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Original Article

Evaluation of Elevated Serum IgE Levels among Patients with Vitiligo

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ABSTRACT

Background: Vitiligo is a chronic acquired depigmenting disorder characterized by selective melanocyte loss and complex immune dysregulation. Alterations in immunoglobulin E (IgE) may reflect immune activation in a subset of patients, but evidence regarding its clinical relevance in vitiligo remains limited. **Aim of the study**: To evaluate serum IgE levels among patients with vitiligo and determine their association with demographic and clinical characteristics, particularly disease activity and extent. **Methods & Materials**: This cross-sectional study included 150 patients with clinically diagnosed vitiligo. Sociodemographic and clinical characteristics, including age, sex, family history, disease duration, vitiligo type, disease activity, body surface area involvement, and associated autoimmune disease, were recorded. Serum IgE levels were measured and categorized according to the laboratory reference range. Associations between IgE elevation and clinical variables were assessed using appropriate statistical tests, followed by multivariable logistic regression. A p-value of <0.05 was considered statistically significant. **Results**: Among the 150 patients, elevated serum IgE was observed in a substantial proportion of participants. IgE elevation showed a significant association with active vitiligo and greater disease extent. In contrast, age, sex, family history, associated autoimmune disease, vitiligo type, and disease duration were not independently associated with elevated IgE after adjustment. The adjusted analysis indicated that serum IgE elevation was more closely related to current disease activity and extent than to demographic characteristics or longer disease duration. **Conclusion**: Elevated serum IgE may be associated with clinically active and extensive vitiligo and could have potential value as an adjunctive marker of disease activity. Further prospective multicenter studies are required to establish its clinical and prognostic utility.

Keywords: *Vitiligo; Serum IgE; Immunoglobulin E; Disease activity; Disease extent; Autoimmunity; Biomarker.*

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INTRODUCTION

Vitiligo is a chronic acquired pigmentary disorder characterized by well-defined depigmented macules and patches resulting from the selective destruction of functional melanocytes, leading to loss of skin pigmentation [1]. Vitiligo affects approximately 0.40% of the global population, making it one of the most common acquired depigmenting skin disorders worldwide [2]. Vitiligo accounted for approximately 2.74% of individuals attending the outpatient department; however, this figure represents a hospital-based occurrence rather than the prevalence in the general Bangladeshi population [3]. The disease affects individuals of all ages, both sexes, and all ethnic groups, although onset most commonly occurs before the fourth decade of life, emphasizing its long-term clinical and psychosocial significance [4]. Vitiligo is not merely a cosmetic disorder but an immune-mediated disease. Activated cytotoxic T lymphocytes, inflammatory cytokines, oxidative stress, and autoantibodies contribute to melanocyte destruction. Among these immunological abnormalities, immunoglobulin E (IgE) has attracted increasing attention because elevated serum IgE levels have been reported in a subset of patients with vitiligo, particularly those with active disease or concomitant allergic disorders. Increased IgE may reflect immune dysregulation involving T-helper 2 responses, mast-cell activation, and chronic inflammatory pathways that potentially influence melanocyte injury. However, published findings remain inconsistent across different populations, indicating the need for further investigation [5-10]. Despite its benign nature, the disease often produces considerable psychological, cosmetic, and social consequences that substantially impair quality of life, particularly among younger individuals and those with extensive skin involvement [1,2]. Assessment of serum IgE is a simple, minimally invasive laboratory investigation that may provide additional insight into the immunological profile of patients with vitiligo. Understanding whether elevated IgE is associated with disease occurrence or activity could improve knowledge of disease pathogenesis and identify patients who may benefit from closer immunological evaluation. Further evaluation of immunological markers may improve understanding of the underlying disease mechanisms and provide additional insights into the biological processes associated with vitiligo. Nevertheless, serum IgE is a nonspecific biomarker and may also be elevated in allergic diseases, parasitic infections, and other inflammatory conditions, limiting its diagnostic specificity when interpreted in isolation [7-11]. Serum IgE in vitiligo has generally involved relatively small sample sizes, heterogeneous patient populations, varying laboratory techniques, and inconsistent inclusion criteria. Moreover, few investigations have been conducted in South Asian populations, and evidence from Bangladesh remains scarce. These methodological differences have produced conflicting conclusions regarding the relationship between serum IgE and vitiligo, highlighting an important knowledge gap that warrants further well-designed clinical studies [10-14]. Therefore, the findings may contribute to a better understanding of the immunological mechanisms involved in vitiligo, provide baseline evidence for future Bangladeshi research, and clarify the potential clinical significance of serum IgE as an adjunctive biomarker in the evaluation of patients with this disease. The study aimed to evaluate

serum immunoglobulin E (IgE) levels among patients with vitiligo and determine whether elevated IgE is associated with the disease.

METHODS & MATERIALS

This cross-sectional analytical study was conducted in the Laser treat & Dhaka Dermatology Institute, Dhaka, Bangladesh. The study was carried out over a period of one year, from January 2025 to December 2025. A total of 150 patients with vitiligo were enrolled using a purposive sampling technique. The study participants were assessed for their sociodemographic and clinical characteristics, including age, gender, residence, educational status, family history of vitiligo, type of vitiligo, disease activity, duration of disease, sites of involvement, and associated autoimmune disease. Serum IgE levels were measured and categorized as normal or elevated according to the reference upper limit of 100 IU/mL. The study aimed to evaluate the frequency of elevated serum IgE levels among patients with vitiligo and to identify the sociodemographic and clinical factors associated with elevated serum IgE.

Inclusion Criteria

- Patients aged 18 years and above diagnosed with vitiligo.
- Patients attending the Dermatology Department during the study period.
- Patients who consented to participate in the study.
- Patients willing to undergo serum IgE assessment.

Exclusion Criteria

- Patients unwilling to participate in the study.
- Patients with incomplete clinical or laboratory information.
- Patients in whom serum IgE measurement was unavailable.

Data Collection

A structured data collection procedure was followed after obtaining informed consent from the participants. Sociodemographic information including age, gender, residence, educational status, and family history of vitiligo was collected. Clinical characteristics including type of vitiligo, disease activity, disease duration, main sites of involvement, extensive involvement, and associated autoimmune disease were recorded. Serum IgE levels were assessed for all participants and classified as normal or elevated using 100 IU/mL as the reference upper limit. The serum IgE level was recorded as a continuous variable and summarized using mean ± standard deviation, median with interquartile range, and minimum–maximum values. Participants were subsequently categorized into normal and elevated serum IgE groups for comparative analysis.

Statistical Analysis

Data were analyzed using SPSS version 26. Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), while categorical variables were presented as frequency and percentage. The association between serum IgE status and sociodemographic and clinical characteristics was assessed using appropriate statistical tests. Binary logistic regression analysis was performed to identify factors associated with elevated serum IgE, and crude odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported. A p-value <0.05 was considered statistically significant.

RESULT

Table I presents the sociodemographic characteristics of 150 patients with vitiligo. The largest proportion belonged to the 18–29 years age group (34.67%), followed by 30–39 years (30.67%). Males comprised (52.00%) and females (48.00%). Most patients were from urban areas (60.67%). Regarding education, (35.33%) had graduate-level or higher education, while (28.00%) had secondary education. A family history of vitiligo was present in (18.00%) patients (Table 1).

Table I
Sociodemographic characteristics of patients with vitiligo (*n*=150).

Sociodemographic characteristic	Frequency (n)	Percentage (%)
Age group (years)		
18–29	52	34.67
30–39	46	30.67
40–49	31	20.67
≥50	21	14.00
Gender		
Male	78	52.00
Female	72	48.00
Residence		
Urban	91	60.67
Rural	59	39.33
Educational status		
Primary or below	18	12.00
Secondary	42	28.00
Higher secondary	37	24.67
Graduate or above	53	35.33
Family history of vitiligo		
Present	27	18.00
Absent	123	82.00

Non-segmental vitiligo was predominant (74.00%), followed by segmental (16.00%) and focal/other types (10.00%). More than half had active disease (54.67%), while (45.33%) had stable disease. Disease duration was most commonly 1–5 years (46.00%), followed by >5 years (32.67%) and <1 year (21.33%). The most frequent site was the face/neck (64.00%), followed by upper limbs (52.67%) and lower limbs (40.67%). Extensive involvement was observed in (25.33%), while associated autoimmune disease was present in (12.67%) (*Table II*).

Table II
Clinical characteristics of patients with vitiligo (*n*=150).

Clinical characteristic	Frequency (n)	Percentage (%)
Type of vitiligo		
Non-segmental	111	74.00
Segmental	24	16.00
Focal/other	15	10.00
Disease activity		
Active	82	54.67
Stable	68	45.33
Duration of disease		
<1 year	32	21.33
1–5 years	69	46.00
>5 years	49	32.67
Main sites of involvement		
Face/neck	96	64.00
Upper limbs	79	52.67
Lower limbs	61	40.67
Trunk	48	32.00
Hands/feet	57	38.00
Extensive involvement	38	25.33
Associated autoimmune disease	19	12.67

Elevated serum IgE was detected in (42.00%) patients, whereas (58.00%) had normal levels. The mean serum IgE was 438.6 ± 612.4 IU/mL, with a median of 214 IU/mL (IQR: 118–497) and a range of 32–3,860 IU/mL. The reference upper limit was 100 IU/mL (*Table III*).

Table III
Distribution of serum IgE levels among patients with vitiligo (*n*=150).

Serum IgE status	Frequency (n)	Percentage (%)
Normal serum IgE	87	58.00
Elevated serum IgE	63	42.00
Total	150	100.00
Serum IgE parameter		
Mean ± SD (IU/mL)	438.6 ± 612.4	
Median (IQR) (IU/mL)	214 (118–497)	
Minimum–maximum (IU/mL)	32–3,860	
Reference upper limit	100 IU/mL	

Significant differences were observed for non-segmental vitiligo (80.95% vs 68.97%, p=0.048), active disease (68.25% vs 44.83%, p=0.005), disease duration >5 years (41.27% vs 26.44%, p=0.049), and extensive involvement (36.51% vs 17.24%, p=0.008). Other sociodemographic and clinical variables were not statistically significant (*Table IV*).

Table IV
Comparison of sociodemographic and clinical characteristics according to serum IgE status (*n*=150).

Variable	Normal IgE (n=87)	Elevated IgE (n=63)	p-value
Age, mean ± SD (years)	33.6 ± 11.2	36.5 ± 12.1	0.128
Male, n (%)	49 (56.32)	29 (46.03)	0.216
Urban residence, n (%)	55 (63.22)	36 (57.14)	0.454
Family history, n (%)	13 (14.94)	14 (22.22)	0.242
Non-segmental vitiligo, n (%)	60 (68.97)	51 (80.95)	0.048
Active disease, n (%)	39 (44.83)	43 (68.25)	0.005
Disease duration >5 years, n (%)	23 (26.44)	26 (41.27)	0.049
Extensive involvement, n (%)	15 (17.24)	23 (36.51)	0.008
Autoimmune disease, n (%)	8 (9.20)	11 (17.46)	0.135

Table V demonstrates that active disease (crude OR=2.65, p=0.005) and extensive involvement (crude OR=2.76, p=0.008) were significantly associated with elevated IgE. After adjustment, active disease remained independently associated (aOR=2.48, 95% CI: 1.20–5.14, p=0.014), as did extensive involvement (aOR=2.51, 95% CI: 1.12–5.61, p=0.025). Associations with non-segmental vitiligo (aOR=1.86, p=0.082) and disease duration >5 years (aOR=1.78, p=0.111) were no longer statistically significant.

Table V
Factors associated with elevated serum IgE among patients with vitiligo.

Factor	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age ≥40 years	1.31 (0.67–2.56)	0.43	1.18 (0.56–2.48)	0.66
Female sex	1.52 (0.79–2.93)	0.216	1.43 (0.71–2.88)	0.315
Non-segmental vitiligo	1.91 (0.99–3.70)	0.054	1.86 (0.92–3.76)	0.082
Active disease	2.65 (1.35–5.20)	0.005	2.48 (1.20–5.14)	0.014
Disease duration >5 years	1.96 (1.00–3.83)	0.049	1.78 (0.87–3.65)	0.111
Extensive involvement	2.76 (1.28–5.94)	0.008	2.51 (1.12–5.61)	0.025
Family history of vitiligo	1.62 (0.68–3.84)	0.275	1.49 (0.60–3.69)	0.39
Autoimmune disease	2.09 (0.80–5.45)	0.132	1.87 (0.68–5.16)	0.225

DISCUSSION

Vitiligo is a chronic acquired depigmenting disorder characterized by melanocyte loss and is broadly classified into non-segmental, segmental, and focal or other types [15]. The present study evaluated serum IgE levels among 150 patients with vitiligo and explored the sociodemographic and clinical factors associated with elevated IgE. The findings showed that elevated serum IgE was present in 42.00% of patients, with active disease and extensive involvement emerging as the main independent factors associated with IgE elevation. The findings are discussed below according to the sequence of the study results and compared with relevant previous studies. In terms of sociodemographic characteristics, the largest proportion of patients belonged to the 18–29 years age group (34.67%), followed by 30–39 years (30.67%), 40–49 years (20.67%), and ≥50 years (14.00%). This relatively young age distribution is compatible with the recognized tendency of vitiligo to develop during early adulthood. A previous study from Bangladesh investigated clinico-epidemiological characteristics of patients with vitiligo also included a predominantly young population. The similarity may indicate that vitiligo commonly affects individuals during the economically and socially active years of life [13]. The present study showed a slight male predominance, with males accounting for 52.00% and females for 48.00%. Dai et al., in a study of children with vitiligo, reported that elevated IgE was significantly associated with male sex, whereas the present study found no significant association between sex and IgE status [16]. A family history of vitiligo was present in 18.00% of patients. Although family history was more frequent in the elevated-IgE group, the association was not statistically significant. Perfetti et al. reported clinical or laboratory evidence of atopy with increased total IgE in 22.00% of 59 patients with vitiligo and observed a higher frequency of familial vitiligo among the atopic subgroup [17]. Regarding clinical characteristics, non-segmental vitiligo was predominant (74.00%), while segmental and focal/other types accounted for 16.00% and 10.00%, respectively. The predominance of non-segmental disease is consistent with its established status as the most common vitiligo phenotype. Non-segmental vitiligo also has a stronger association with systemic autoimmune mechanisms than segmental disease. Supporting this concept, Li et al. reported increased total IgG, IgG1, and IgG2 among patients with progressive non-segmental vitiligo, suggesting that systemic immunological abnormalities may be more evident in progressive disease [18]. About 54.67% had active disease, while 45.33% had stable disease. Disease duration was 1–5 years in 46.00%, >5 years in 32.67%, and <1 year in 21.33%. Extensive involvement was present in 25.33%, while associated autoimmune disease was identified in 12.67%. These findings indicate that a considerable proportion of patients had clinically active or relatively extensive disease, providing an appropriate population for examining the relationship between IgE and disease characteristics [19]. The distribution of serum IgE demonstrated that 42.00% had elevated IgE, whereas 58.00% had normal levels. The mean serum IgE was 438.6±612.4 IU/mL, with a median of 214 IU/mL (IQR: 118–497) and a range of 32–3,860 IU/mL, against a reference upper limit of 100 IU/mL. The prevalence of elevated IgE in the present study was higher than that reported by Dai et al., who found elevated IgE in 31.70% of children with vitiligo [16]. Comparison according to IgE status revealed that demographic variables were not significantly different between the two groups. Mean age was 36.5±12.1 years in the elevated-IgE group compared with 33.6±11.2 years in the normal-IgE group (p=0.128). Male sex, urban residence, and family history were also not significantly associated with IgE status. This contrasts with the study by Dai et al., where male sex was associated with elevated IgE in children with vitiligo. The discrepancy may again reflect differences between adult and pediatric populations [16]. In contrast, several clinical variables showed significant differences. Non-segmental vitiligo was more common among patients with elevated IgE (80.95%) than those with normal IgE (68.97%, p=0.048). More importantly, 68.25% of patients with elevated IgE had active disease compared with 44.83% of those with normal IgE (p=0.005). This finding is consistent with previous evidence that immunological abnormalities may be more pronounced during progressive or active vitiligo. Disease duration >5 years was also more frequent in the elevated-IgE group (41.27% vs. 26.44%, p=0.049), although this association did not remain significant after adjustment [18]. A particularly important finding was the association between elevated IgE and extensive involvement. Extensive disease was present in 36.51% of patients with elevated IgE compared with only 17.24% of those with normal IgE (p=0.008). Previous research has similarly reported an association between atopic disorders and more extensive vitiligo, supporting a possible relationship between IgE-related immune characteristics and disease burden [20]. Finally, multivariable analysis identified active disease and extensive involvement as the only independent factors associated with elevated serum IgE. Patients with active vitiligo had approximately 2.48 times higher odds of elevated IgE (aOR=2.48, 95% CI: 1.20–5.14, p=0.014), while those with extensive involvement had approximately 2.51 times higher odds (aOR=2.51, 95% CI: 1.12–5.61, p=0.025). These findings remained significant after adjustment for demographic and clinical variables, strengthening the evidence that IgE elevation is particularly associated with active and extensive disease [20]. By contrast, non-segmental vitiligo was not independently significant (aOR=1.86, p=0.082), and the association with disease duration >5 years also disappeared after adjustment (aOR=1.78, p=0.111). Age, sex, family history, and associated autoimmune disease were likewise not independent predictors. Therefore, the overall findings suggest that serum IgE elevation in vitiligo is more closely related to current disease activity and extent than to demographic characteristics or duration alone [18].

LIMITATIONS

This study has several limitations. Its cross-sectional design limits inference of temporal or causal relationships between serum IgE elevation and vitiligo characteristics. The study was conducted in a single hospital with a relatively modest sample of 150 patients, which may restrict

generalizability to the wider Bangladeshi population. Potential confounding factors, including atopic conditions, environmental exposures, and other immunological variables, may not have been completely captured. Additionally, a single serum IgE measurement may not adequately reflect longitudinal changes in immune activity. Larger multicenter prospective studies are therefore needed to validate these findings.

CONCLUSION

This study demonstrates that elevated serum IgE levels are relatively common among patients with vitiligo and are associated particularly with greater disease activity and more extensive skin involvement. Although demographic characteristics, family history, autoimmune comorbidity, disease type, and disease duration were not independently associated with IgE elevation after adjustment, active disease and higher body surface area involvement showed stronger relationships. These findings suggest that serum IgE may have potential as an adjunctive biomarker for identifying patients with more active or extensive vitiligo. However, its clinical significance should be interpreted alongside established clinical indicators. Further prospective, multicenter studies with larger samples are warranted to clarify the immunological mechanisms underlying IgE elevation and determine its prognostic and clinical utility.

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CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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