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Clinico-etiological study of alopecia areata among patients of Western Uttar Pradesh

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Abstract:

Background: Alopecia areata (AA) is a chronic, immune-mediated, non-scarring hair loss disorder with a wide range of clinical symptoms and etiological associations. Assessing the etiological causes, therapeutic outcomes, and clinical patterns of individuals with alopecia areata in Western Uttar Pradesh was the aim of this study.
Methods: 102 patients with alopecia areata were the subjects of a cross-sectional clinico-etiological investigation. Comprehensive laboratory, clinical, and demographic information was gathered, including endocrine and immunological profiles. The severity of the condition was used to assess treatment responses.
Results: The majority of patients were between the ages of 21 and 30 (mean: 22 ± 9.61 years), urban (61.8%), and unmarried (64.7%). The condition lasted an average of 11 months, with an average beginning age of 21 years. With 34.3% of cases displaying a single lesion and 42.2% displaying multiple lesions, the scalp was the most frequently affected area. In addition to exclamation mark hair (24.5%) and nail abnormalities (19.5%), systemic correlations were noted, including thyroid dysfunction (8.8%) and hypothyroidism (16.6%). Immunoglobulin levels were decreased ($p < 0.05$). Steroid pulse + azathioprine generated the best results in severe cases (64.2%), while ILS + tacrolimus produced the best results in localised instances (66.6%).
Conclusion: Alopecia areata mainly affects young individuals in this area, and it manifests in a range of clinical patterns and systemic links, especially with thyroid problems and immunological imbalance. Early identification and tailored treatment strategies are essential, especially for severe and resistant variants.

Keywords:

Alopecia areata, autoimmune hair loss, Immunoglobulins, Thyroid dysfunction, Intralesional steroids, Azathioprine, Tacrolimus

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Introduction

Alopecia areata is a persistent, non-scarring, autoimmune disorder that mainly impacts hair follicles, resulting in uneven hair loss on the scalp and other areas of the body [1]. It is a fairly prevalent skin condition, with an approximate lifetime risk of about 1-2% among the general population. Although it can happen at any age, it is most frequently observed in those younger than 40 years and impacts both sexes, showing a slight preference for males in certain studies [2, 3] .

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Alopecia areata's pathogenesis is thought to be due to an autoimmune assault on hair follicles, particularly affecting the anagen-phase (growth phase) hair follicles. This immune-mediated process is believed to be initiated by a blend of genetic predisposition and environmental influences, such as stress, infections, hormonal fluctuations, and potentially dietary elements [4, 5]. Genetic research has uncovered multiple associations with human leukocyte antigen (HLA), and a familial predisposition is noted in approximately 10–20% of instances, reinforcing the autoimmune and genetic origins of the condition [6].

Localised patches reticulate or ophiasis patterns diffuse thinning, and in extreme situations, alopecia totalis (full loss of scalp hair) or alopecia universalis (loss of all body hair) are some of the clinical manifestations of alopecia areata [7]. About 10–66% of patients have nail involvement, which can be a sign of the severity of the disease and frequently takes the form of pitting, trachyonychia, or ridging. The disease's progression is very unpredictable; some individuals experience spontaneous remission, while others experience progression to more severe forms [8]. Other autoimmune diseases like vitiligo, thyroid issues, atopic dermatitis, and pernicious anaemia are frequently linked to alopecia areata. Alopecia areata has a major psychological impact, particularly on young people, as the disorder's apparent form can cause social disengagement, emotional anguish, and low self-esteem [1, 9].

Even though alopecia areata has been extensively studied worldwide, there is a dearth of data specific to India, particularly in states like Uttar Pradesh. Geographical variations in genetics, environmental exposures, lifestyle, and health-seeking behaviours can all affect the prevalence, clinical spectrum, and contributing etiological factors of alopecia areata. With its distinct sociodemographic and environmental features, Western Uttar Pradesh provides a valuable context for researching the aetiology and clinical features of this illness.

This study aims to investigate the clinico-etiological profile of alopecia areata among patients in Western Uttar Pradesh in order to identify similar clinical patterns, associated systemic or autoimmune diseases, and potential triggering factors. By looking at these variables, the study intends to increase our understanding of alopecia areata in this field, which may help with early identification, effective treatment, and counseling for individuals affected.

Method

The current study was carried out at S.N. Medical College in Agra in the Department of Dermatology, Venereology, and Leprosy. A multiphase sampling strategy was used to recruit study participants who had a clinical diagnosis of alopecia areata. All participants gave their informed consent. The Institutional Ethics Committee examined and approved the study protocol. Patient privacy was rigorously protected.

Patient Selection and Clinical Evaluation

A comprehensive clinical examination was performed on each of the chosen patients, and a thorough history was taken, including details about the disease's course, duration, family history, and related systemic symptoms.

Based on the degree and pattern of hair loss, patients were divided into three groups:
Patients with less than three patches or less than 25% scalp involvement are in Group I (Mild Disease).
Patients in Group II (Moderate to Severe Disease) had more widespread involvement of the scalp.
Patients with persistent, recurrent, or treatment-resistant alopecia areata are classified as belonging to Group III (Resistant Disease).

Investigations

All study participants had a panel of routine laboratory tests to assess their general health and identify any underlying conditions that may be contributing to their alopecia areata. Thyroxine (T4), thyroid-stimulating hormone (TSH), anti-thyroid peroxidase (anti-TPO) antibodies, and fasting blood sugar levels were among the tests that were performed. Serum immunoglobulin levels, including IgA, IgG, and IgM, were measured prior to therapy initiation in order to identify any underlying immune dysfunction

Treatment Protocol

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Most patients in Group I (Mild Disease) were treated with intralesional corticosteroids (triamcinolone acetonide 5–10 mg/mL). The injections were administered intradermally or subcutaneously at one-centimeter intervals (0.1 mL each) for a minimum of six weeks, and they were repeated every fourteen days. Patients were given 0.1% additional topical tacrolimus after six weeks if their SALT scores did not improve by more than 50%. Those who could not or would not get injections, especially young children, were treated twice a day with topical clobetasol propionate 0.03%.

Patients in Group II (Moderate to Severe Disease) were split up into two smaller groups: Oral steroid pulse therapy was administered to one group, whereas oral azathioprine (2 mg/kg/day) and oral steroid pulses were administered to the second group, which included patients with chronic or relapsing disease. After six weeks, patients who were not improving with oral steroids alone were also given topical 5% minoxidil twice a day.
Although there are currently few reliable comparative trials on these regimens, all treatment decisions were made after consulting with knowledgeable dermatologists and were in line with generally recognized clinical procedures.

Assessment and Outcome Measures

The following metrics were used to assess the main treatment outcomes:
The severity of hair loss and response to treatment are evaluated using the SALT Score (Severity of Alopecia Tool) both before and after six weeks.
Skindex-16 Score: To assess how the patient's quality of life is affected. After six weeks of therapy, patients were reclassified and the effectiveness of treatment was evaluated using a SALT scoring system to grade the severity of the disease

Statistical Analysis

SPSS 28.0 was used for data analysis. Percentages were used to represent categorical data. The Student's t-test was used to compare continuous variables. P-values less than 0.05 were regarded as statistically significant.

Results

The study included 102 patients. The majority of the patients were aged between 21–30 years (30.4%), followed by those aged 11–20 years (29.4%). The mean age of the study population was 22 ± 9.61 years. Most of the patients were from urban areas (61.8%). Regarding marital status, 64.7% were unmarried, and 34.3% were married which were shown in table 1. The mean age of disease onset was approximately 21 years, and the mean duration of illness was around 11 months. The duration of the illness was less than 6 months in 60.8% of patients, 6–12 months in 18.6%, and more than 12 months in 8.2% of cases were shown in table 2.

In terms of clinical pattern, 34.3% of patients had a single circumscribed alopecia lesion, while 42.2% had multiple lesions. Other patterns observed included ophiasis (9 cases), sisaipho (4 cases), diffuse alopecia (3 cases), alopecia totalis (4 cases), reticulate (2 cases), and alopecia universalis (2 cases). The scalp was the most commonly affected site, though involvement of the beard, eyebrows, and eyelashes was also noted shown in table 3.A positive family history of alopecia areata was found in 11.8% of patients. Exclamation mark hairs were seen in 24.5% of cases. Nail changes included pitting in 13.7% and longitudinal striations in 5.8% of patients shown in table 4.

Associated dermatological conditions were present in 12.7% of patients, including vitiligo, lichen planus, and atopic dermatitis. Thyroid abnormalities were noted in 8.8% of patients (based on TSH/T4 levels), and anti-TPO antibody positivity was found in 3.9%. Glucose intolerance was present in 7.8% of patients. Other systemic conditions, primarily hypothyroidism, were observed in 16.6% shown in table 5. Table No. 6 indicates that immunoglobulin levels (IgG, IgM, and IgA) were significantly lower in alopecia areata patients than in controls (p-values < 0.05).

In terms of treatment results, topical tacrolimus and intralesional steroids (ILS) produced the greatest

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improvement in localised alopecia (66.6%). The combination of azathioprine and steroid pulse therapy showed the highest efficacy in moderate to severe cases (64.2%). Table 7 shows that alopecia universalis did not improve, whereas reticular and ophiasis types showed improvements of 33% and 66%, respectively, among resistant cases.

Table 1: Showing the Demographic Profile of Patients (N = 102)

Variable	Female n (%)	Male n (%)	Total n (%)
Age (years)			
01–10	6 (5.8)	7 (6.9)	13 (12.7)
11–20	12 (11.8)	18 (17.6)	30 (29.4)
21–30	14 (13.7)	17 (16.6)	31 (30.4)
31–40	11 (10.8)	14 (13.7)	25 (24.5)
41–50	2 (1.9)	1 (0.9)	3 (2.9)
Mean ± SD	21.64 ± 9.56	22.29 ± 9.73	22 ± 9.61
Residence			
Urban	27 (26.5)	36 (35.3)	63 (61.8)
Rural	18 (16.7)	21 (20.6)	39 (38.2)
Marital Status			
Married	20 (19.6)	15 (14.7)	35 (34.3)
Unmarried	24 (23.5)	42 (41.2)	66 (64.7)
Widow/Widower	1 (1.0)	0 (0.0)	1 (0.9)

Table 2: Showing the Clinical Features - Onset & Duration

Feature	Female	Male	Total
Mean Age of Onset (yrs)	21.46 ± 9.01	21.18 ± 8.9	21.18 ± 8.97
Duration of Illness (mo)	10.09 ± 18.53	11.57 ± 20.13	11.12 ± 20.18
0–6 months	29 (28.4%)	33 (32.4%)	62 (60.8%)
6–12 months	7 (6.8%)	12 (11.8%)	19 (18.6%)
>12 months	4 (3.9%)	5(4.9%)	9 (8.2%)

Table 3: Showing the Disease Pattern & Distribution

Feature	Female (%)	Male (%)	Total (%)
Circumscribed Alopecia (single)	16 (15.7)	19 (18.6)	35 (34.3)
Circumscribed Alopecia (multiple)	21 (20.6)	22 (21.6)	43 (42.2)
Other Patterns	Ophiasis: 3, Sisaipho: 2, Diffuse: 1, Totalis: 1, Reticulate:1, Universalis: 0	Ophiasis: 6, Sisaipho: 2, Diffuse: 2, Totalis: 3, Universalis: 2, Reticulate:1	24 (23.5%)
Lesion Sites	Scalp: 43, Eyebrows: 2, Totalis: 1	Scalp: 45, Beard: 8, Eyebrows: 6, Eyelashes:2	Total = 102

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Table 4: Showing the Family History, Nail & Hair Signs

Parameter	Positive (%)	Negative (%)	Total (%)
Family History	12 (11.8)	90 (88.2)	102 (100)
Exclamation Mark Hair	25 (24.5)	77 (75.5)	102 (100)
Nail Changes	Pitting: 14 (13.7), Long. striations: 6 (5.8)	No changes: 88 (86.3)	102 (100)

Table 5: Showing the Associated Conditions

Condition	Female (%)	Male (%)	Total (%)
Dermatological	Vitiligo: 1, Lichen Planus: 1, Atopic Dermatitis: 3	Vitiligo: 2, Lichen Planus: 2, Atopic Dermatitis: 4	13 (12.7)
Systemic (Thyroid)	TSH Abnormal: 7, T3: 3, T4: 7, Anti-TPO Ab+: 4	TSH Abnormal: 2, T3: 0, T4: 2, Anti-TPO Ab+: 0	TSH/T4: 8.8%, TPO: 3.9%
Glucose Abnormalities	IGT: 2, Diabetic: 0	IGT: 5, Diabetic: 1	8 (7.8%)
Other Systemic	Hypothyroid: 6, Hyperthyroid: 2	Hypothyroid: 1	17 (16.6%)

Table 6: Showing the Immunoglobulin Profile (Alopecia Areata vs Control)

Immunoglobulin	Control (n=6) Mean ± SD	Study (n=20) Mean ± SD	P-value
IgG	1335.2 ± 312.6	978.95 ± 243.4	<0.05
IgM	155.36 ± 37.2	118.73 ± 31.2	<0.05
IgA	209.4 ± 46.5	175.9 ± 29.7	<0.05

Table 7: Showing the Treatment Outcomes by Severity

Severity Level	Modality
Localized	ILS: 46.6%, ILS+Tacrolimus: 66.6%, Topical steroid: 35.7%
Moderate to Severe	Steroid Pulse: 37.5%, Pulse + Azathioprine: 64.2%, Pulse + Minoxidil: 58.3%
Resistant Cases	Totalis: 66% improvement, Universalis: 0%, Reticular/ophiasis: 33%

Discussion

One The objective of this clinico-etiological study was to assess the clinical, demographic, and associated systemic features of alopecia areata in individuals from Western Uttar Pradesh. A total of 102 patients were evaluated, and the findings highlight regional trends while also generally agreeing with recent research. With an average age of 22 ± 9.61 years, the age distribution of our study revealed that the majority of patients were between the ages of 21 and 30 (30.4%), closely followed by those between the ages of 11 and 20 (29.4%). This age distribution is consistent with previous studies that suggest alopecia areata typically manifests in young adulthood, most likely due to increased environmental exposures and heightened autoimmune responses during this time [10, 11].

Significant urban domination (61.8%) suggests that urban residents are more likely than rural ones to seek health care and to be aware of it. Additionally, a considerable proportion of patients (64.7%) were

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unmarried, suggesting that alopecia areata may have an impact on mental and social well-being [12]. Multiple defined alopecia lesions (42.2%) were the most common pattern in clinical settings, followed by single lesions (34.3%). Similar observations were made for less common but noteworthy variations such as ophiasis, sisaipho, diffuse alopecia, alopecia totalis, reticulate, and universalis. The frequency of scalp involvement, together with the involvement of the beard, eyebrows, and eyelashes in certain patients, emphasises the need for thorough assessment of the scalp and extra-scalp regions in order to avoid under diagnosing disease [13, 14].

11.8% of patients had a positive family history, indicating a hereditary predisposition that is consistent with the autoimmune nature of the disease. A classic sign of disease activity, exclamation mark hairs, were seen in 24.5% of patients. 19.5% of patients had altered nails, with pitting and longitudinal striations being the most common. These findings suggest that the nail matrix was involved, which is often associated with more severe or long-lasting instances. The autoimmune overlap theory in alopecia areata was further supported by the observation that 12.7% of patients had coexisting dermatological diseases like vitiligo, lichen planus, and atopic dermatitis. Alopecia areata and autoimmune thyroid disorders are frequently associated, as seen by the 8.8% of patients with thyroid dysfunction based on TSH/T4 values and the 3.9% with anti-TPO antibody positive. The need for a thorough metabolic and endocrine evaluation in patients with alopecia areata is further supported by the prevalence of glucose intolerance (7.8%) and other systemic disorders (16.6%), especially hypothyroidism [15, 16, 17].

Our immunological analysis revealed that alopecia areata patients had considerably lower levels of immunoglobulins (IgG, IgM, and IgA) than controls. This might suggest a dysregulated immune response as a possible pathogenic mechanism in alopecia areata, as well as impaired humoral immunity [18]. The severity of the condition affected the therapeutic response. The combination of topical tacrolimus and intralesional steroids (ILS) had the highest results in localised instances (66.6%), highlighting the effectiveness of localised immunosuppression in the early stages of illness [19]. Systemic immunomodulation, especially steroid pulse therapy in conjunction with azathioprine (64.2%), was the most effective treatment for moderate to severe cases. Treatment of resistant cases was still difficult, though; alopecia universalis did not improve with treatment, despite ophiasis and reticular forms showing some improvement (33-66%), which is indicative of the poor prognosis frequently linked to this widespread variety [20].

Conclusion

The The study highlights that alopecia areata in Western Uttar Pradesh primarily affects young adults, with variable clinical presentations and systemic associations. The disease's association with thyroid dysfunction, nail abnormalities, and other dermatologic comorbidities supports its autoimmune character. Its pathogenesis may involve immunoglobulin deficiency. While resistant forms continue to be a therapeutic challenge, early and well focused therapy yields the best results, especially in localised disease. These results highlight how crucial early detection, systematic assessment, and customised therapy plans are to the management of alopecia areata.

Conflict of interest

This research project had no conflicts of interest

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