of the data related to the AD is available from hospital-based studies.[10] Differentiating AD from other forms of eczema is the first step in receiving a proper diagnosis. The presence of at least three major and three minor symptoms is necessary for an accurate diagnosis of AD.[11]Our study is also a hospital-basedcross-sectionalcase-control study, and to the best of our knowledge, a first of its kind in northwestern region of India, conducted with a purpose of evaluating the association between eosinophilia and severity of AD. The elevated blood eosinophil counts in the atopic dermatitis patient is a well-known feature. The diagnostic importance of this finding, however, was earlier unclear but research has clearly demonstrated that eosinophils, as a result of their functional capacities and the release of highly toxic proteins, are active proinflammatory cells causing various symptoms of allergic inflammation.[12]Chronic AD skin lesions have significantly fewer IL-4 and IL-13 mRNA expressing cells, but, greater numbers of IL-5, Granulocyte-Macrophage Colony-Stimulating Factor (GM-CSF) IL-12 and INF-γ mRNA expressing cells than acute AD. IL-5 and GM-CSF probably contribute to the increased numbers of eosinophils and macrophages.[13]We have also seen that 5 patients of the severe AD and 2 patients of the moderate AD with raised eosinophilic count are also suffering from Atopic Rhinitis and both Atopic Rhinitis and Bronchial Asthma respectively. In a study conducted on eastern Indian children, Mani Kant Kumar et al identified that both absolute eosinophil count and total serum IgE increased significantly in about 66% patient and directly correlated with the severity of the AD.[14]

Conclusion

This study identifies that the routine laboratory investigationslike differential leucocyte count can serve as an indicator of the severity of atopic dermatitis.

Source of funding: Nil

Conflict of interest: None declared

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Quick Response Code	Subject: Medical Sciences

How to cite this article:
Oshin Agrawal, BB Mahajan, Saurabh Sharma, Deepak Rana, N.S. Neki. (2018). A role of a hematological profile in assessing the severity of Atopic dermatitis. Int. J. Curr. Res. Med. Sci. 4(1): 111-115.
DOI: http://dx.doi.org/10.22192/ijcrms.2018.04.01.014