Research Article

INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

THYROID AUTOIMMUNITY IN ATOPIC DERMATITIS PATIENTS AND THE CORRELATION BETWEEN THE TWO DISORDERS

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How to cite: Chandak SH, Balaji BM. Thyroid autoimmunity in atopic dermatitis patients and the correlation between the two disorders. International Research Journal of Pharmacy. 2020;11:8:45-48.

Doi: 10.7897/2230-8407.110880

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ABSTRACT

Background: Th1-type autoimmune disorders like thyroid autoimmunity and Th2-mediated allergy diseases like atopic dermatitis must be observed in patients who are mutually exclusive due to the counter-regulation of Th1 and Th2 cells. On the other hand, atopy is thought to be a cause of both urticaria and AD (atopic dermatitis), and thyroid autoimmunity is linked to chronic urticaria.

Aim: The purpose of this study was to determine the prevalence of thyroid autoimmunity in children with atopic dermatitis and to compare the two conditions using the SCORing Atopic Dermatitis (SCORAD) score and biochemical parameters such as serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels.

Methods: Children with atopic dermatitis between the ages of 0 and 18 were evaluated in this study. Subjects with sick euthyroid syndrome, immunodeficiency disorders, and medications that cause thyroid dysfunction were not included. The clinical illness severity was evaluated using SCORAD. Vitamin D levels, serum IgE, absolute eosinophil count, ANA (antinuclear antibody), anti-thyroid peroxidase antibodies, and thyroid profile were among the other parameters evaluated.

Results: Out of 106 participants, 18.9% (n=20) had thyroid autoimmunity. Serum IgE levels and SCORAD showed a significant connection ($p=0.002$), as did SCORAD and absolute eosinophil counts ($p<0.001$). Vitamin D levels and SCORAD showed a strong negative connection ($p=0.006$).

Conclusion: The current study shows that a high index of suspicion is essential because thyroid autoimmunity may be connected to atopic dermatitis. Children with atopic dermatitis should also take vitamin D supplements because their levels are frequently low, especially in severe cases. To determine the prevalence of thyroid autoimmunity in children with atopic dermatitis, further multi-center case-control studies are necessary.

Keywords: Thyroid Autoimmunity, Thyroid Profile, Biomarkers, And Atopic Dermatitis

INTRODUCTION

With a lifetime frequency of about 20%, atopic dermatitis (AD) is an inflammatory, recurrent skin disorder that primarily affects children. Th1-type autoimmune disorders like thyroid autoimmunity and Th2-mediated allergy diseases like atopic dermatitis must be observed in patients who are mutually exclusive due to the counter-regulation of Th1 and Th2 cells. On the other hand, atopy is thought to be a cause of both urticaria and AD (atopic dermatitis), and thyroid autoimmunity is linked to chronic urticaria.[1]

Chronic urticaria is frequently associated with thyroid autoimmunity, and atopy is thought to be the cause of both acute and chronic urticaria as well as atopic dermatitis. Other lymphocyte subsets, such as Th17 cells, and soluble components, such as IL-9 and regulatory T cells (T reg), are evaluated as a common connection between atopy and autoimmune. [2, 3]

The frequency of thyroid autoimmunity and impaired thyroid function in Indian children with atopic dermatitis is not well documented in the literature. 4 Therefore, using the SCORing Atopic Dermatitis (SCORAD) score and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels, the current study sought to determine the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and analyze the relationship in two conditions.

MATERIALS AND METHODS

Using the SCORing Atopic Dermatitis (SCORAD) score and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels, the current institution-based cross-sectional study sought to determine the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and assess the relationship in two conditions.

Following approval from the relevant institutional ethical committee, the study was conducted at Department of Dermatology provided the study participants. Prior to participation, each subject provided both written and verbal informed consent.

All children between the ages of 0 and 18 who were diagnosed with atopic dermatitis based on the UK Working Party Diagnostic Criteria were included in the current study. Participants with thyroid dysfunction, those taking medications that cause thyroid dysfunction, such as lithium, those with immunodeficiency disorders, and those who were extremely sick with sick euthyroid syndrome were all excluded from the study.

Clinical and demographic information was entered into a pre-made, organized proforma following the study subjects' final inclusion. In order to measure vitamin D levels, serum IgE, absolute eosinophil count, ANA (antinuclear antibody), anti-thyroid peroxidase antibodies (anti-TPO antibody), and thyroid profile, SCORAD was evaluated and intravenous blood samples were obtained under stringent aseptic and sterile conditions.

Using a fully automated chemiluminescence immunoassay analyzer, thyroid autoimmunity was evaluated using the anti-TPO antibody when serum levels were at least twice as high as normal. The thyroid profile was also evaluated using a fully automated immunoassay analyzer.

The collected data was statistically evaluated using the Student t-test, Chi-square test, ANOVA (analysis of variance), and SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk, NY, USA). The mean, standard deviation, frequency, and percentages were used to express the results. A p-value of less than 0.05 was taken into account.

RESULTS

Using the SCORing Atopic Dermatitis (SCORAD) score and biochemical parameters of serum immunoglobulin E (IgE), absolute eosinophil count, and vitamin D levels, the current institution-based cross-sectional study sought to determine the frequency of thyroid autoimmunity in child subjects with atopic dermatitis and assess the relationship in two conditions. 106 children with confirmed clinical diagnoses of atopic dermatitis from both genders participated in the study.

In 15% (n=16) and 26.4% (n=28) of the research participants, the age of onset was less than one year and five years, respectively. In 49.1% (n=52) and 50.9% (n=54) of the study participants, respectively, the onset occurred in the summer and winter (Table 1).

Allergic rhinitis, bronchial asthma, and allergic conjunctivitis were observed in 11.5% (n=16), 11.3% (n=12), and 47.2% (n=50) of the study participants, respectively. 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) of the study participants, woolen clothing, seasonal exacerbation, dietary allergens, contact allergens, and other factors were identified as aggravating factors for the disease. Of the 52 study participants, 49% had a positive family history of atopy.

Acute eczema, subacute eczema, chronic eczema, follicular eczema, and mixed eczema were found in 28.3% (n=32), 30.2% (n=32), 19% (n=20), 3.8% (n=4), and 18.8% (n=19) of the research participants, respectively (Table 1).

According to the study's findings, 18.9% (n=20) of children—eight males and twelve females—were diagnosed with thyroid autoimmunity based on the existence of anti-TPO antibodies. Ten of these people had thyroid function tests that were normal, and ten had results that were abnormal. Eight, six, and six individuals, respectively, had mild, moderate, and severe atopic dermatitis. The remaining study participants were asymptomatic, but two exhibited symptoms that might indicate a thyroid condition.

Six individuals lacked anti-TPO antibodies and had aberrant thyroid profiles. However, because these assays were not available at the institute, other antithyroid antibodies, such as TSH (thyroid stimulating hormone) receptor antibodies and

thyroglobulin antibody levels, were not evaluated. Of the twenty individuals with thyroid autoimmunity, eighteen showed high serum IgE levels, and two did not have an IgE test. All of the child individuals with thyroid autoimmunity had negative ANA results.

Regarding the Pearson correlation between SCORAD and serum vitamin D levels, absolute eosinophil count, and serum IgE levels, it was observed that 102 participants had serum IgE levels measured; the r-value was 0.434 and the 95% CI was 0.176, 0.634, indicating a statistically significant connection with p=0.002.

The absolute eosinophil count measured in 100 participants likewise showed a statistically significant correlation, with r and 95% CI of 0.573 and 0.351, 0.734, and p-value of <0.001. Additionally, there was a statistically significant correlation between vitamin D levels and SCORAD, with r-R-values of -0.371 and 95% CI of -0.584, -0.113, and p=0.005 (Table 2).

DISCUSSION

The current study evaluated 106 children of both sexes and verified the atopic dermatitis clinical diagnosis. In 15% (n=16) and 26.4% (n=28) of the research participants, the age of onset was less than one year and five years, respectively. For 49.1% (n=52) and 50.9% (n=54) of the research participants, the onset occurred in the summer and winter, respectively.

These findings were similar to those of earlier research by Himdari et al. (2021) and Renert Yuval Y et al. (2021), in which the authors evaluated participants whose demographic information was similar to that of the current study.

According to the study's findings, 11.5% (n=16), 11.3% (n=12), and 47.2% (n=50) of the participants had allergic conjunctivitis, allergic rhinitis, and bronchial asthma, respectively. 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) of the study participants, woolen clothing, seasonal exacerbation, dietary allergens, contact allergens, and other factors were identified as aggravating factors for the disease. Of the 52 study participants, 49% had a positive family history of atopy.

In 28.3% (n=32), 30.2% (n=32), 19% (n=20), 3.8% (n=4), and 18.8% (n=19) of the study participants, the clinical variations were acute eczema, subacute eczema, chronic eczema, follicular eczema, and mixed eczema. These findings were in line with research by Benson AA et al. in 2021 and Peroni DG et al. in 2011, where the authors' reported disease data was similar to the findings of the current investigation.

Depending on the presence of anti-TPO antibodies, 18.9% (n=20) of children—eight males and twelve females—were found to have thyroid autoimmunity. Ten of these people had thyroid function tests that were normal, and ten had results that were abnormal. Eight, six, and six individuals, respectively, had mild, moderate, and severe atopic dermatitis. The remaining study participants were asymptomatic, but two exhibited symptoms that might indicate a thyroid condition.

6 individuals lacked anti-TPO antibodies and had aberrant thyroid profiles. However, because these assays were not available at the institute, other antithyroid antibodies, such as TSH (thyroid stimulating hormone) receptor antibodies and thyroglobulin antibody levels, were not evaluated. Of the twenty individuals with thyroid autoimmunity, eighteen showed high serum IgE levels, and two did not have an IgE test. All of the child individuals with thyroid autoimmunity had negative ANA results. These results were consistent with those of Pedulla M et al. (2016) and Unnikrishnan AG et al. (2011), where the authors reported similar thyroid autoimmunity data.

The study's findings also revealed a statistically significant correlation with p=0.002 for the Pearson correlation between SCORAD and serum vitamin D levels, absolute eosinophil count, and serum IgE levels. Serum IgE levels were measured in 102 subjects, with an r-value of 0.434 and a 95% confidence interval of 0.176, 0.634. The absolute eosinophil count measured in 100 participants likewise showed a statistically significant correlation, with r and 95% CI of 0.573 and 0.351, 0.734, and p-value of <0.001.

Additionally, there was a statistically significant correlation between vitamin D levels and SCORAD, with r-R-values of -0.371 and 95% CI of -0.584, -0.113, and p=0.005. These findings were consistent with those of Silverberg JI11 in 2019 and Brunner PM et al12 in 2017, where the authors reported a correlation between SCORAD and serum levels of vitamin D, absolute eosinophil count, and serum IgE.

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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Characteristics	**Number (n)**	**Percentage (%)**
Onset age (years)		
1	16	15
5	28	26.4
Onset season		
Summer	52	49.1
Winter	54	50.9
Allergy		
Allergic conjunctivitis	16	115
Allergic rhinitis	12	11.3
Bronchial asthma	50	47.2
Aggravating factors		
Woolen clothing	20	18.7
Seasonal exacerbation	10	9.4
Airborne allergens	14	13.2
Food allergens	10	9.4
Contact allergens	20	18.7
Others	8	7.4
Atopy family history	52	49
Clinical variants		
Acute eczema	30	28.3
Subacute eczema	32	30.2
Chronic eczema	20	19
Follicular eczema	4	3.8
Mixed eczema	19	18.8
Involved sites		
Extensor aspect of limbs	43.4	46
The flexural aspect of limbs	79.2	84
Trunk	52.8	56
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