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ORIGINAL ARTICLE

Evaluation of IL-17 and Vitamin B_{12} Levels in the Serum of Vitiligo Patients in Najaf Governorate

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ABSTRACT

Background: *Vitiligo is an autoimmune disease marked by the destruction of epidermal melanocytes, typically presenting as white skin patches.* ***Objectives****: this study aimed to investigate the role of IL-17 and Vit. B_{12} in vitiligo patients in Najaf Governorate by comparing their levels with the control group.* ***Methodology:*** *This case control study was conducted on 63 patients with vitiligo from Department of Dermatology in AL-Najaf AL-Ashraf Teaching Hospital and AL-Sader Medical City, and 25 age- and sex-matched healthy controls. Patients were identified by the physician based on clinical history, symptoms and by using Wood's lamp, each patients group of the study was divided into subgroups according to the age, gender, age at disease onset, type, severity of vitiligo disease and family history. The concentration of Vit.B_{12} was estimated by using Cobas e 411 Analyzer), the serum levels of IL-17 were measured by ELISA method.* ***Results:*** *The highest percent of vitiligo patients was in the age group 16- 30 years as (36.5%), followed by the age group under 15 years (30.2 %) compared with other groups. The highest percentage of vitiligo patients were males (57.1%). The largest percentage of patients within the Generalized vitiligo type (63.5 %). The largest percentage (54.0 %) of patients had the disease onset at the age of under 15years compared to other groups. As for the history of the vitiligo, (58.7 %) of patients were without family history. The results showed a significant increase ($p=0.016$) in the levels of IL-17 and significant decrease ($p=0.001$) in serum Vit.B_{12} in vitiligo patients compared with control group. IL-17 was significantly elevated ($p=0.007$) in male vitiligo patients compared to female vitiligo patients. Also, the levels of IL-17 was increased in the age group (Under 15 years) compared to other groups, and there was a significant decrease in Vit. B_{12} in the two age groups: (Under 15 years) and (16- 30 years. The results showed that there was a slight significant difference ($p=0.067$) in the levels of interleukin -17 in serum of vitiligo patients groups depending on the types of vitiligo. And there was a significant decrease in Vit. B_{12} in the generalized vitiligo group comparing with other groups:* ***Conclusion:*** *IL-17 and Vit.B_{12} have an association with vitiligo.*

INTRODUCTION

The autoimmune loss of melanocytes is the immuno-inflammatory genesis of vitiligo, an autoimmune illness that results in skin depigmentation [1,2]. It affects between 0.5% and 2.0% of the population [3].

The patient typically exhibits well-defined, amelanotic, chalky-white skin patches that can show up in specific locations. Vitiligo patients may also have serious psychological consequences and a reduced quality of life [4].

Interleukin 17 (IL-17) is linked to the pathogenesis of several autoimmune diseases, but its exact function in vitiligo is unknown. Increased levels of IL-17 in the tissues, cells, and systemic levels have been linked to vitiligo, according to recent studies conducted on humans and mice[5]. Additionally, IL-17 and these local inflammatory mediators cooperate to further restrict melanocyte growth[6].

Vitamin B_{12} contributes significantly to the production of melanin by activating a variety of biochemical pathways. A nutritional deficiency in vitamin B_{12}, which has been found to be a significant predictor of homocysteine (Hcy) levels due to its role as a cofactor of the enzyme methyltransferase for the regeneration of methionine from Hcy, results in hyperhomocysteinemia [7]. It is believed that vitiligo is caused by the detrimental effects of high Hcy levels on melanocytes[7]. The exact reason of melanocyte death is complicated and hasn't been identified yet[8].

Therefore, the aim of this research was to study the epidemiology of vitiligo in Najaf Governorate and to study the association of IL-17 and Vit.B_{12} to this disease.

METHODOLOGY

The present research was done between September 2024 and January 2025. Samples were obtained from the Department of Dermatology at AL-Najaf AL-Ashraf Teaching Hospital and AL-Sader Medical City. This case-control research comprised sixty-three vitiligo patients and twenty-five controls of comparable age and gender. The physician selected patients based on their clinical history and symptoms, as well as utilizing Wood's light. Each participant was given a questionnaire to gather information on their age, family history of vitiligo, duration of vitiligo, and medication history. Additionally, research participants' agreement was acquired prior to data collection and blood collection. Each patient group in the research was split into subgroups based on the type, severity, age at illness beginning, gender, age, and family history of vitiligo disease, in accordance with the experimental design of the study and the data for each subject.

Exclusion criteria

Participants were excluded from the study if they had diabetes, arthritis, allergic diseases, depigmentation-causing dermatological conditions, inflammatory conditions, acute or chronic infections, or had been taking vitamins for vitiligo for at least three months before enrolling.

Control group

The twenty-five healthy men and women made up the control group. All of the control subjects' medical histories were documented. Adults without skin conditions who were in good health made up the control group. When they were examined at regular intervals, they showed no symptoms. The subjects in the control group lived in the same neighborhood as vitiligo sufferers.

Methods

Five milliliters of venous blood were collected. The gel tube is left at room temperature to allow the blood to coagulate. The serum is separated by aspirating it after centrifuging it at 3000 rounds per minute (r. p. m.) for 5–10 minutes. The resulting serum is then placed in additional disposable sterile plain tubes, labeled, and assigned a serial number along with the patient's name. separated into aliquots and kept in Eppendorf tubes at -20 °C until the research parameters were measured.

Biochemical Tests

The concentration of Vit.B12 was calculated by using Cobas e 411 Analyzer that was a "fully automated analyzer that procedures a patented ElectroChemiLuminescence (ECL) technology for immunoassay analysis".

The enzyme-linked immunosorbent assay (ELISA) technique was used to determine the blood levels of Interleukin 17 (IL-17), in accordance with the prepared procedure from Sun Long Biotech, China, Catalog No.: SL0978Hu.

Statistical Analysis

The statistical program SPSS version 25 was used to analyze the results of this research. "P value≤0.05 was considered statistically significant". Chi-Square test was used for comparing nominal and categorical data between groups, results was expressed as frequency, percentage. T- tests was used to compare normally distributed pairwise groups. Also, ANOVA test was used to compare normally distributed more than two groups, and LSD was used for post-hoc comparison and the results was expressed as mean ± standard deviation. The Spearman's correlation was utilized for detection of a linear correlation between two variables. "Receiver operating characteristic (ROC) curve" was used to show the relationship between medical sensitivity, specificity and cut-off point for the tests in this study.

RESULTS

Characteristics of the study population

This study included 63 patients with vitiligo and 25 healthy individuals. Table (1) shows the demographic characteristics of the two groups. The results showed that the average age of vitiligo patients was 26.68±15.39 years, the median was 20 years, and the minimum-maximum value were 5- 58 years. While the average age of the control group was 26.80±12.13 years, the median was 26 years, and the minimum- maximum value were 5- 52 years.

The results in the same table showed that there was a significant difference (p=0.040, Chi-Square=8.302) in the numbers and percentages of the age groups of vitiligo patients, as the highest percent was in the age group 16- 30 years (36.5%), followed by the age group under 15 years (30.2 %) compared with the age group above 46 years (20.6%) and the age group 31- 45 years (12.7 %). While the control group had the numbers and percentage of age groups without significant differences (p=0.989, Chi-Square: 0.120) due to its collection in a selective manner.

From table (1), the results show the highest percentage of vitiligo patients were males by (57.1%), while Female were (42.9 %), but this difference was not significant (p=0.257, Chi-Square=1.286). For the control group, there was no significant differences (p=0.841, Chi-Square: 0.040) in the number of male (52%) and female (48 %).

Clinical characteristics of vitiligo patients

Clinical characteristics of vitiligo patients are summarized in Table (2). Regarding the type of vitiligo, the results showed that 100% of patient had non-segmental vitiligo. As for the types of vitiligo within non-segmental type, the results showed that there were significant differences (p=0.001, Chi-Square= 50.333) in numbers and percentage, as the largest percentage of patients within the Generalized (63.5 %), followed by

Facial vitiligo (15.9 %), then the Acrofacial (11.1 %), and finally Focal (9.5 %).

Also the results in the same table showed that there were significant differences (p=0.002, Chi-Square: 31.032) in the age groups in which the disease appeared, as the largest percentage (54.0 %) of patients had the disease at the age of under 15years , and (23.8 %) had the disease at the age 16- 30 years, compared to (12.7 %) had the disease at the age 31- 45 years and (9.5 %) had the disease at the age above 46 years.

As for the family history of the vitiligo, the results showed that there was non-significant deference's (p=0.166, Chi-Square: 1.921), however, the highest percentage of patients were without family history 37 (58.7 %) compared to patients who had a family history of vitiligo 26 (41.3%).

As for the results of vitiligo stability, the results indicate that (63) 100% of patients had Active vitiligo.

Table 1: Demographic characteristic of the study populations

Demographic Characteristics		**Group of Vitiligo patients (N=63)**			**Control group (N= 25)**		
1. Age-years	**Mean±SD**	**26.68±15.39**			**26.80±12.13**		
	Median	**20.00**			**26.00**		
	Minimum- maximum	**5-58**			**5- 52**		
2. Age Groups (years)		**Number (%)**	**Chi-Square**	**p-value**	**Number (%)**	**Chi-Square**	**p-value**
Under 15 years		19 (30.2 %)	8.302	0.040	6 (24 %)	0.120	0.989
16- 30 years		23 (36.5%)*			6 (24 %)		
31- 45 years		8 (12.7 %)			6 (24 %)		
Above 46 years		13 (20.6%)			7 (28 %)		
Total number		63 (100%)			25 (100%)		
3. Gender							
Male		36 (57.1%)	1.286	0.257	13(52 %)	0.040	0.841
Female		27 (42.9 %)			12 (48 %)		
Total number		63 (100%)			25 (100%)		

* Significant differences at p-value <0.05. Values are expressed as frequencies and percentage. Chi-Square test.

Table 2: The clinical characteristic of vitiligo patients

Clinical characteristic of Vitiligo patients (N=63)		**Number (%)**	**Significant**
1. Type of Vitiligo	**63(100%) Non_ segmental vitiligo**		Chi-Square: 50.333 P- value: 0.001
	Facial	10 (15.9 %)	
	Acrofacial	7 (11.1 %)	
	Generalized	40 (63.5 %)*	
	Focal	6 (9.5 %)	
	Total numbers	63 (100%)	
2. Age at disease onset (years)	**Under 15 y**	34 (54.0 %)*	Chi-Square: 31.032 P- value: 0.002
	16- 30 y	15 (23.8 %)*	
	31- 45 y	8 (12.7 %)	
	Above 46 y	6 (9.5 %)	
	Total numbers	63 (100%)	
3. Family history	**Yes**	26 (41.3 %)	Chi-Square: 1.921 P- value: 0.166
	No	37 (58.7 %)	
	Total numbers	63 (100%)	
4. Stability of vitiligo	(63) 100% Active		

*Significant differences at p-value <0.05. Values are expressed as frequencies and percentage. Chi-Square test.

Comparison of IL-17 and Vit.B_{12} parameters between vitiligo patients and control groups.

The results in Table (3) showed a significant increase (p=0.016) in the levels of IL-17 in Vitiligo patients (18.374 ± 4.055 pg/ml) compared with control group (16.227±2.476 pg/ml). Also, there was a significant decrease (p=0.001) in serum Vit.B_{12} of Vitiligo patients (282.17±55.174 pg/ml) compared with control group (387.37± 86.502pg/ml).

The mean ±SD for serum IL-17 in male vitiligo patients was (19.541±4.332pg/ml) and in female Vitiligo patients was (16.819±3.090pg/ml). Serum levels of IL-17 was significantly elevated (p=0.007) in male vitiligo patients compared to female vitiligo patients Table (4).

Also, the results indicate that there was an insignificant decrease (p=0.304) on serum Vit.B_{12} for male vitiligo patients (275.942±61.422pg/ml) compared with female vitiligo patients (290.481±45.334pg/ml).

The results in Table (5) showed that there was a significant difference (p=0.024) in the levels of interleukin -17 in serum of vitiligo patients depending on their age group. The levels of IL-17 (20.666± 5.358 pg/ml) was increased in the age group (Under 15 years) compared to other groups. As for the age groups (16-30 years), (31- 45 years) and (Above 46 years) there was on significant difference in the levels of IL-17 between them, where there concentration were as follows: (17.496± 2.566 pg/ml), (16.588± 4.043 pg/ml) and (17.678± 2.798 pg/ml) respectively.

Also, the results indicated that there was a significant difference (P=0.001) in the levels of Vit. B_{12} in serum of vitiligo patients depending on their age group. The results showed that there was a significant decrease in Vit. B_{12} in the two age groups: (Under 15 years) and (16- 30 years), which was estimated as (273.77± 49.59 pg/ml) and (255.58± 46.37 pg/ml) compared to age groups (31- 45 years) and (Above 46 years) where the Vit. B_{12} levels was estimated as: (325.06± 61.29 pg/ml) and (315.09± 45.13 pg/ml) respectively.

In the results of Table (6) it is noted that there was no significant differences in the concentration of IL-17 and vit.B_{12} when comparing vitiligo patients with a family history and patients without a family history of the disease.

Table 3: Comparison of Il-17, Vit.D_3, Vit.B_{12} and Zinc between vitiligo patients and control group

Groups / Parameters	vitiligo patients (N=63) mean±SD	Control groups (N=25) mean±SD	Significant
Il-17 (pg/ml)	18.374 ± 4.055	16.227 ± 2.476	0.016 *
Vit.B_{12}(pg/ml)	282.17 ± 55.174	387.37± 86.502	0.001*

Values are expressed as mean ±SD, SD: Standard deviation.* significant deference (*P*<0.05).

Table 4: Comparison of Il-17, Vit.D_3, Vit.B_{12} and Zinc in vitiligo patients according to the gender

Groups / Parameters	Male Vitiligo patients (N=36) mean±SD	Female Vitiligo patients (N=27) mean±SD	Significant
Il-17 (pg/ml)	19.541±4.332	16.819±3.090	0.007*
Vit.B_{12}(pg/ml)	275.942±61.422	290.481±45.334	0.304

Values are expressed as mean ±SD, SD: Standard deviation.* significant deference(*P*<0.05).

Table 5: Comparison of Il-17 and Vit.B_{12} in vitiligo patients according to the age groups

Parameters / Age groupsof vitiligo patients	Il-17 (pg/ml)	Vit.B_{12} (pg/ml)
Under 15 years (N= 19)	20.666± 5.358 **a**	273.77± 49.59 **a**
16- 30 years (N= 23)	17.496± 2.566 **b**	255.58± 46.37 **a**
31- 45 years (N= 8)	16.588± 4.043 **b**	325.06± 61.29 **b**
Above 46 (N= 13)	17.678± 2.798 **b**	315.09± 45.13 **b**
p-value	0.024*	0.001*

Values are expressed as mean ±SD, SD: Standard deviation* significant deference (*P*<0.05).
Similar letters indicate no significant differences at the 0.05 level.
Different letters indicate a significant difference at the 0.05 level

Table 6: Comparison of Il-17 and Vit.B_{12} in vitiligo patients according to the family history

Groups / Parameters	Vitiligo patients with family history (N=26) mean±SD	Vitiligo patients without family history (N=37) mean±SD	Significant
Il-17 (pg/ml)	17.943± 3.810	18.677± 4.243	0.484 NS
Vit.B_{12}(pg/ml)	278.627± 49.200	284.665± 59.551	0.672 NS

Values are expressed as mean ±SD, SD: Standard deviation, NS: non-significant.

The results in Table (7) showed that there was a slight significant difference (p=0.067) in the levels of interleukin -17 in serum of vitiligo patients groups depending on the types of vitiligo. When comparing the groups the results show that a difference in IL-17 levels in the Facial vitiligo (18.302±3.901pg/ml) and acrofacial vitiligo (16.643±3.634pg/ml) compared with Generalized vitiligo (19.229±4.07 pg/ml) and Focal vitiligo (15.316±3.06 pg/ml), but the difference appeared between Generalized and Focal only (p=0.067).

Also, the results indicated that there was a significant difference (P=0.046) in the levels of Vit. B_{12} in serum of vitiligo patients according to types of vitiligo. The results showed that there was a significant decrease in Vit. B_{12} in the generalized vitiligo group (267.91±49.96 pg/ml) comparing with other groups: the facial (300.68± 61.88 pg/ml), acrofacial (303.18± 37.34 pg/ml) and the focal (318.85± 69.07 pg/ml), and when comparing the last groups with each other, no significant differences appeared between them.

The results of study in Figure (1) revealed that there was statistically significant negative correlation (r=-0.334-**, p=0.008) between serum IL-17 and Vit.B_{12} in vitiligo patients.

Receiver Operating Characteristic Curve for study parameters

The ROC curve analysis (Figure 2) of IL-17 was used to distinguish between vitiligo patients and healthy control group by measurement of the area under the curve (AUC), predictive values, sensitivity, specificity and the cut-off value in vitiligo patients. The area under the ROC curve was 0.656 with sensitivity equal to 73 %, specificity equal to 56 % and at cut-off = 15.816 pg/ml Table (8). Therefore, IL-17 can be proposed as a cytokine that is elevated in vitiligo, and therefore can be used as an indicator of vitiligo severity, and the cut- off value for IL- 17 levels was >15.816 pg/ml.

The ROC curve analysis (Figure 3) of Vit. B_{12} showed that area under the ROC curve was 0.840 with sensitivity equal to 96 %, specificity equal to 68 % and at cut-off= 365.25 ng/ml (Table 9). The ROC curve for this study parameters showed that the serum levels for association of vitiligo were 96 % for Vitamin B_{12}.

Table 7: Comparison of Il-17 and Vit.B_{12} in patients according to the types of vitiligo

Parameters / Types of vitiligo	Il-17 (pg/ml)	Vit.B_{12} (pg/ml)
Facial (N= 9)	18.302±3.901**a**	300.68± 61.88 **a**
Acrofacial (N= 7)	16.643±3.634**a**	303.18± 37.34 **a**
Generalized (N= 40)	19.229±4.07 **ab**	267.91±49.96 **b**
Focal (N= 7)	15.316±3.06 **ac**	318.85± 69.07 **a**
p-value	0.067*	0.046*

Values are expressed as mean ±SD, SD: Standard deviation,
Similar letters indicate no significant differencesat the 0.05 level.
Different letters indicate a significant differenceat the 0.05 level.

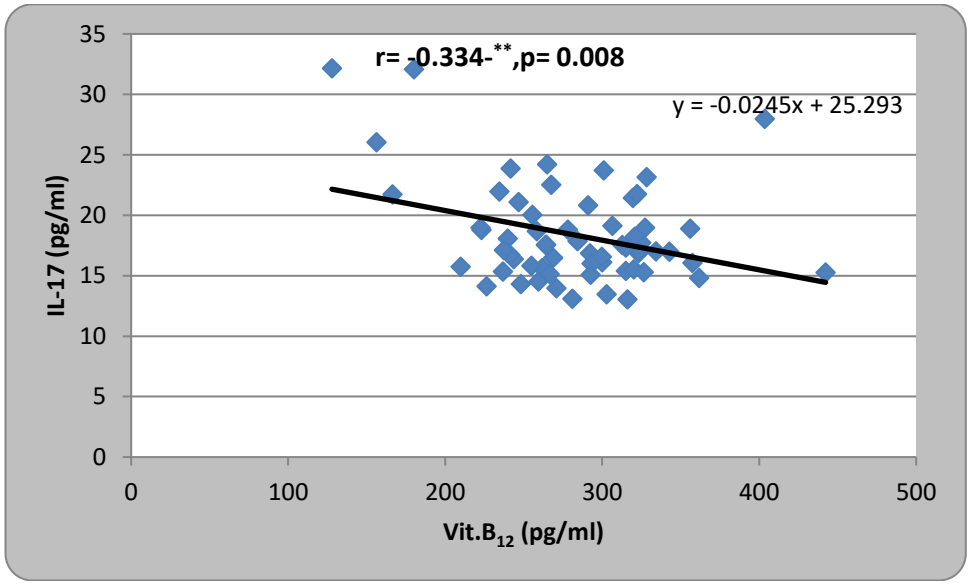

Fig. 1: Pearson correlation (r) between Il-17 and Vit.B_{12} in vitiligo patients

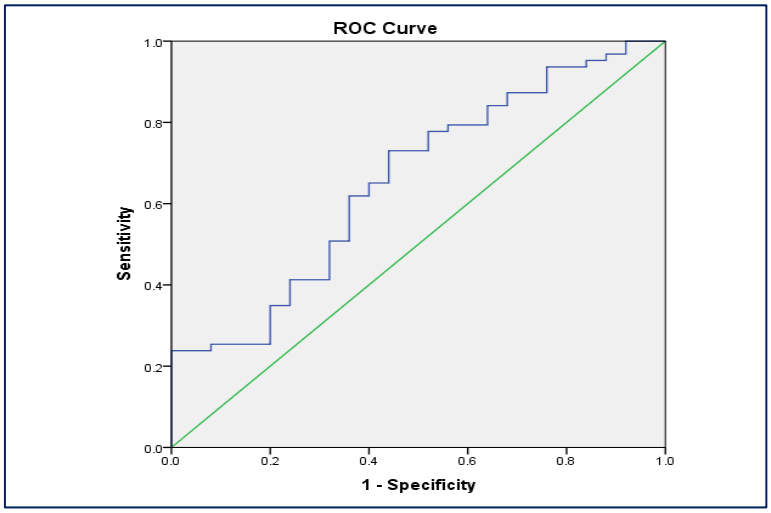

Fig. 2: Receiver Operating Characteristic Curve for IL-17

Table 8: Area Under the ROC Curve (AUC) analysis for IL-17

Il-17 (pg/ml)	AUC	P	95% CI	Cut- off	Sensitivity	Specificity
	0.656	0.023	0.530- 0.782	15.816	0.73	0.56

AUC: Area Under the ROC Curve, CI: Confidence Interval.

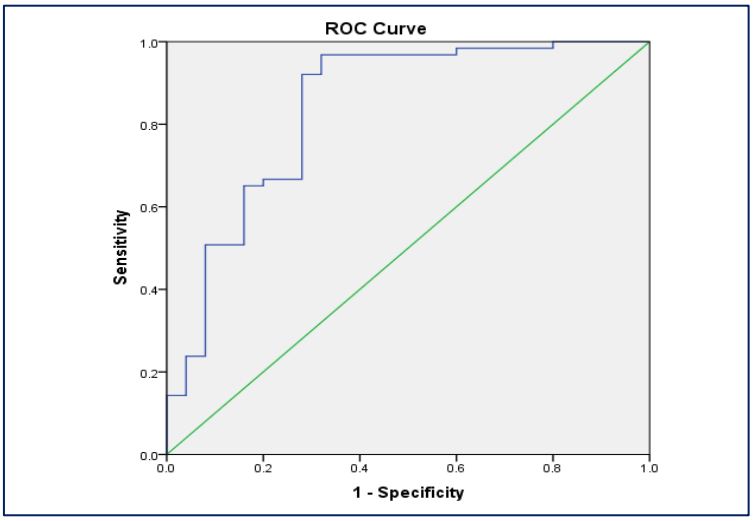

Fig. 3: Receiver Operating Characteristic Curve for Vit. B_{12}.

Table 9: Area Under the ROC Curve (AUC) analysis for Vit. B_{12}.

Vit.B_{12}(pg/ml)	AUC	P	95% CI	Cut- off	Sensitivity	Specificity
	0.840	0.000	0.736- .944	365.25	0.96	0.68

DISCUSSION

Demographic characteristic of the study populations

The results of this study showed that the average age of vitiligo patients was 26.68±15.39 years, and the largest percentage of patients were within the age groups (16- 30) years by (36.5%), followed by the age group (under 15) years (30.2 %) compared with the age group (above 46) years (20.6%) and the age group (31-45) years (12.7 %).

The results show the highest percentage of vitiligo patients were males by (57.1%), while Female were (42.9 %), but this difference was not significant.

The clinical characteristic of vitiligo patients

Results of clinical characteristics in vitiligo patients showed that all of patients had non-segmental vitiligo, and according to the type of vitiligo showed that there

were significant differences, with the most widespread being Generalized (63.5 %), followed by Facial (15.9 %) compared with Acrofacial (11.1 %) and Focal (9.5 %). Also, this study indicated that 100% of the patients had Active vitiligo.

As for the results related to the age at which the disease onset (in years) there were significant differences, with the age group (under 15 years) being the most susceptible to the disease (54.0 %), followed by the age group (16 -30 years) (23.8 %) compared to the age group (31- 45years) (12.7 %) and the age group (over 46years) (9.5 %).

The results showed that there was non-significant deference's according to family history, and the percentage of vitiligo patients without a family history (58.7 %) is higher than vitiligo patients with a family history (41.3%).

The results of current study provide a risk indicator because the majority of patients are children and adolescents with no family history of the disease. This is likely due to poor sleeping habits, an unhealthy lifestyle, and anxiety and stress at this age.

The current study found that serum Il-17 levels were significantly higher in vitiligo patients compared to the control group.

According to a research conducted by Singh et al., IL-17 has a strong correlation with autoimmune vitiligo and might play a crucial role in the development and severity of the condition. Research on humans has shown that vitiligo patients had higher levels of blood IL-17 and a greater frequency of circulating Th17 cells, which are positively correlated with the severity, length, and activity of the condition. Th17 and CD8+ cells that secrete IL-17 are far more numerous in viraginous lesions than in healthy controls and patients' unaffected skin. There is a favorable correlation between the length and degree of the illness and the significantly elevated expression of IL-17 mRNA inside vitiliginous lesions, as shown in several investigations. Reducing Th17 cell abundance in blood and tissue IL-17 levels, NB-UVB treatment has been shown to therapeutically ameliorate vitiligo. Lastly, clinical depigmentation may be caused by exogenous IL-17, which directly inhibits factors involved in melanocyte survival and function [5]. In a research by Mikhael et al.[9] it was shown that patients' blood IL-17 levels were statistically significantly higher than controls' ($p<0.0001$), indicating a substantial involvement for IL-17 in the pathophysiology of vitiligo. These findings concurred with those of Habeb, *et al.* [10] .

However, research by Jandus *et al.* on the function of Th17 cells in autoimmune diseases, which included five vitiligo patients, failed to detect elevated Th17 cell counts in the peripheral blood of vitiligo patients when contrasted with normal subjects [11]. Similarly, Basak *et al.* found no statistically significant difference in IL-17 mean levels between the control and patient groups [12]. It is possible that the insufficient power caused by the various numbers of patients and control individuals included is to blame for these contradictory findings. One possible explanation for the observed discrepancy in outcomes is the wide range of human cultures and locations.

There was no correlation between vitiligo severity and interleukin 17 serum levels in the study by Serarslan *et al.* [13]. Aly *et al.* showed a negligible negative connection between IL-17 and illness degree, contrary to the findings of their investigation [14]. Different sample size can be the cause of these contradicting outcomes. Researchers found that IL-17 levels were much higher in vitiligo patients compared to healthy controls. Their results were derived from eleven recent case-control studies that compared IL-17 levels in healthy persons to those in vitiligo sufferers. The levels of IL-17 in vitiligo were discovered to be considerably higher than both the serum and lesion levels. Compared to controls or normal skin, vitiligo lesional skin had substantially higher IL-17 levels in all three investigations [15].

Researchers have shown a strong positive association between blood IL-17 levels and the region affected by vitiligo [12,16–18]. Sanad *et al.* found that patients' mean blood IL-17 levels were much greater than the control group's [19]. These results were the same as what Zhou *et al* says [20].

According to the study's results, vitiligo patients' blood vitamin B_{12} levels were significantly lower than those of the control group. The 2024 research by Hassan *et al.* found that compared to the control group, there was a significantly higher serum Hcy and a significantly lower vitamin B_{12} level in the cases group. This difference was statistically significant ($P<0.001$) [21]. Furthermore, it has been discovered that shortage of vitamin B_{12} or folic acid may be associated with increased Hcy and reduced methionine levels [22]. However, Tsai *et al* found that although vitamin B_{12} and folic acid levels were the same in both groups, blood Hcy levels were greater in vitiligo patients than in healthy people[23]. Furthermore, other investigations claimed that serum Hcy and vitamin B showed no significant change between vitiligo patients and controls[24].

According to a research by Tsai *et al.*, vitiligo was linked to decreased vitamin B_{12} and greater blood homocysteine levels, and these results were connected with disease activity. To identify the underlying causes of hyperhomocysteinemia and vitamin B_{12} insufficiency and investigate the possible therapeutic benefits of homocysteine-lowering techniques, further study on vitiligo is required [23].

This research found that male vitiligo patients had significantly higher levels of serum Il-17 than female vitiligo patients. While other studies have proven the opposite, as serum levels of IL-17 did not significantly

change between male and female patients, which is consistent with the findings of Bassiouny D, Shaker [17] and Aly et al., who found that there was no discernible gender difference in blood IL-17 levels [14].

The results of this investigation showed that male Vit. B_{12} levels were not significantly lower than those of female Vitiligo patients. A research conducted by Park and Lee in 2005 revealed that vitiligo patients' blood levels of vitamin B_{12} were significantly lower ($p \leq 0.05$), even though they were still within the normal range [25]. Compared to male patients, female patients had greater vitamin B_{12} levels. But the control group also showed this difference (777; 228 pg/ml in males and 972; 336 pg/ml in women, $p \leq 0.05$), and this result was previously reported in healthy individuals [26].

The findings of this study revealed a substantial difference in serum Il-17 levels between the age groups under 15 years and 16-30 years, as opposed to the age groups 31-45 years and over 46 years.

Also, the results showed that the age groups under 15 and 16–30 years old had significantly different blood vitamin B_{12} levels than the age groups 31–45 and above 46 years old. There was no significant variation in folate and vitamin B_{12} levels based on gender, age, family history, duration, and activity of the condition ($P>0.05$)[27]. In 2024, Hassan et al. studied the comparison of sociodemographic parameters and found that there were no statistically significant differences between both groups for age, gender, and family history[21].

The study's findings demonstrated that there were no significant variations in blood Il-17 levels between vitiligo patients with and without family history. Similar results supporting the elevation of IL-17 levels in early onset, positive family history, and chronic vitiligo were observed in a 2013 research by A. Habeb *et al*. [10]. Although there was no discernible difference between individuals with widespread and localized vitiligo or between those with active and stable vitiligo, this may be explained by the existence of other variables that influence the blood level of IL-17 and the activity of the illness [28].

According to the study's findings, vitiligo patients with a family history had a negligible drop in blood vitamin B_{12} levels when compared to those without a family history. In terms of family history, there were 24% positive family history cases and 76% negative family history cases in the cases group [21].

According to the study's findings, serum Il-17 levels for the facial and acrofacial forms of vitiligo differed somewhat and insignificantly from those of the generalized and focal forms. Serum IL-17 levels in individuals with widespread vitiligo and localized vitiligo were compared in a 2018 research by Sushama *et al.*, and the latter group had a significantly higher level [18]. Additionally, in line with earlier research, they discovered a significant link between blood IL-17 levels, the size of the afflicted skin surface area, and the length of the illness in widespread vitiligo [12]. Their results indicate that IL-17 plays an important role in the pathophysiology of vitiligo, with its levels rising as the illness advances.

This research found that there was a substantial drop in Vit. B_{12} in the generalized vitiligo group compared to the facial, acrofacial, and focal groups.

When the subclasses were compared based on the location of lesions, it was shown that the generalized form of the illness had considerably lower levels of vitamin B_{12} and folate than the localized kind (pv0.05). According to these findings, depigmentation may be influenced by a drop in blood levels of vitamin B_{12} and folate, particularly in cases with widespread vitiligo [25].

CONCLUSION

IL-17 and may Vit.B_{12} have a clear role in the pathogenesis and severity of vitiligo.

Ethical Approval Declaration

The procedures followed in this study were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki). In addition, each participant provided written consent following a concise overview of the project.

REFERENCES

1. Bergqvist C, Ezzedine K. Vitiligo: A Review. Dermatology. 2020;236(6):571-592. doi:10.1159/000506103
2. Chen J, Li S, Li C. Mechanisms of melanocyte death in vitiligo. Med Res Rev. 2021;41(2):1138-1166.
3. Krüger C, Schallreuter KU. A review of the worldwide prevalence of vitiligo in children/adolescents and adults. Int J Dermatol. 2012;51(10):1206-1212.
4. Marcelina K, Kutwin M, Karp P, et al. New Therapeutic Targets in Vitiligo New Therapeutic Targets in Vitiligo. 2024;(July). doi:10.20944/preprints202407.0700.v1
5. Singh RK, Lee KM, Vujkovic-Cvijin I, et al. The role of IL-17 in vitiligo: A review. Autoimmun Rev. 2016;15(4):397-404. doi:10.1016/j.autrev.2016.01.004
6. Miossec P. IL-17 and Th17 cells in human inflammatory diseases. Microbes Infect. 2009;11(5):625-630.
7. Hassan RA, Hasan AS, Ismail SR. Assessment of Serum Level of Vitamin B12 and Homocysteine in

Vitiligo Patients and Their Correlation with Disease Activity and Severity. Egypt J Hosp Med. 2024;94(1):1040-1045.

8. Hussein SM, Shehata H, El Zawahry YB, et al. Role of vitamin B12, folic acid and oxidative damages, in serum of patients with vitiligo. J Glob Pharma Technol. 2019;11:455-461.
9. Mikhael NW, Hamed AM, Elfallah AA, Ahmed AA. Assessment of Serum Level of Interleukin-17 in Patients with Vitiligo. Benha J Appl Sci. 2021;6(3):173-176. doi:10.21608/bjas.2021.188835
10. Habeb A, Al Hefnawy AH, Elsayed S, Abo Bkr AE, Elhefnawy A. Expression of interleukin-17 mRNA in vitiligo patients. Egypt J Dermatology Venerol. 2013;33(2):67. doi:10.4103/1110-6530.123951
11. Jandus C, Bioley G, Rivals J, Dudler J, Speiser D, Romero P. Increased numbers of circulating polyfunctional Th17 memory cells in patients with seronegative spondylarthritides. Arthritis Rheum Off J Am Coll Rheumatol. 2008;58(8):2307-2317.
12. Basak PY, Adiloglu AK, Ceyhan AM, Tas T, Akkaya VB. The role of helper and regulatory T cells in the pathogenesis of vitiligo. J Am Acad Dermatol. 2009;60(2):256-260.
13. Serarslan G, Yönden Z, Söğüt S, Savaş N, Celik E, Arpaci A. Macrophage migration inhibitory factor in patients with vitiligo and relationship between duration and clinical type of disease. Clin Exp Dermatol. 2010;35(5):487-490.
14. Aly D, Mohammed F, Sayed K, et al. Is there a relation between vitamin D and interleukin-17 in vitiligo? A cross-sectional study. Dermatology. 2018;233(6):413-418.
15. Acharya P, Mathur M. Interleukin-17 level in patients with vitiligo: A systematic review and meta-analysis. Australas J Dermatol. 2020;61(2):e208-e212. doi:10.1111/ajd.13233
16. Abou Elela M, Hegazy RA, Fawzy MM, Rashed LA, Rasheed H. Interleukin 17, interleukin 22 and FoxP3 expression in tissue and serum of non-segmental vitiligo: a case-controlled study on eighty-four patients. Eur J Dermatology. 2013;23(3):350-355.
17. Bassiouny D, Shaker O. Role of interleukin-17 in the pathogenesis of vitiligo. Clin Exp Dermatol. 2011;36(3):292-297.
18. Sushama S, Dixit N, Gautam RK, Arora P, Khurana A, Anubhuti A. Cytokine profile (IL-2, IL-6, IL-17, IL-22, and TNF-α) in vitiligo—New insight into pathogenesis of disease. J Cosmet Dermatol. 2019;18(1):337-341. doi:10.1111/jocd.12517
19. Sanad EM, El-Fallah AA, Al-Doori AR, Salem RM. Serum zinc and inflammatory cytokines in vitiligo. J Clin Aesthet Dermatol. 2020;13(12 Suppl 1):S29.
20. Zhou L, Shi Y, Li K, et al. Increased circulating Th17 cells and elevated serum levels of TGF-beta and IL-21 are correlated with human non-segmental vitiligo development. Pigment Cell Melanoma Res. 2015;28(3):324-329.
21. Hassan RA, Hasan AS, Ismail SR, State AF, Dermatology D. Assessment of Serum Level of Vitamin B12 and Homocysteine in Vitiligo Patients and Their Correlation with Disease Activity and Severity. Egypt J Hosp Med. 2024;94(1):1040-1045. doi:10.21608/ejhm.2024.345772
22. Sundar PK, Chavala BM, Nagaraj SM, Reddy HK. A study of serum levels of vitamin B12, folic acid, and homocysteine in vitiligo patients and controls attending a tertiary care hospital in Bengaluru-an analytical cross-sectional study. J Evol Med Dent Sci. 2021;10(30):2271-2276.
23. Tsai TY, Kuo CY, Huang YC. Serum homocysteine, folate, and vitamin B 12 levels in patients with vitiligo and their potential roles as disease activity biomarkers: A systematic review and meta-analysis. J Am Acad Dermatol. 2019;80(3):646-654.e5. doi:10.1016/j.jaad.2018.08.029
24. Maryam G, Vahide L, Abbas F. Serum levels of vitamin B12, folic acid, and homocysteine in patients with vitiligo. Iran J Dermatology. 2015;18(2):45-50.
25. Park HH, Lee MH. Serum levels of vitamin B12 and folate in Korean patients with vitiligo [3]. Acta Derm Venereol. 2005;85(1):66-67. doi:10.1080/00015550410021565
26. Lim H-S, Heo Y-R. Plasma total homocysteine, folate, and vitamin B12 status in Korean adults. J Nutr Sci Vitaminol (Tokyo). 2002;48(4):290-297.
27. Gonul M, Çakmak SK, Soylu S, Kiliç A, Gül Ü. Serum vitamin B12, folate, ferritin and iron levels in Turkish patients with vitiligo. Indian J Dermatol Venereol Leprol. 2010;76(4):448. doi:10.4103/0378-6323.66611
28. Toy D, Kugler D, Wolfson M, et al. Cutting edge: interleukin 17 signals through a heteromeric receptor complex. J Immunol. 2006;177(1):36-39.