






Two stories beneath the skin: Differential diagnosis of scabies and atopic dermatitis in a pediatric allergy clinic

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ABSTRACT

Objective: This study aimed to enhance the differential diagnosis of scabies and atopic dermatitis in pediatric patients by integrating hematologic and epidemiological parameters alongside clinical symptoms.

Material and Methods: A retrospective review was conducted on 376 pediatric patients (188 with scabies, 188 with atopic dermatitis) who presented with itching and/or rash between December 2023 and December 2024. Age, sex, presenting complaints, complete blood count parameters (neutrophils, lymphocytes, eosinophils, platelets, total leukocytes), and total serum IgE levels were analyzed and compared between groups.

Results: Neutrophil counts, eosinophil percentages, and total IgE levels were significantly higher in the scabies group ($p<0.05$), while lymphocyte and platelet counts were higher in the atopic dermatitis group ($p<0.05$). Children with scabies presented at an older age (6.93 ± 4.60 vs. 5.37 ± 4.03 years) and were more likely to be male ($p<0.05$). “Itching alone” was the most common complaint in scabies, whereas “rash” and “skin thickening” were more frequent in atopic dermatitis. A positive family history was significantly more common in the scabies group ($p<0.01$).

Conclusion: By highlighting distinct distributions of total IgE and basic hematologic markers, this study offers clinically relevant insight into differentiating scabies from atopic dermatitis in children. Demographic variables such as age, sex, and symptom patterns further support diagnostic decision-making in pediatric allergy and primary care settings.

Keywords: Atopic dermatitis, child, differential diagnosis, pruritus, scabies, skin diseases.

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INTRODUCTION

Scabies is a highly contagious, pruritic, parasitic skin infestation caused by the mite *Sarcoptes scabiei* var. *hominis*. Although it can affect all age groups, it is more common in children.^[1] It typically spreads among densely populated communities or households with low socioeconomic and educational levels.^[2] Four classic clinical features include nocturnal pruritus, prevalence in overcrowded settings, burrow formation in the skin, and the presence of the parasite.^[3] In a study conducted in a boarding school in Indonesia, the prevalence of scabies was reported to be 24.6%.^[4] It is a widespread condition that causes considerable morbidity in certain regions.^[5] Transmission occurs primarily through close physical contact.^[6] Although it can affect anyone, morbidity is higher among immunosuppressed individuals and populations living in crowded and unhygienic environments.^[7] In recent years, the incidence has shown an increasing trend globally.^[8] The scabies mite burrows into the epidermis and causes intense pruritus and irritation due to allergic reactions against mite-secreted proteins and fecal material.^[9]

The differential diagnosis of scabies in pediatric dermatology is broad, making clinical diagnosis challenging. Although dermoscopy and microscopy can assist dermatologists, in routine practice, diagnosis is often based on clinical evaluation alone, which increases the risk of misdiagnosis.^[1,10] Treatment of scabies can be topical or oral, with topical agents being the first-line approach. Among these, permethrin is the most effective, while sulfur-based ointments and benzyl benzoate are also used.^[11–13] In cases of inadequate response to topical therapy, oral ivermectin may be administered.^[14]

Since scabies infestation presents with itching and eczematous lesions, it may clinically resemble allergic skin conditions such as atopic dermatitis, potentially leading to diagnostic delays. Recently, there has been a growing trend of pediatricians referring scabies cases to allergy clinics under a misdiagnosis of allergic diseases, particularly atopic dermatitis (AD). This increases the risk of incorrect treatment and negatively impacts patient quality of life. Our study aims to contribute to the differential diagnosis of scabies and atopic dermatitis in pediatric populations.

MATERIAL AND METHODS

This retrospective, cross-sectional study was conducted at *Umraniye Training and Research Hospital*. Medical records of pediatric patients aged 0 to 18 years who presented to the pediatric allergy outpatient clinic with complaints of itching and/or rash between December 2023 and December 2024 were reviewed via the hospital information management system (HIMS). Patients diagnosed with scabies (ICD-10 code: B89) or atopic dermatitis (ICD-10 codes: L20.8, L20.9) were included. An equal number of patients (n=188) were selected from each diagnostic group, yielding a total sample of 376 cases. Patients with alternative dermatological conditions (e.g., urticaria, mastocytosis, viral exanthems, drug reactions, insect bites) and those with incomplete data were excluded. Collected variables included demographic characteristics (age, sex), age at symptom onset, family history, presenting complaints, and laboratory data including complete blood count parameters (white blood cell, neutrophil, lymphocyte, eosinophil, monocyte, platelet counts) and serum total immunoglobulin E (IgE) levels.

Statistical Analysis

All statistical procedures were conducted using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). The normality of distribution for continuous variables was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Parameters—including total IgE, eosinophil percentage, and white blood cell count—exhibited substantial deviations from normal distribution. Given the non-normal distribution, continuous variables were compared using the Mann–Whitney U test, and results were reported as medians with interquartile ranges (IQR). Categorical variables such as sex and family history were analyzed using Pearson’s chi-square or Fisher’s exact test, as appropriate.

Ethical Considerations

The study was approved by the Ethics Committee of *Umraniye Training and Research Hospital*. All procedures were carried out in accordance with the ethical principles of the Declaration of Helsinki. As the study was retrospective in nature, informed consent was not required. Patient data were anonymized and handled in strict confidentiality, and no personally identifiable information was collected or reported.

RESULTS

The study sample consisted of 188 children diagnosed with scabies and 188 children diagnosed with atopic dermatitis. Among those diagnosed with scabies, 36.2% were female (n=68) and 63.8% were male (n=120); in the atopic dermatitis group, 47.8% were female (n=90) and 52.2% were male (n=98). Descriptive statistics of hematological parameters and total IgE levels in the study population are summarized in Table 1. When

Table 1: Descriptive statistics of hematological parameters and total IgE in the study population

Variable	n	Min	Max	Mean	Std. deviation
WBC	369	1,064	151,500	9,442.36	7,933.07
Neutrophil	369	772	12,020	3,764.68	2,019.34
Basophil	369	10	160	41.06	21.57
Eosinophil	369	10	2,870	455.80	423.67
Eosinophil percentage	369	0.0	36.8	4.82	4.23
Lymphocyte	369	520	15,410	4,265.15	2,056.51
Monocyte	369	40	1,570	607.78	227.85
Platelet	369	35,300	773,000	348,939.3	96,317.59
Total IgE	361	0.0	21,694	357.80	1,408.85

Descriptive statistics including mean, standard deviation, skewness, and kurtosis are presented for each hematological parameter and total IgE. WBC: White blood cell; IgE: Immunoglobulin E; Std. Deviation: Standard deviation.

Table 2: Comparison of laboratory parameters in individuals diagnosed with scabies and atopic dermatitis

Variable	Scabies median	Scabies IQR	Atopic dermatitis median	Atopic dermatitis IQR	Mann-Whitney U	Z	p (2-tailed)
WBC	8600	4140	8490	3115	16553.500	-0.450	0.653
Neutrophil	3380	2320	3005	2640	13875.500	-3.064	0.002
Basophil	40	20	40	20	16438.000	-0.571	0.568
Eosinophil	360	400	310	390	15932.000	-1.056	0.291
Eosinophil percentage	4.5	4.3	3.3	4.0	14350.000	-2.601	0.009
Lymphocyte	3520	2150	4135	2495	13821.000	-3.117	0.002
Monocyte	570	300	560	300	16635.000	-0.370	0.711
Platelet	332000	104000	346000	128500	14955.500	-2.010	0.044
Total IgE	131.0	259.5	41.0	173.0	11244.500	-5.090	0.000

Comparison of hematological parameters between scabies and atopic dermatitis groups using Mann–Whitney U test. Median and interquartile range (IQR) values are reported due to non-normal data distribution. IQR: Interquartile range; WBC: White blood cell; IgE: Immunoglobulin E; Z: Z-score; p: Two-tailed significance value.

Table 3: Analysis of gender distribution in scabies and atopic dermatitis groups

Diagnosis	Female	Male	Total (n)	Female	Male
	(n)	(n)		(n)	(n)
Scabies	68	120	188	36.2%	63.8%
Atopic dermatitis	90	98	188	47.9%	52.1%
Total	158	218	376	42.0%	58.0%

Comparison of gender distribution between the two diagnostic groups. Percentages are calculated within each group. n: Number of individuals; %: Percentage.

comparing laboratory parameters between individuals diagnosed with scabies and those with atopic dermatitis, statistically significant differences were found in neutrophil count, eosinophil percentage, lymphocyte count, platelet count, and total IgE levels ($p < 0.05$). The scabies group had higher median values for neutrophils, eosinophil percentage, and total IgE, whereas the atopic dermatitis group had higher lymphocyte and platelet counts. Notably, the significant difference in total IgE levels ($p = 0.000$) indicates markedly lower IgE concentrations in the atopic dermatitis group. No statistically significant differences were observed between the groups in terms of WBC, basophil, eosinophil, or monocyte levels ($p > 0.05$) (Table 2). The mean age of individuals diagnosed with scabies was 6.93 ± 4.60 years, while it was 5.37 ± 4.03 years in those with atopic dermatitis. This difference was statistically significant ($p = 0.001$). Similarly, the mean age at presentation was 5.91 ± 4.60 years in the scabies group and 4.37 ± 4.03 years in the atopic dermatitis group, also showing a statistically significant difference ($p = 0.001$) (Fig. 1).

Table 4: Distribution and effect of family history in diagnostic groups

Diagnosis	No family history	Positive family history	Total	p (Chi-square)
Scabies	176 (93.6%)	12 (6.4%)	188	0.006
Atopic dermatitis	186 (98.9%)	2 (1.1%)	188	

Chi-square test results comparing the presence of a positive family history between patients diagnosed with scabies and those with atopic dermatitis. n: Number; p: Chi-square test significance value.

Gender distribution significantly differed between the diagnostic groups ($p < 0.05$). Scabies was more commonly diagnosed in males (Table 3). A positive family history of scabies was significantly more frequent among those diagnosed with scabies (Table 4). The relationship between diagnosis and presenting complaints showed a statistically significant difference ($\chi^2 = 230.750$, $df = 11$, $p < 0.001$). The most frequent presenting complaints in the scabies group were itching alone (29.3%) and itching + rash (37.8%), whereas in the atopic dermatitis group, the most common complaints were rash alone (44.7%), skin elevation (13.8%), and rash + elevation (12.8%) (Fig. 2).

DISCUSSION

The study sample comprised 188 children diagnosed with scabies and 188 children diagnosed with atopic dermatitis. The comparative evaluation of the scabies and atopic dermatitis groups, each consisting of 188 pediatric patients, provides a statistically robust and balanced sample structure. The data obtained not only enable the

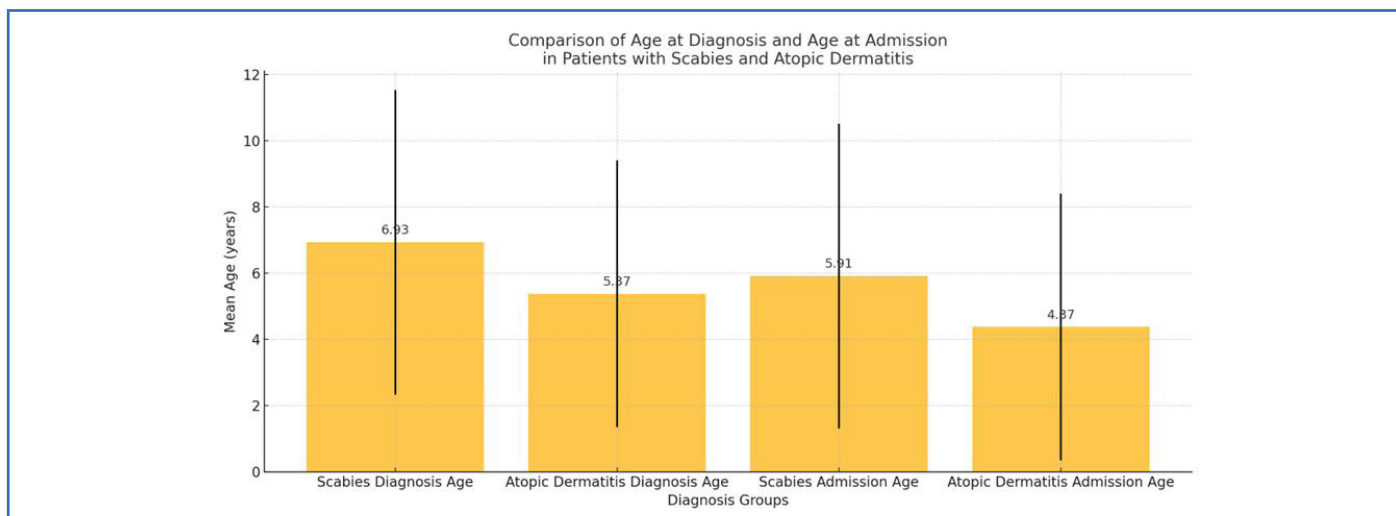


Figure 1: Box plot comparison of age distribution and age at presentation for scabies and atopic dermatitis patients.

Mean ages at diagnosis and admission of patients diagnosed with scabies and atopic dermatitis. Patients with scabies have significantly higher mean ages for both diagnosis and admission compared to with atopic dermatitis (p=0.001).

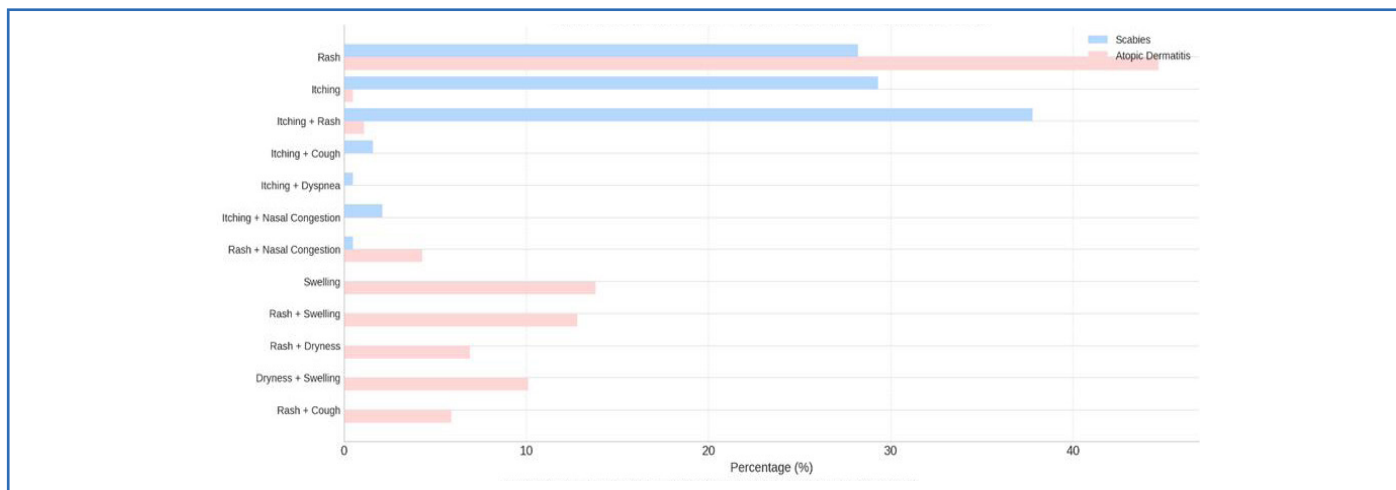


Figure 2: Distribution of presenting complaints (itching, rash, thickening, etc.) in children diagnosed with scabies vs. atopic dermatitis.

Distribution of presenting complaints in children diagnosed with scabies and atopic dermatitis. Itching (29.3%) and the combination of itching with rash (37.8%) were most common in the scabies group. Symptoms such as dryness and nasal congestion were only observed in patients with atopic dermatitis. This difference was statistically significant ($\chi^2=230.750$, $df=11$, $p<0.001$).

distinction between the clinical features of these two diseases but also increase the reliability of the results due to the adequate sample size. In our study, hematological and immunological parameters of children diagnosed with scabies and atopic dermatitis were compared, and certain significant differences were identified. Neutrophil count was significantly higher in the scabies group (3380 vs. 3005; $p=0.002$). This finding indicates that scabies infestation is associated with a more prominent acute inflammatory response. Although no significant difference was observed in eosinophil counts between the groups, eosinophil percentage was significantly higher in the scabies group compared to the atopic dermatitis group (4.5% vs. 3.3%; $p=0.009$). Absolute eosinophil counts did not show a statistically significant difference between the groups due to individual variability

and wide distributions. However, in relation to differences in total leukocyte counts, the percentage of eosinophils provided a more sensitive distinction and was found to be statistically significant. This suggests that the two diseases activate different immune responses. Lymphocyte count was significantly higher in the atopic dermatitis group compared to the scabies group (4135 vs. 3520; $p=0.002$). This finding supports the notion that atopic dermatitis is associated with a more prominent adaptive immune response. Furthermore, the higher platelet count in the atopic dermatitis group (346,000 vs. 332,000; $p=0.044$) indicates a relationship with chronic inflammation. Total IgE levels were significantly higher in the scabies group (131 IU/mL vs. 41 IU/mL; $p<0.001$). This finding suggests that although allergic mechanisms are typically considered predominant in atopic dermatitis,

elevated IgE levels can also occur in some cases of scabies. Another study in the literature reported that individuals diagnosed with scabies had significantly higher levels of white blood cells (WBC), neutrophils, lymphocytes, total IgE, and eosinophils compared to a control group. Additionally, an upward trend in basophil levels was observed in these patients.^[15] These findings demonstrate that the immune system is systemically activated in both scabies and atopic dermatitis. The data obtained show that although the two diseases share certain immunological features, they also differ in specific parameters such as neutrophils, lymphocytes, and eosinophil percentage. In this context, considering hematological and immunological parameters in addition to clinical evaluation increases diagnostic accuracy and contributes to planning individualized treatment approaches.

The mean age of individuals diagnosed with scabies was 6.93 ± 4.60 years, while the mean age in the atopic dermatitis group was 5.37 ± 4.03 years. The difference was statistically significant ($p=0.001$). Another source reported the overall mean age of patients diagnosed with scabies as 5.82 ± 5.21 years.^[16] The higher average age in our sample compared to that study may be attributed to differences in age distribution, sociodemographic characteristics, healthcare-seeking behavior, or sampling structure in the study population. Moreover, the statistical significance of the age difference indicates that age may be an influential variable in the diagnostic process. This suggests that considering age during clinical evaluation may enhance diagnostic accuracy. Similarly, age at presentation was examined, with a mean of 5.91 ± 4.60 years in the scabies group and 4.37 ± 4.03 years in the atopic dermatitis group. This difference was also statistically significant ($p=0.001$). In another study based on data from 404 patients, the median age at presentation in the atopic dermatitis group was 19 months (ranging from 8 to 51 months), while in the scabies group it was 53 months (ranging from 17 to 117 months). These findings suggest that atopic dermatitis tends to present clinically at an earlier age, whereas scabies is often recognized later and results in delayed healthcare seeking.^[10,17] This finding supports our current study, demonstrating that scabies cases tend to present to healthcare facilities at older ages compared to atopic dermatitis. This may be related to delayed recognition of scabies, more prominent clinical signs with age, or the fact that atopic dermatitis is more commonly diagnosed in early childhood. From this perspective, age at presentation emerges as an important parameter to be considered both in epidemiological assessments and in the diagnostic process. When gender distribution was examined within the scope of the study, 63.8% of the 188 individuals diagnosed with scabies were male, and 36.2% were female; in the atopic dermatitis group, the male-to-female ratio was 52.1% to 47.9%. In the overall sample, 58.0% were male, and 42.0% were female. The gender distribution differed significantly between the diagnostic groups, with scabies being more prevalent among males ($p<0.05$). A retrospective study that examined 1952 scabies cases found that 55.1% of the cases were male ($n=1076$) and 44.9% were female ($n=876$), with the difference being statistically significant ($p<0.001$).^[18] In contrast, another study conducted between 2013 and 2018 involving 1947 scabies cases reported that 56% of the cases were female ($n=1090$) and 44% were male ($n=857$), with this difference also being statistically significant ($p=0.000$).^[19] The higher prevalence observed in males may be related to

hygiene practices, physical contact behaviors during play, and greater exposure to crowded or enclosed environments such as military units, dormitories, labor camps, and prisons. On the other hand, the higher prevalence reported among females in some studies may be explained by greater healthcare-seeking behavior and the widespread caregiving roles of women within households, which increase the risk of intrafamilial transmission. In the atopic dermatitis group, a more balanced gender distribution was observed, supporting previous reports that AD generally occurs at similar rates in both sexes. Nevertheless, gender-based differences in prevalence are likely shaped by cultural, environmental, and societal factors; thus, findings should be interpreted within the context of the studied population and further validated in large, multicenter studies.

When the relationship between diagnosis and family history was examined, 6.4% of individuals diagnosed with scabies reported a family history of the disease, while this rate was 1.1% in those with atopic dermatitis. The difference was statistically significant ($p=0.006$). This finding supports the tendency of scabies to spread through contact, particularly within households, and reflects the distinct epidemiological contrast with atopic dermatitis, which is a non-contagious, genetic/immune-based disease. Similar findings are reported in the literature. A meta-analysis conducted on 1144 school-aged children in Ethiopia found that children with a family history of scabies had a significantly higher likelihood of developing the disease than those without such a history. According to the data, the presence of scabies among family members increased the risk of disease in children by approximately 7.25 times.^[20] The statistically significant relationship found between family history and diagnostic group in our study ($p=0.006$) supports the household transmission feature of scabies. The higher frequency of similar diagnoses among family members of those diagnosed with scabies indicates a tendency for transmission through direct contact and shared living environments. In contrast, the significantly lower rate of family history in the atopic dermatitis group highlights its non-contagious nature and its relationship to genetic and immunological factors. This finding emphasizes the epidemiological differences between the two diseases and underscores the importance of considering transmission mechanisms in clinical management strategies. The relationship between diagnosis and presenting complaints was significantly different ($\chi^2=230.750$, $df=11$, $p<0.001$). In the scabies group, the most common complaint combinations were itching (29.3%) and itching + rash (37.8%), whereas in the atopic dermatitis group, the most frequent symptoms were rash alone (44.7%), skin thickening (13.8%), and rash + thickening (12.8%). A study conducted among individuals diagnosed with scabies reported that intense itching often leads to secondary lesions, which manifest with skin symptoms such as rash and erythema.^[21] Another study found that rash was the most common presenting complaint (56%) among patients with atopic dermatitis, followed by rash accompanied by itching (24.2%).^[22] The significant difference in presenting complaints highlights the clinical divergence between scabies and atopic dermatitis. The prominence of itching in scabies may be related to the immune response triggered by the parasitic agent. In contrast, the frequent reporting of rash and thickening in atopic dermatitis reflects the chronic, immunologically driven nature of the disease. These symptom patterns suggest that the symptom history can

contribute meaningfully to differential diagnosis, emphasizing the importance of a systematic clinical approach in patients presenting with similar dermatologic complaints. Few studies in the literature provide this level of detail in diagnosis-based symptom evaluation, making this study a unique contribution by highlighting the diagnostic distinctiveness of symptom profiles.

This study aims to contribute to the literature by comprehensively comparing the clinical, hematological, and epidemiological features of children diagnosed with scabies and atopic dermatitis. The findings revealed significant differences between the two diseases in terms of symptom profiles and laboratory parameters. In the scabies group, itching, elevated neutrophil counts, and older age at presentation were more prominent, whereas in the atopic dermatitis group, rash, thickening, and elevated lymphocyte and platelet levels were more notable. Additionally, the demonstration of the influence of epidemiological variables such as gender distribution and family history on the diagnostic process represents a unique aspect of this study. The data obtained are valuable in guiding the differential diagnosis of pediatric patients presenting with similar symptoms, not only in pediatric allergy, dermatology, and pediatric health and disease clinics but also in primary care settings. With its balanced sample structure and multidimensional evaluation approach, the study provides important insights into the effective diagnosis and management of scabies and atopic dermatitis.

Limitations and Strengths

This study has a retrospective design, and the data were obtained from file records. This may have resulted in the absence or limitation of certain clinical details, and the fact that symptoms were based on patient or parental reports carries the risk of subjective evaluation. Furthermore, the single-center nature of the study may limit the generalizability of the findings. One of the most important strengths of this study is its comparative design and the inclusion of an equal number of cases in both diagnostic groups, which ensures a balanced sample. The comprehensive evaluation of clinical, hematological, and epidemiological variables broadens the scope of the study and offers a unique contribution to the field. Additionally, conducting the study in a pediatric patient group is valuable for shedding light on the diagnosis and management processes in early childhood. By providing multidimensional data to differentiate between diseases with similar clinical manifestations such as scabies and atopic dermatitis, the study offers practical guidance for clinicians working in pediatrics, dermatology, pediatric allergy, and family medicine, and contributes to public health. In this regard, the study serves as a valuable reference.

CONCLUSION

This study highlights the diagnostic complexity of distinguishing scabies from atopic dermatitis in pediatric patients with overlapping symptoms such as itching and rash. While conventional clinical assessment remains essential, our findings emphasize the added value of integrating hematological markers, demographic features, and epidemiological clues into the diagnostic process. Total IgE levels, traditionally associated with atopic conditions, were unexpectedly higher in the scabies group, underscoring the immunologic activation caused by parasitic infestation. Elevated

neutrophil and eosinophil levels further reinforced the acute inflammatory nature of scabies, whereas higher lymphocyte and platelet counts in atopic dermatitis aligned with a chronic, adaptive immune response. These hematologic distinctions, although individually limited in discriminatory power, offer meaningful support when interpreted alongside patient history and clinical findings. Additionally, age at presentation, gender distribution, and family history emerged as critical epidemiological indicators that could guide physicians toward a more accurate diagnosis in real-world settings. The observed delays in scabies diagnosis and its male predominance underline the importance of heightened clinical suspicion, particularly in crowded or underserved populations. Rather than relying solely on classical textbook descriptions, this study encourages clinicians to adopt a multifactorial diagnostic perspective—especially when dealing with ambiguous dermatologic presentations in children. The findings not only inform differential diagnosis but also support timely and appropriate treatment decisions, ultimately improving patient outcomes. Future prospective and multicenter studies are warranted to validate these insights and further refine diagnostic strategies in pediatric dermatology.

Disclosures

Ethics Committee Approval: The study was approved by Umraniye Training and Research Hospital Ethics Committee (No: 471, Date: 26.12.2024).

Informed Consent: Since the study is retrospective in nature, informed consent was not required.

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