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ORIGINAL ARTICLE

AUTOIMMUNE DISORDERS IN CASES WITH ALOPECIA AREATA PRESENTED TO TERTIARY CARE HOSPITAL: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Alopecia areata (AA) is an autoimmune condition which is recognized for its association with various autoimmune disorders. While previous studies have validated links between AA and autoimmune conditions, the data in our setup remain limited, we conducted this study to assess the frequency of autoimmune disease in patients presenting with AA.

Materials & Methods: A cross-sectional study was conducted from 01-Novemeber-2024 to 01-May-2025 at Department of Dermatology, Hayatabad Medical Complex, Peshawar, in which 117 AA patients were enrolled using non-probability consecutive sampling technique. We assessed the autoimmune diseases like hypothyroidism, vitiligo, atopic dermatitis, diabetes, psoriasis and rheumatoid arthritis. Statistical analysis was conducted by Statistical package for social sciences. We used mean and SD for age and duration of AA. Frequency and percentages were evaluated for demographics and AD. Chi square test was used for assessing association of AD with age and gender, keeping significance level at $P \leq 0.05$.

Results: There were 117 patients included in this study. Mean age turned out to be 33.97±8.82 years. There 79 males (67.5%) and 38 females (32.5%). Atopic dermatitis was found in 21 (17.9%) patients. Hypothyroidism and diabetes in 9 (7.7%) patients each. Vitiligo 4 (3.4%). Psoriasis in 3 (2.6%) and rheumatoid arthritis was 2 (1.7%).

Conclusion: We found a notable pattern of autoimmune diseases associated with alopecia areata, thyroid disorders, diabetes and atopic dermatitis emerged as the most frequent conditions.

KEY WORDS: Alopecia areata; Autoimmune disorders; Atopic dermatitis; Thyroid dysfunction; Vitiligo.

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INTRODUCTION

Alopecia areata (AA) is a chronic autoimmune disorder that involves immune-mediated attacks on hair follicles and nails. Reported frequency of AA according to study conducted in India was 2% of overall dermatology outpatients with male-female ratio nearly equal.[1] AA typically manifests as distinct areas of hair loss in the scalp, emerging over a period of several weeks. AA typically presents as isolated, smooth, unexpected, non-scarring, as well as patchy hair loss, occurring on scalp or any region with hair growth.[2] It impacts as much as 2% of the globally population.[2] The impact can be witnessed across all age groups; however, the tendency seems to be more pronounced among kids than in adults, with prevalence rates of 1.92% and 1.47%, correspondingly.[3] A higher development has been observed in females compared with males, particularly in people who have late-onset disease.[4] In individuals without any health issues, hair follicles show an immune privilege which safeguards toward autoimmunity. In individuals with AA, the attack on the hair follicle is believed to target autoantigens present inside the follicle. This process is caused by a breakdown of its immune advantage, with proposed autoantigens associated to both melanocytes and keratinocytes.[5] The production of Th1, Th2, along with Th17 cytokines are all linked to immune attacks, in Th1 cytokines as well as Th17 cytokines demonstrating an association with disease activity.[6]

Autoimmune disorders develop when the immune system erroneously targets self-molecules because of

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a failure in maintaining immunologic tolerance regarding auto-reactive immune system cells. [7] Autoimmune disorders can often occur together, and an increased likelihood of another autoimmune disease is seen as a sign of possible shared pathogenic mechanisms among these diseases.[8,9] Autoimmune disorders are rare causes of death; however, they have an effect on mortality rates and quality of life, emphasizing a significant gap in their classification.[10] Previous reports have indicated relationships between AA and various autoimmune disorders.[11] AA has been shown to coexist with various autoimmune disorders. According to a Pakistani study, the observed common autoimmune disorder related to AA was diabetes mellitus (20.9%), anemia (12.5%), dermatitis (12.5%) and thyroid disorders (8.3%).[12] Alopecia areata is a common form of hair loss with an autoimmune basis that is characterized by patchy loss of hair from the scalp or other body areas. The exact association between AA and other autoimmune disorders remains incompletely understood, especially in our population. This knowledge gap highlights the need for systematic evaluation of autoimmune comorbidities in patients presenting with AA. Therefore, this study aimed to determine the frequency of autoimmune disease in patients presenting with AA at a tertiary care hospital. The findings will contribute to a better understanding of the underlying immunological links, and help clinicians develop comprehensive management strategies to improve patient outcomes.

MATERIALS AND METHODS

This cross-sectional study was conducted from 01-Novemeber-2024 to 01-May-2025 in dermatology department, Hayatabad Medical Complex, Peshawar after securing ethical clearance from the institute. The sample of 117 patients was assessed by taking 8.3% prevalence of thyroid disorder in AA patients which was derived from previous research, along with 95% confidence interval and 5% margin of error. A non-probability consecutive sampling technique was employed to recruit the patients. We enrolled patients greater 18 to 50 years, clinically confirmed AA. Patients with pre-existing systemic autoimmune diseases (except those potentially linked to AA), pregnant patients or those who recently had immunosuppressive therapy were excluded from the study. Data collection was initiated after securing consent from the patients, their demographic characteristics such as age, gender, residence, socioeconomic status and clinical parameters like disease duration and severity of AA were recorded. Disease severity was defined as mild (localized patches), moderate (extensive patchy involvement) or severe (alopecia totalis/universalis).

Laboratory investigations included thyroid function tests and HbA1C. Patients were assessed for autoimmune conditions such as vitiligo, atopic dermatitis, and diabetes mellitus through clinical examination and relevant laboratory tests. For vitiligo, depigmented areas were observed under a Wood's lamp. For the diagnosis of atopic dermatitis and psoriasis, we performed a physical examination of the skin. For the diagnosis of rheumatoid arthritis, lab tests such as Rheumatoid Factor (RF), Erythrocyte sedimentation rate, Anti-CCP antibodies and C-reactive protein were performed along with X-rays. Statistical Package for Social Sciences (SPSS) 24 was employed for analyzing the gathered data. All the numerical and categorical variables were assessed using mean $\pm$ SD and frequencies/percentages respectively. Chi-square tests were used to evaluate associations of AD with age and gender. We kept P value ≤ 0.05 as significant.

RESULTS

The study included a total of 117 participants with alopecia areata. The mean age of 117 patients was 33.97 ± 8.82 years. The mean duration of alopecia areata was 3.69 ± 1.47 years. There were 79 males (67.5%) and 38 females (32.5%). Demographic profile of the patients is presented in table no .1

Table 1: Demographic profile of the patients

Demographic profile		N	%age
Gender	Male	79	67.5%
	Female	38	32.5%
Education status	Educated	55	47.0%
	Uneducated	62	53.0%
Residence	Urban	65	55.6%
	Rural	52	44.4%
Socioeconomic background	Low (<50K/Month)	34	29.1%
	Middle (50K to 100K /Month)	56	47.9%
	High (>100K / Month)	27	23.1%

The severity of alopecia areata was mild in 53 (45.3%) patients, moderate in 43 (36.8%) and severe in 21 (17.9%) (Figure 1).

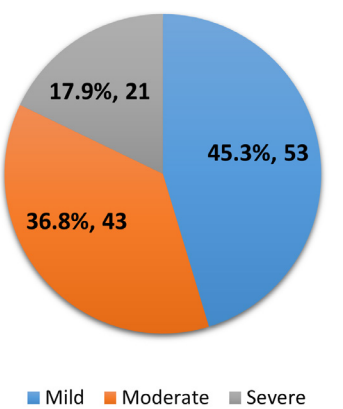

Figure 1 Severity of alopecia

Regarding the autoimmune comorbidities we observed that atopic dermatitis was the most prevalent condition found in 21 (17.9%; 95% CI, 0.11 to 0.25) patients while hypothyroidism (95% CI, 0.041 to 0.14) and diabetes (95% CI, 0.041 to 0.14) were each present in 9 (7.7%) patients. Vitiligo was seen in 4 (3.4%; 95%CI, 0.013 to 0.084), psoriasis in 3 (2.6%; 95% CI, 0.008 to 0.07), and rheumatoid arthritis was observed in 2 (1.7%; 95% CI, 0.0047 to 0.06) (Table 2).

Table 2: Autoimmune diseases in AA patients

Autoimmune diseases		N	%	95% confidence level	
				Lower	Upper
Atopic dermatitis	Yes	21	17.9%	0.11	0.25
	No	96	82.1%		
Vitiligo	Yes	4	3.4%	0.013	0.084
	No	113	96.6%		
Diabetes	Yes	9	7.7%	0.041	0.14
	No	108	92.3%		
Psoriasis	Yes	3	2.6%	0.008	0.07
	No	114	97.4%		
rheumatoid arthritis	Yes	2	1.7%	0.0047	0.06
	No	115	98.3%		
Hypothyroidism	Yes	9	7.7%	0.041	0.14
	No	108	92.3%		

We observed that among all the autoimmune conditions, diabetes was more prevalent in patients aged 35 to 50 years (P = 0.002) (Table 3). Gender did not exhibit noteworthy association with the autoimmune conditions (Table 4).

These findings highlight the variability in autoimmune associations with alopecia areata, influenced by factors such as age and gender, while underscoring the need for comprehensive screening in clinical practice.

Table 4: Association of autoimmune diseases with gender

Autoimmune diseases	Gender					P value
	Male		Female			
	N	%	N	%		
Atopic dermatitis	Yes	12	57.1%	9	42.9%	0.26
	No	67	69.8%	29	30.2%	
Vitiligo	Yes	3	75.0%	1	25.0%	0.74
	No	76	67.3%	37	32.7%	
Diabetes	Yes	5	55.6%	4	44.4%	0.42
	No	74	68.5%	34	31.5%	
Psoriasis	Yes	2	66.7%	1	33.3%	0.97
	No	77	67.5%	37	32.5%	
Rheumatoid arthritis	Yes	1	50.0%	1	50.0%	0.59
	No	78	67.8%	37	32.2%	
Hypothyroidism	Yes	4	44.4%	5	55.6%	0.12
	No	75	69.4%	33	30.6%	

Table 3: Association of autoimmune diseases with age

Autoimmune diseases	Age groups (Years)					P value
	20 to 35		36 to 50			
	N	%	N	%		
Atopic dermatitis	Yes	11	52.4%	10	47.6%	0.49
	No	58	60.4%	38	39.6%	
Vitiligo	Yes	3	75.0%	1	25.0%	0.50
	No	66	58.4%	47	41.6%	
Diabetes	Yes	1	11.1%	8	88.9%	0.002
	No	68	63.0%	40	37.0%	
Psoriasis	Yes	2	66.7%	1	33.3%	0.78
	No	67	58.8%	47	41.2%	
rheumatoid arthritis	Yes	0	0.0%	2	100.0%	0.08
	No	69	60.0%	46	40.0%	
Hypothyroidism	Yes	5	55.6%	4	44.4%	0.82
	No	64	59.3%	44	40.7%	

DISCUSSION

The mean age of patients in our study was 33.97±8.82 years which aligns with the age reported by Habib et al, they reported mean age in their cases and control groups 31.09±13.011.[13] Our finding of male predominance which was 67.5% resonates with Habib et al, in their study majority of the patients in both cases and control groups were males.[13] Similarly, Thomas et al, also reported higher frequency of male patients in their study.[14] Disease severity distribution in our cohort (45.3% mild 36.8% moderate 17.9% severe) resonates with Sana et al, they reported mild AA in 41.6% patients, moderate in 33.33% cases and severe in 25% cases. Aligned with our results, Thomas et al reported higher proportions of mild to moderate cases.[14] The average disease duration of 3.69±1.47 years in our study suggests a relatively chronic course consistent with descriptions of AA as a persistent condition.

Regarding the autoimmune conditions our findings present both confirmations and contradictions to previous studies. The 17.9% prevalence of atopic dermatitis in our AA patients, aligns moderately with Shahzadi et all; 29.2% and Thomas et all; 14.1% with variations possibly reflecting differences in diagnostic criteria or population characteristics.[12,14] Hypothyroidism occurred in 7.7% of our patients which matches with Puavilai et al; 7.2%.[15] Shahzadi et al reported thyroid function disorder in around 5% patients in which 4.2% had hypothyroidism while 0.8% had hyperthyroidism.[12] Our frequency of hypothyroidism was lower than Thomas et al; 18.3%, which can be attributed to the regional differences in thyroid disorder prevalence or screening intensity.[14]

Vitiligo represents an autoimmune dermatological disorder which manifests as depigmented macules resulting from the destruction of melanocytes. In our study we observed that round 3.4% AA patients had vitilgo. Shahzadi et al found 4.2% prevalence of virtiligo.[12] Thomas et al reported 2.8% prevalence of vitiligo.[15] Chanprapaph et al in their cohort of AA patients reported vitiligo in 2.4% patients.[16] Our 7.7% frequency of diabetes corroborates with Thomas et al as they reported 7.1% patients in their study being diabetic. However in contrast Shahzadi et al reported 1.7%.[12]

Psoriasis and rheumatoid arthritis showed low prevalence in our study (2.6% and 1.7% respectively), our findings of lower prevalence of these diseases is consistent with Holmes et al who also reported lower frequencies for psoriasis and rheumatoid arthritis.[17]

CONCLUSION

In conclusion, our study reveals a notable pattern of autoimmune diseases associated with alopecia areata, atopic dermatitis, thyroid disorder and diabetes emerged as the most frequent conditions which were followed by vitiligo. We recommend the need for comprehensive evaluation of alopecia areata patients to identify and manage potential concurrent autoimmune disorders.

Limitation of the study: We consider the lack of control group a potential weakness of our study. We also consider our small samples size a weakness; we recommend larger studies with longer durations and control groups.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	GU, HR
Acquisition, Analysis or Interpretation of Data:	GU, HR, TR, MR, FA, SS
Manuscript Writing & Approval:	GU, HR, TR, MR, FA, SS

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.