



The Impact of Psychological Stress on Vitiligo Activity and Severity in Saudi Arabia: A Cross-Sectional Study

Fawwaz F. Alshammrie¹, Luluh Zamil Aljaloud², Shoog Saleh Alanazi³, Shadan Saud H. Alshammari⁴ and Razan Saleh Alanazi^{5*}

¹Department of Dermatology, College of Medicine, University of Hail, Hail, Kingdom of Saudi Arabia

²College of Medicine, University of Hail, Hail, Kingdom of Saudi Arabia

Author Designation: ¹Associate Professor

*Corresponding author: Razan Saleh Alanazi (e-mail: irazansaleh1@gmail.com).

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Abstract Introduction: Psychological stress has been associated with various chronic diseases and its role in the onset and progression of vitiligo has also been proposed. However, little is known regarding the direct association of psychological stress with vitiligo activity and severity. **Objectives:** This study aims to examine the association between psychological stress and vitiligo activity and severity among patients with vitiligo in Saudi Arabia. **Methods:** A cross-sectional, questionnaire-based study was conducted via an online survey from August 1 to September 1, 2023, targeting individuals with a confirmed diagnosis of vitiligo across different regions of Saudi Arabia. Psychological stress was assessed through self-reported stressful life events within the 2 years before vitiligo onset, including bereavement and other major stressors, as well as participants' perception that emotional trauma triggered their disease. Vitiligo severity was classified according to Body Surface Area (BSA) involvement as mild (1-25%), moderate (26-50%), severe (51-75%) and extensive (76-100%). **Results:** The study included 100 participants, with the majority (57%) of subjects having lost a loved one during the 2-year acceleration period before the development of vitiligo, suggesting a potential psychological stressor on vitiligo activity. It was also revealed that 52% of participants connected their vitiligo to emotional or psychological trauma. There was also a significant association ($p = 0.038$) between gender and the perception of stress-inducing vitiligo, with more females linking stress to vitiligo onset (65.4% versus 34.6%). However, no statistically significant connections were found between stress and vitiligo severity, the body surface area affected or the number of anatomical sites involved. **Conclusions:** This study suggests that psychological stress, particularly due to bereavement, may contribute to cases of vitiligo. Dermatologists should consider routine psychosocial screening and provide supportive counseling or referral when stress-related triggers are identified. However, no significant association was found between stress and disease severity.

Key Words Psychological Stress, Vitiligo Activity, Vitiligo Severity, Emotional Trauma, Stress-Related Triggers

INTRODUCTION

Vitiligo is an autoimmune disorder that causes loss of skin pigmentation among patients, resulting in formation of white patches or, at times, everywhere on the entire body [1]. The condition can affect individuals of all ages, irrespective of gender or ethnic background. Its etiology is multifactorial, involving a complex interplay of genetic predisposition and environmental triggers such as skin trauma, oxidative stress or infections [2]. Although vitiligo is non-contagious and not physically harmful, it often carries significant psychosocial consequences. Affected individuals may experience emotional distress, social stigma and a reduced quality of life due to the visible nature of the disease [3]. Psychological

stress can have a significant influence on physical health, which can lead to the emergence of different chronic diseases like heart disease, diabetes and even stroke [4]. The emerging research also emphasizes the role of psychological stress on the individual facing vitiligo, as both these factors are dependent on one another and have a directly proportional relationship. The exact reasoning and mechanisms are still under research; however, it is clear that the hormonal and immune systems get disrupted due to this stress, which serves as a prominent and potential contributor to vitiligo [5,6].

In the year 2021, a study published by Middle East Current Psychiatry showed that people with vitiligo were

significantly more likely to have experienced psychological stress in the previous year than people without the condition. Also, there was a direct connection between the severity of vitiligo and the level of psychological stress [5]. Similarly, another study involving more than 3,500 vitiligo patients identified a significant association between disease severity, pattern and mental health disorders, including moderate to severe depression [6]. The relationship between vitiligo and stress is especially noticeable in individuals with more extensive areas of the body affected, darker skin tones or lesions on the face and hands. Research has also shown that people with vitiligo tend to have higher levels of stress-related biomarkers, like cortisol and catecholamines, compared to those without the condition. This suggests that stress could trigger or worsen vitiligo by affecting hormone levels [6]. However, because vitiligo is influenced by different factors, which include a mix of genetic, environmental and psychological factors, it is hard to pinpoint precisely how stress fits into the bigger picture. The researchers are still looking to fill the ambiguity of the exact contribution of stress towards the progression of the disorder and further research is needed to understand more profoundly and precisely how this relationship works [7-9].

Psychological stress may contribute to vitiligo through several biological pathways. Stress activates the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system, leading to increased release of cortisol and catecholamines [10]. These changes may disturb immune regulation, increase oxidative stress and promote inflammatory responses that can damage melanocytes or impair their function [10]. In addition, stress-related neuroendocrine changes may worsen existing disease activity and influence the course of vitiligo [11]. Beyond biological mechanisms, the psychosocial burden of vitiligo may be amplified in settings where visible skin disease affects self-image and social interaction. In Saudi Arabia, patients may experience additional stress related to public appearance, social stigma, family expectations and concerns about marriage or social acceptance [12]. Although stress has been studied as a possible trigger for vitiligo in other populations, little is known about this association in Saudi patients. In particular, it remains unclear whether psychological stress is linked only to perceived disease onset or whether it is also associated with objective measures of vitiligo activity and severity in the Saudi context.

The goal of this study is to explore the link between psychological stress and the activity and severity of vitiligo, focusing on individuals who are living in Saudi Arabia. By examining how stress might influence the progression of vitiligo, the research hopes to shed light on the emotional and psychological factors that could play a role in the condition. Ultimately, the aim is to deepen our understanding of vitiligo from a psychosomatic perspective and help develop better, more targeted stress management strategies for those affected by the condition. The secondary objectives included whether perceived stress-related vitiligo differs by sociodemographic characteristics and whether stress

exposure is associated with vitiligo clinical features such as body surface area involvement and lesion distribution. We hypothesized that psychological stress would be associated with vitiligo onset and may also relate to disease activity and severity, particularly among patients reporting recent major life stressors.

This study contributes to the multidisciplinary field of stress and health by examining vitiligo as a psychosomatic condition, bridging dermatology, psychology and public health perspectives.

METHODS

Study Design and Participants

A cross-sectional, questionnaire-based examination was conducted to evaluate association of psychological strain on vitiligo activity and severity in Saudi Arabia. The examination included male and female participants of both Saudi and non-Saudi nationalities from diverse areas, all identified with vitiligo. Participants were eligible if they reported having a physician-confirmed diagnosis of vitiligo. Inclusion criteria included individuals aged 18 years or older residing in Saudi Arabia who reported having a physician-confirmed diagnosis of vitiligo and agreed to participate voluntarily in the online survey. Exclusion criteria included incomplete survey responses, duplicate submissions and individuals without a self-reported confirmed diagnosis of vitiligo.

Questionnaire Development and Validation

The questionnaire was developed based on a review of relevant literature and refined through expert consultations with dermatologists and psychologists to ensure content validity. A pilot study was conducted with a small group of participants to assess the clarity, reliability and overall feasibility of the survey. Feedback from the pilot phase was used to make necessary adjustments prior to full-scale distribution.

Data Collection

Data were accumulated through an internet survey (Google Forms) over two months (August-September 2023). The survey hyperlink was distributed through social media and WhatsApp organizations to ensure broad participation. To minimize duplicate responses, participants were encouraged to submit the survey only once and incomplete or potentially duplicated entries were excluded during data screening when identified. No personally identifiable information was collected and survey responses were recorded anonymously to maintain participant confidentiality.

Survey Structure

The questionnaire consisted of 3 sections. Sociodemographic data included information on age, gender, training degree, employment status and location of residence. Data about vitiligo characteristics included ailment length, age at prognosis, affected frame areas and perceived severity. Psychological stress factors assessed

publicity to demanding existence activities, emotional trauma and perceived effect on vitiligo development.

Assessment of Vitiligo Activity and Severity

Vitiligo was assessed using self-pronounced progression in lesion length and new patch development over the past six months. Severity was determined primarily based on the share of Body Surface Area (BSA) affected, labeled into four classes: mild (1-25%), moderate (26-50%), severe (51-75%) and extensive (76-100%).

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 28.0. Descriptive information (imply, widespread deviation, counts, chances) were used for demographic and clinical characteristics. Chi-square tests were used to observe associations among categorical variables and independent t-tests and one-way ANOVA were applied to non-stop variables. A p-value <0.05 was considered statistically significant.

RESULTS

Sociodemographic Characteristics

The study included 100 participants, including 44% males and 56% females. Most were Saudi nationals (86%), while 14% were non-Saudi nationals. The largest age group was 21-30 years (46%), followed by 31-40 years (26%) and 18-20 years (14%). Marital status distribution showed that 69% were single, 25% were married and 6% were separated. Regarding education, 50% held a college degree, 25% completed high school, 14% had postgraduate qualifications and 11% had an intermediate-level education. Employment status varied, with 39% students, 34% employed, 22% unemployed and 5% retired (Table 1).

Clinical Characteristics and Vitiligo Severity

The duration of vitiligo varied among participants, with 37% having the condition for 1-5 years, 25% for 6-10 years, 15% for 11-15 years, 10% for 16-20 years and 13% for over 20 years. The most frequent age at vitiligo onset was 6-12 years (32%), followed by 13-20 years (27%) and 21-30 years (19%). Regarding vitiligo severity, the extent of body surface area (BSA) affected was mild (1-25%) in 68% of cases, moderate (26-50%) in 16%, severe (51-75%) in 12% and extensive (76-100%) in 4%. In terms of anatomic distribution, 50% had vitiligo on both the face and body, 24% on the body only and 12% on the face only (Table 2, Figure 1 and 2).

Psychological Stress and Its Association with Vitiligo Activity and Severity

A significant 57% of participants experienced the loss of a loved one within two years prior to vitiligo onset, suggesting a potential psychological trigger for disease activity. Additionally, 21% of participants reported other stressful life events (e.g., anxiety, family issues) within two years before

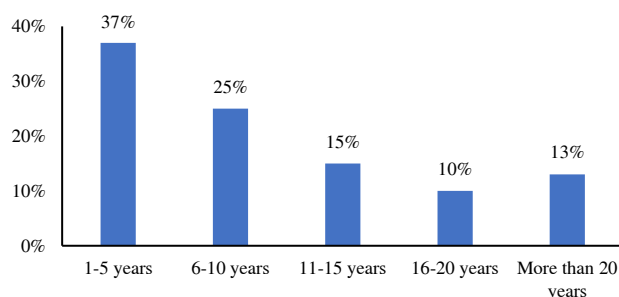


Figure 1: The Distribution of Vitiligo Duration Among a Sample Population

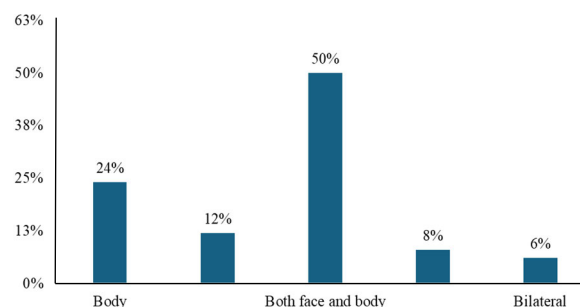


Figure 2: Distribution of Anatomic Sites Affected

Table 1: Sociodemographic Information of Participants

Variables	Frequency	Percentage
Gender		
Male	44	44
Female	56	56
Nationality		
Saudi	86	86
non-Saudi	14	14
Age		
18-20 years	14	14
21-30 years old	46	46
31-40 years old	26	26
41-50 years old	7	7
51-60 years old	4	4
61-70 years old	3	3
Marital Status		
Single	69	69
Married	25	25
Separate	6	6
Educational Level		
Intermediate	11	11
High school	25	25
Collegiate	50	50
Postgraduate	14	14
Employment Status		
Student	39	39
Unemployed	22	22
Employee	34	34
Retired	5	5

vitiligo onset, while 52% believed their vitiligo was triggered by psychological or emotional trauma (Table 3, Figure 3).

However, when assessing vitiligo severity and progression, statistical analysis found no significant association between stress exposure and disease severity, as measured by BSA involvement (p = 0.582) or the number of anatomical sites affected (p = 0.187) (Table 4).

Table 2: Clinical Characteristics of Participants with Vitiligo

Variables	Frequency	Percentage
Duration of Vitiligo		
1-5 years	37	37
6-10 years	25	25
11-15 years	15	15
16-20 years	10	10
More than 20 years	13	13
Age at Vitiligo Onset		
1-5 Years	11	11
6-12 Years	32	32
13-20 Years	27	27
21-30 Years	19	19
31-40 Years	5	5
41-50 Years	3	3
51-60 Years	3	3
BSA Affected (%)		
1%-25%	68	68
26%-50%	16	16
51%-75%	12	12
76%-100%	4	4
No. of Anatomic Sites Affected		
Body	24	24
Face	12	12
Both face and body	50	50
Unilateral/midline	8	8
Bilateral	6	6

Table 3: Hypothesis-Specific Questions

Variables	Frequency	Percentage
Did a loved one pass away within the 2 years prior to developing vitiligo?		
No	43	43%
Yes	57	57%
Did you have any stressful life events within the 2 years before to the onset of vitiligo?		
No	79	79%
Yes	21	21.0
Do you think that the cause of your condition “vitiligo “ is a psychological/emotional trauma?		
No	48	48%
Yes	52	52%

Table 4: The Relationship Between Clinical Characteristics of Participants with Vitiligo and Vitiligo-Associated Stress

Variables	Do you think that the cause of your condition, “vitiligo, “is a psychological/emotional trauma?		p-value
	Yes	No	
BSA affected (%)			
1%-25%	37 (71.2%)	31 (64.5%)	0.582
26%-50%	9 (17.3%)	7 (14.6%)	
51%-75%	5 (9.6%)	7 (14.6%)	
76%-100%	1 (1.9%)	3 (6.3%)	
No. of Anatomic Sites Affected			
Body	15 (28.8%)	9 (18.8%)	0.187
Face	6 (11.5%)	6 (12.5%)	
Both face and body	27 (51.9%)	23 (47.9%)	
Unilateral/midline	1 (1.9%)	7 (14.6%)	
Bilateral	3 (5.8%)	3 (6.3%)	
Did a loved one pass away within the 2 years prior to developing vitiligo?			
Yes	15 (28.8%)	6 (12.5%)	0.038
No	37 (71.2%)	42 (87.5%)	

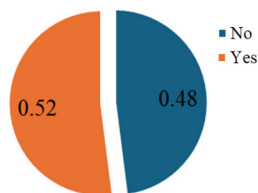


Figure 3: Participants' Responses Regarding (Do You Think that the Cause of Your Condition (Vitiligo) is a Psychological/Emotional Trauma?)

Association Between Sociodemographic Factors and Perceived Stress-Related Vitiligo

A statistically significant association ($p = 0.038$) was found between gender and the perception of psychological stress as a triggering factor, with 65.4% of females attributing vitiligo onset to emotional trauma compared to 34.6% of males. However, no significant associations were found between perceived stress-related vitiligo and age ($p = 0.782$), marital status ($p = 0.277$), education level ($p = 0.539$) or employment status ($p = 0.823$) (Table 5).

Table 5: The Relationship Between Sociodemographic Information of Participants and Vitiligo Associated Stress

Variables	Do you think that the cause of your condition "vitiligo" is a psychological/emotional trauma?		p-value
	Yes	No	
Gender			
Male	18 (34.6%)	26 (54.2%)	0.038
Female	34 (65.4%)	22 (45.8%)	
Age			
18-20 years	7 (13.5%)	7 (14.6%)	0.782
21-30 years old	23 (44.2%)	23 (47.9%)	
31-40 years old	13 (25%)	13 (27.1%)	
41-50 years old	5 (9.6%)	2 (4.2%)	
51-60 years old	3 (5.8%)	1 (2.1%)	
61-70 years old	1 (1.9%)	2 (4.2%)	
Marital Status			
Single	34 (65.4%)	35 (72.9%)	0.277
Married	13 (25%)	12 (25%)	
Separate	5 (9.6%)	1 (2.1%)	
Educational Level			
Intermediate	4 (7.7%)	7 (14.6%)	0.539
High school	12 (23.1%)	13 (27.1%)	
Collegiate	27 (51.9%)	23 (47.9%)	
Postgraduate	9 (17.3%)	5 (10.4%)	
Employment Status			
Student	19 (36.5%)	20 (41.7%)	0.823
Unemployed	13 (25%)	9 (18.8%)	
Employee	18 (34.6%)	16 (33.3%)	
Retired	2 (3.8%)	3 (6.3%)	

DISCUSSION

The purpose of this research paper is to find out the impact of psychological stress on vitiligo activity and severity in Saudi Arabia. The findings showed that the majority of participants (57%) experienced a stressful event in the last two years prior to development of vitiligo but these findings should be considered carefully as there was not control group. Furthermore, approximately one-fourth reported stressful life events (e.g., anxiety, family issues) within two years before vitiligo onset. These findings are in line with Papadopoulos *et al.*, who reported that vitiligo patients experience a significantly high number of stressful events compared to controls prior to development of vitiligo [13]. Similar to the present study, Silverberg *et al.* reported that 56.6% of participants experienced a death or stressful event in the last two years prior to the development of vitiligo. They further reported that 17.4% experienced multiple stressors during this period [14]. Similarly, another study reported that 47% of individuals with vitiligo experienced stress [15].

A case-control study by Picardi *et al.* [16] investigated the impact of stress-inducing incidents as potential catalysts for vitiligo; 31 individuals diagnosed with the condition were compared with 116 control subjects. Every participant with vitiligo experienced either the initial manifestation or a worsening of the disease during the preceding three months. Stressors were evaluated. When the two groups were examined, the cumulative number of stress-related occurrences, along with the tally of episodes considered negative, unmanageable or highly significant, exhibited no substantial differences between affected individuals and controls. Nevertheless, a markedly higher proportion of participants within the vitiligo group reported encounters

with three or more uncontrollable incidents ($p < 0.01$) [16]. A possible cause of increasing risk of vitiligo in patients with a history of stress is overproduction of catecholamines, neuropeptides and cortisol, which play their roles in the development of vitiligo [9,17]. Moreover, both environmental and genetic factors can precipitate and initiate the development and progression of vitiligo in patients with a history of stress.

In the present study, no significant association was established between stress and vitiligo severity, the body surface area affected or the number of anatomical sites involved. Despite the lack of a direct association with severity, our findings highlight the psychosocial burden of stress-related triggers in vitiligo and underline their impact on patients' quality of life. This aligns with Silverberg *et al.* [14], who also reported no association between stressors in last 2 years and BSA or distribution of lesion. Furthermore, in the present study, investigating the relationship between sociodemographic status of participants and vitiligo showed a statistically significant association between gender and belief of psychological factors in precipitating vitiligo, with females attributing vitiligo to psychological/emotional trauma compared to males. Several possible explanations exist for this observed disparity. Firstly, females are known to experience higher rates of stress and anxiety compared to males [18], which could heighten their perception of stress as a contributing factor to their vitiligo.

Secondly, societal expectations and gender roles could play a role, with females potentially feeling more pressure to conform to beauty standards, leading them to attribute skin conditions like vitiligo to emotional distress. Additionally, biological factors such as hormonal fluctuations could influence female susceptibility to stress-related skin

conditions [17]. However, the study showed no statistically significant associations between belief in vitiligo-associated psychological/emotional trauma and age, marital status, educational level and employment status. The result of this study shows that impact of a loved one's passing within the 2 years prior to developing vitiligo indicated a statistically significant association. This finding suggests a potential link between personal grief and the perception of vitiligo causation. Personal grief can contribute to the pathogenesis of vitiligo is believed to be multifactorial including sleep difficulties, poor appetite or overeating, shakiness or trembling, listlessness, disorientation, headaches, dizziness and exhaustion. Moreover, grief patients may suffer from withdrawal from society [6].

Currently, there is a paucity of research that has identified stress as a trigger for vitiligo. For example, a review of literature identified only 7 studies on the topic until 2018. Their findings also support our results, showing that most studies reported that stress can trigger the onset of vitiligo [19]. Therefore, our study contributes to increasing the evidence on the topic but further research is also required.

CONCLUSIONS

In conclusion, our study highlights a significant link between psychological stress and vitiligo, particularly noting the association with the loss of a loved one within two years of vitiligo onset. The findings also reveal gender-based differences in attributing vitiligo to psychological factors. Our results place vitiligo within the broader field of stress and health research, reinforcing the importance of integrating stress management approaches into holistic patient care. However, study has several limitation as acknowledged above including small sample size and cross-sectional study design which should be considered prior to interpreting findings. Future research should use longitudinal multicenter designs, validated stress assessment instruments and standardized clinical activity measures to better clarify the relationship between psychological stress and vitiligo progression in Saudi Arabia and other populations.

Limitations

A primary limitation is the reliance on self-reporting and using subjective measures as a self-assessment of treatment outcomes. Moreover, recall bias and response rate were not evaluated. Another limitation is sampling bias as the survey was distributed online, it's possible that the sample doesn't represent the entire population of vitiligo patients. In addition, as this was a cross-sectional study, causal relationships cannot be established. The study also had limited sample size which limits generalizability of findings. Future research should adopt longitudinal or intervention-based designs to clarify the mechanisms linking stress and vitiligo activity, in line with rigorous stress and health research standards. Despite these limitations, our study findings could serve as a foundation to guide future research

in investigating the process through which stress affects vitiligo and exploring the potential efficacy of stress management interventions for vitiligo patients. Another limitation is that psychological stress was assessed using self-reported stressful life events and perceived emotional triggers rather than validated psychometric instruments such as the Perceived Stress Scale (PSS) or Depression Anxiety Stress Scales (DASS). Therefore, the psychological assessment may lack the precision and comparability of standardized stress measures. Another limitation is that participants were invited online which may have over representation of younger and more digitally active users. Although the survey was distributed across multiple regions of Saudi Arabia, the exact geographic distribution of participants was not equally represented and could not be fully assessed.

Acknowledgement

The authors would like to acknowledge the thank the researchers whose primary studies were included in this analysis.

Ethical Statement

This study was approved by Research Ethics Committee (REC) at University of Hail (IRB No. H-2024-238 Approval Date: 22/4/2024). All participants provided informed consent.

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