International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 2, February 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.2.2025.71

Original Research

Assessing Thyroid Autoimmunity In Subjects With Atopic Dermatitis And Evaluating The Relationship Between Two Conditions

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Received: 15 December, 2024 Accepted: 23 January, 2025 Published: 14 February, 2025

Abstract
Background: Owing to the counter-regulation of Th1 and Th2 cells, Th1-type autoimmune diseases such as autoimmunity of thyroid and Th2-mediated allergic diseases such as atopic dermatitis must be seen in mutually exclusive subjects. However, thyroid autoimmunity is associated with chronic urticaria, and atopy is considered a cause of both urticaria and AD (atopic dermatitis).
Aim: The present study was aimed to assess the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and evaluate the relationship in two conditionsutilizing the SCORing Atopic Dermatitis (SCORAD) score, and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels.
Methods: The present study assessed child subjects with atopic dermatitis aged 0-18 years. It excluded subjects with immunodeficiency disorder, sick euthyroid syndrome, and drugs affecting thyroid dysfunction. SCORAD was used to assess the clinical disease severity. Other parameters assessed were vitamin D levels, serum IgE, absolute eosinophil count, ANA (antinuclear antibody), anti-thyroid peroxidase antibodies, and thyroid profile.
Results: The study showed that thyroid autoimmunity was seen in 18.9% (n=20) subjects among 106 subjects. A significant correlation was seen in serum IgE levels and SCORAD with p=0.002 and SCORAD and absolute eosinophil counts with p<0.001. A significant negative correlation was seen in vitamin D levels and SCORAD with p=0.006.
Conclusions: The present study concludes that thyroid autoimmunity can be linked with atopic dermatitis making a high index of suspicion vital. Vitamin D should also be supplemented in children with atopic dermatitis as it is commonly low, particularly in severe cases. However, future multi-center case-control studies are warranted to assess the prevalence of thyroid autoimmunity in children with atopic dermatitis.
Keywords: atopic dermatitis, biomarkers, thyroid profile, thyroid autoimmunity

Introduction

Atopic dermatitis (AD) represents an inflammatory and relapsing chronic skin condition that majorly affects child subjects and has a lifetime prevalence of nearly 20%. Owing to the counter-regulation of Th1 and Th2 cells, Th1-type autoimmune diseases such as autoimmunity of thyroid and Th2-mediated allergic diseases such as atopic dermatitis must be seen in mutually exclusive subjects. However, thyroid autoimmunity is associated with chronic urticaria, and atopy is considered a cause of both urticaria and AD (atopic dermatitis).[1]

Thyroid autoimmunity is regularly linked to chronic urticaria and atopy is considered as a reason for both atopic dermatitis and chronic as well as acute urticaria. Additional subsets of lymphocytes as Th17 cells and soluble factors as regulatory T-cells (T reg) and IL-9 are assessed as a common link in autoimmunity and atopy.[2,3]

Existing literature data is scarce concerning the prevalence of impairment in thyroid function and

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thyroid autoimmunity in Indian child subjects with atopic dermatitis.[4] Hence, the present study was aimed to assess the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and evaluate the relationship in two conditionsutilizing the SCORing Atopic Dermatitis (SCORAD) score, and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels.

Materials and methods

The present institution-based cross-sectional study was aimed to assess the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and evaluate the relationship in two conditionsutilizing the SCORing Atopic Dermatitis (SCORAD) score, and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels. The study subjects were from the Department of Dermatology of the Institute. Verbal and written informed consent were taken from all the subjects before participation.

The present study included all the child subjects that were diagnosed with atopic dermatitis depending on the UK Working Party Diagnostic Criteria, aged 0–18 years were included in the study. The exclusion criteria for the study were subjects with thyroid dysfunction, subjects on drugs causing thyroid dysfunction as lithium, subjects with an immunodeficiency disorder, and severely ill subjects with sick euthyroid syndrome.

After the final inclusion of the study subjects, clinical and demographic data were recorded in a preformed structured proforma. SCORAD was assessed and intravenous blood samples were collected under strict aseptic and sterile conditions for assessment of vitamin D levels, serum IgE, absolute eosinophil count, ANA (antinuclear antibody), anti-thyroid peroxidase antibodies (anti-TPO antibody), and thyroid profile.

Thyroid autoimmunity was considered utilizing the anti-TPO antibody when it had serum levels minimum twice more than normal using a fully automated chemiluminescence immunoassay analyzer machine and the thyroid profile was also assessed fully automated immunoassay analyzer.

The data gathered were analyzed statistically using SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk. NY, USA) for assessment of descriptive measures,Student t-test, ANOVA (analysis of variance), and Chi-square test. The results were expressed as mean and standard deviation and frequency and percentages. The p-value of <0.05 was considered.

Results

The present institution-based cross-sectional study was aimed to assess the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and evaluate the relationship in two conditionsutilizing the SCORing Atopic Dermatitis (SCORAD) score, and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels. The study assessed 106 child subjects from both genders and with confirmed clinical diagnoses of atopic dermatitis. Age of onset was under 1 and 5 years in 15% (n=16) and 26.4% (n=28) study subjects respectively. The onset was in summer and winter in 49.1% (n=52) and 50.9% (n=54) study subjects respectively (Table 1).

It was seen that allergic conjunctivitis, allergic rhinitis, and bronchial asthma were seen in 11.5% (n=16), 11.3% (n=12), and 47.2% (n=50) study subjects respectively. Aggravating factors for the disease were found to be woollen clothing, seasonal exacerbation, airborne allergens, food allergens, contact allergens, and others in 18.7% (n=20), 9.4% (n=10), 13.2% (n=14), 9.4% (n=10), 18.7% (n=20), and 7.4% (n=8) study subjects respectively. Family history of atopy was positive in 49% (n=52) study subjects. Clinical variants were acute eczema, subacute eczema, chronic eczema, follicular eczema, and mixed eczema in 28.3% (n=32), 30.2% (n=32), 19% (n=20), 3.8% (n=4), and 18.8% (n=19) study subjects respectively (Table 1)

The study results showed that thyroid autoimmunity was diagnosed in 18.9% (n=20) of children including 8 males and 12 females depending on anti-TPO antibody presence. Among these, 10 subjects had normal thyroid function tests and 10 had abnormal test results. Mild, moderate, and severe atopic dermatitis was seen in 8, 6, and 6 subjects respectively. Two of the study subjects had symptoms suggestive of thyroid disorder, and the rest were asymptomatic. Six subjects had abnormal thyroid profiles and no anti-TPO antibodies. However, other antithyroid antibodies as TSH (thyroid stimulating hormone) receptor antibodies and thyroglobulin antibody levels were not assessed owing to the non-availability of these tests at the institute. Among 20 subjects with thyroid autoimmunity, 18 subjects had elevated serum IgE levels and two subjects did not undergo a test for IgE. ANA was negative in all the child subjects with thyroid autoimmunity.

It was seen that concerning Pearson correlation between SCORAD and serum Vitamin D levels, absolute eosinophil count, and serum IgE levels, serum IgE levels were assessed in 102 subjects where r- value was 0.434 and 95% CI was 0.176, 0.634 showing statistically significant correlation with p=0.002. A statistically significant association was also seen in absolute eosinophil count assessed in 100 subjects with r and 95% CI of 0.573 and 0.351, 0.734, and p-value of <0.001. Also, a statistically significant association was seen in SCORAD and vitamin D levels with r- R-values of -0.371 and 95% CI of -0.584, -0.113, and p=0.005 (Table 2).

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S. No	Characteristics	Number (n)	Percentage (%)
1.	**Onset age (years)**		
a)	1	16	15
b)	5	28	26.4
2.	**Onset season**		
a)	Summer	52	49.1
b)	Winter	54	50.9
3.	**Allergy**		
a)	Allergic conjunctivitis	16	115
b)	Allergic rhinitis	12	11.3
c)	Bronchial asthma	50	47.2
4.	**Aggravating factors**		
a)	Woolen clothing	20	18.7
b)	Seasonal exacerbation	10	9.4
c)	Airborne allergens	14	13.2
d)	Food allergens	10	9.4
e)	Contact allergens	20	18.7
f)	Others	8	7.4
5.	**Atopy family history**	52	49
6.	**Clinical variants**		
a)	Acute eczema	30	28.3
b)	Subacute eczema	32	30.2
c)	Chronic eczema	20	19
d)	Follicular eczema	4	3.8
e)	Mixed eczema	19	18.8
7.	**Involved sites**		
a)	Extensor aspect of limbs	43.4	46
b)	The flexural aspect of limbs	79.2	84
c)	Trunk	52.8	56
d)	Face	56.6	60

Table 1: Demographic and clinical data in child subjects with atopic dermatitis

S. No	Parameters	Vitamin D levels r (95% CI)	p-value
1.	**Serum IgE (n=102)**	0.434 (0.176, 0.634)	**0.002**
2.	**Absolute eosinophil count (n=100)**	0.573 (0.351, 0.734)	**<0.001**
3.	**Vitamin D (n=104)**	-0.371 (-0.584, -0.113)	**0.005**

Table 2: Pearson correlation between SCORAD and serum Vitamin D levels, absolute eosinophil count, and serum IgE levels

Discussion

The present study assessed 106 child subjects from both genders and confirmed clinical diagnosis of atopic dermatitis. Age of onset was under 1 and 5 years in 15% (n=16) and 26.4% (n=28) study subjects respectively. The onset was in summer and winter in 49.1% (n=52) and 50.9% (n=54) study subjects respectively. These data were comparable to the previous studies of Himdari et al[5] in 2021 and Renert-Yuval Y et al[6] in 2021 where authors assessed subjects with demographic data comparable to the present study in their respective studies.

The study results showed that allergic conjunctivitis, allergic rhinitis, and bronchial asthma were seen in 11.5% (n=16), 11.3% (n=12), and 47.2% (n=50) study subjects respectively. Aggravating factors for the disease were found to be woollen clothing, seasonal exacerbation, airborne allergens, food allergens, contact allergens, and others in 18.7% (n=20), 9.4% (n=10), 13.2% (n=14), 9.4% (n=10), 18.7% (n=20), and 7.4% (n=8) study subjects respectively. Family history of atopy was positive in 49% (n=52) study subjects. Clinical variants were acute eczema, subacute eczema, chronic eczema, follicular eczema, and mixed eczema in 28.3% (n=32), 30.2% (n=32), 19% (n=20), 3.8% (n=4), and 18.8% (n=19) study subjects respectively. These results were consistent with the studies ofBenson AA et al[7] in 2021 and Peroni DG et al[8] in 2011 where disease data reported by authors in their studies was comparable to the results of the present study.

It was seen that thyroid autoimmunity was diagnosed in 18.9% (n=20) of children including 8 males and 12 females depending on anti-TPO antibody presence. Among these, 10 subjects had normal thyroid function tests and 10 had abnormal test results. Mild, moderate, and severe atopic dermatitis was seen in 8, 6, and 6 subjects respectively. Two of the study subjects had

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symptoms suggestive of thyroid disorder, and the rest were asymptomatic. Six subjects had abnormal thyroid profiles and no anti-TPO antibodies. However, other antithyroid antibodies as TSH (thyroid stimulating hormone) receptor antibodies and thyroglobulin antibody levels were not assessed owing to the non-availability of these tests at the institute. Among 20 subjects with thyroid autoimmunity, 18 subjects had elevated serum IgE levels and two subjects did not undergo a test for IgE. ANA was negative in all the child subjects with thyroid autoimmunity. These findings were in agreement with the results of Pedulla M et al[9] in 2016 and Unnikrishnan AG et al[10] in 2011 where data concerning thyroid autoimmunity similar to the present study was also reported by the authors in their respective studies.

The study results also showed that concerning Pearson correlation between SCORAD and serum Vitamin D levels, absolute eosinophil count, and serum IgE levels, serum IgE levels were assessed in 102 subjects where r- value was 0.434 and 95% CI was 0.176, 0.634 showing statistically significant correlation with p=0.002. A statistically significant association was also seen in absolute eosinophil count assessed in 100 subjects with r and 95% CI of 0.573 and 0.351, 0.734, and p-value of <0.001. Also, a statistically significant association was seen in SCORAD and vitamin D levels with r- R-values of -0.371 and 95% CI of -0.584, -0.113, and p=0.005. These results were in line with the findings ofSilverberg JI[11] in 2019 and Brunner PM et al[12] in 2017 where the correlation reported by the authors for SCORAD to serum Vitamin D levels, absolute eosinophil count, and serum IgE levels, serum IgE levels were similar to the results of the present study.

Conclusions

The present study, within its limitations, concludes that thyroid autoimmunity can be linked with atopic dermatitis making a high index of suspicion vital. Vitamin D should also be supplemented in children with atopic dermatitis as it is commonly low, particularly in severe cases. However, future multi-center case-control studies are warranted to assess the prevalence of thyroid autoimmunity in children with atopic dermatitis.

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