



Predicting Depression and Anxiety in Vitiligo Patients by Considering Forgiveness, Perfectionism, Anger, and Alexithymia

Seyed Gohar Mousavi ¹, Azar Shirzadian Kebria  ², Abolfazl Hosseinnataj  ³, Hamideh Azimi Lolaty  ^{4,*}

¹ Student Research Committee, Mazandaran University of Medical Sciences, Sari, Iran

² Development Unit of Yahyanejad Hospital, Babol University of Medical Sciences, Babol, Iran

³ Department of Biostatistics, Faculty of Health, Mazandaran University of Medical Sciences, Sari, Iran

⁴ Department of the Psychiatric Nursing, Psychiatry and Behavioral Sciences Research Center, Psychosomatic Research Center, Addiction Institute, Mazandaran University of Medical Sciences, Sari, Iran

*Corresponding Author: Department of the Psychiatric Nursing, Psychiatry and Behavioral Sciences Research Center, Psychosomatic Research Center, Addiction Institute, Mazandaran University of Medical Sciences, Sari, Iran. Email: azimihamideh@gmail.com

Received: 24 February, 2024; Revised: 31 July, 2024; Accepted: 4 August, 2024

Abstract

Background: Vitiligo, a chronic dermatological disorder, is characterized by depigmented patches. Depression and anxiety are considered two major problems in patients with skin disorders, requiring special attention. Various factors can influence the onset of anxiety and depression in these patients.

Objectives: The present study aimed to predict depression and anxiety in vitiligo patients by considering forgiveness, perfectionism, anger, and alexithymia.

Methods: This cross-sectional study was conducted at the Dermatology Department of Shahid Yahyanejad Hospital in Babol from May to September 2023. The study population consisted of 119 vitiligo patients whose anxiety, depression, forgiveness, perfectionism, anger, and alexithymia were evaluated using relevant questionnaires. The data were analyzed using statistical tests, including the Mann-Whitney, Kruskal-Wallis, Spearman Correlation, and Generalized Linear Model, in SPSS-22.

Results: The mean age of the vitiligo patients was 34.17 ± 12.32 years. Their mean scores for depression and anxiety were 4.24 ± 4.90 and 11.50 ± 9.04 , respectively. Among the vitiligo patients, 43.6% displayed mild to severe degrees of depression, and 61.3% displayed mild to severe degrees of anxiety. The mean scores for depression and anxiety were significantly higher in women than in men ($P < 0.05$). There were significant correlations between the mean scores for depression and anxiety ($r = 0.58$), forgiveness ($r = -0.25$), perfectionism ($r = 0.29$), anger ($r = 0.30$), and alexithymia ($r = 0.40$). Additionally, the mean scores for anxiety were correlated with forgiveness ($r = -0.36$), perfectionism ($r = 0.36$), anger ($r = 0.44$), and alexithymia ($r = 0.53$). The results of the Generalized Linear Model analysis revealed that anxiety was the only predictive factor of depression among the subjects. Furthermore, depression, anger, and alexithymia were identified as positive predictors of anxiety, while forgiveness was identified as a negative predictor of anxiety in these patients.

Conclusions: The study underscores the importance of addressing psychological factors in the management and treatment of vitiligo patients to improve their overall well-being and quality of life. Further research and interventions targeting these factors may enhance our understanding of the mental health challenges faced by individuals living with vitiligo and aid in developing strategies to better address these challenges.

Keywords: Depression, Anxiety, Vitiligo, Forgiveness, Perfectionism, Anger, Alexithymia

1. Background

Vitiligo is an acquired pigment-producing skin disorder with a worldwide prevalence of 0.5% to 2% (1). In

some societies and cultures, individuals with vitiligo may face discrimination and have difficulties in finding employment or partners (2). Studies indicate that these patients are at risk of developing various psychological

disorders, such as anxiety and depression, due to their different appearance and fear of being judged by others (3), which exacerbates their mental distress and may even lead to suicide, especially if vitiligo affects visible areas of the body (4). A 2017 systematic review and meta-analysis estimated the prevalence of depression among vitiligo patients to be 25% (5). A meta-analysis of 17 studies in 2018 reported the prevalence of depression among vitiligo patients to be between 8% and 33% (6). According to Nasser et al., 78% of these patients experienced varying degrees of anxiety (7). Moreover, numerous studies have revealed that people with skin diseases, particularly vitiligo, experience higher levels of anxiety than others and are more susceptible to psychological complications (8-11).

Certain characteristics, acting as protective or risk factors, can influence patients' adaptation to the disease or the development of psychological complications (1). Forgiveness is one such attribute that plays a significant role in patients' psychophysical health. Forgiveness involves letting go of negative emotions, cognitions, and behaviors such as hostility, revengeful thoughts, and verbal aggression in response to perceived injustices (12). Forgiveness-induced motivational changes ultimately reduce retaliatory intentions while increasing motivations for positive actions and controlling anger towards the offender. In fact, forgiveness helps individuals better cope with problems and reinforces positive internal thoughts (13). The results of a study by Taşçıoğlu et al. reported that vitiligo patients with a greater ability to forgive were in better physical condition compared to others (14).

Another important capability for such patients is developing realism and avoiding perfectionism. Perfectionism is characterized by striving for flawlessness, setting excessively high standards for performance, and having a tendency to critically evaluate oneself and others (15). Perfectionism is known to impact an individual's mental health (16). The negative aspects of perfectionism are associated with the individual's mistakes, causing obsessive-compulsive anxiety and excessive concerns (17). Perfectionism can result in difficulties in recognizing situations, inflexibility, and a tendency toward destructive behaviors, such as high self-expectations and a severe fear of failure (18). Therefore, it is essential to investigate the predictive role of perfectionism in the depression and anxiety of these patients.

Another factor affecting mental health is how vitiligo patients express and control anger, a natural emotion in response to negative events. While some level of anger in response to problems and stressful situations is

normal, it can become problematic when expressed excessively (19). Studies have revealed that individuals who control their anger and do not express it excessively have better mental health and experience a higher quality of life (18, 20). Therefore, excessive expression of anger can cause various problems. Research has shown that patients with skin disorders often experience suppressed emotions, feelings of resentment towards others, and increased anxiety (10, 21, 22). Therefore, it is necessary to examine the predictive role of anger expression and control on the levels of depression and anxiety in these patients.

Another influential factor in psychophysical health is alexithymia, which is defined as a disturbance in emotional and cognitive functioning, along with an inability to find the proper words to express feelings and emotions (23). Alexithymia is considered a major problem among many psychologically disordered patients, as it can lead to an inability to verbally express their feelings (24). This condition is often observed in patients suffering from chronic pain and appearance-related problems (25), with its prevalence among vitiligo patients reported to be approximately 13% (26). Alexithymia hinders the regulation and adaptation of emotions (27) and can be a precursor to many physical illnesses, including chronic back pain, tension headaches, bodily pain disorders, and inflammatory bowel diseases, all of which can exacerbate an individual's anxiety (25, 28). Additionally, alexithymia can be an influential psychological factor in the occurrence or progression of an illness (29). Thus, it is essential to determine the role of alexithymia in depression and anxiety in these patients.

A study conducted on patients diagnosed with vitiligo revealed a potential correlation with mental disorders, indicating the involvement of psychological factors in their condition. Gaining a comprehensive understanding of the influence of psychological variables on treatment and interventions for these individuals, particularly in relation to anxiety and depression, is of utmost importance (14, 21, 30). According to the researcher's investigations, important psychological factors such as forgiveness, perfectionism, anger, and alexithymia, which may be related to the mental health, anxiety, and depression of vitiligo sufferers, have not been addressed in previous studies.

2. Objectives

The present study was performed to predict depression and anxiety in vitiligo patients by considering forgiveness, perfectionism, anger, and alexithymia. The study results appear promising for the

prevention, improvement, and promotion of health and quality care in these patients.

3. Methods

3.1. Study Design

This is a cross-sectional, descriptive-analytical study involving a population of all vitiligo patients.

3.2. Study Setting and Participants

Using the convenience sampling method, 119 vitiligo patients who visited Babol Shahid Yahyanejad Hospital from May 2023 to September 2023 and were willing to participate in the study were selected. The inclusion criteria for the study sample were: (1) no physical diseases other than vitiligo, (2) a history of vitiligo for at least 6 months, and (3) at least 18 years of age. Patients with known psychological disorders were excluded from the study. Patients who agreed to participate were first asked to complete an informed consent form and the study questionnaires. All patients were examined by a dermatologist, and their clinical features and demographic information were recorded in the respective checklists. The severity of their vitiligo was determined using the VASI scale. It should be noted that in this study, the assessment of depression and anxiety in vitiligo patients was based solely on the data from the research questionnaires.

3.3. Data Collection and Measurement

All patients were evaluated using the following questionnaires.

3.4. Socio-Demographics Questionnaire

It includes questions about age, gender, marital status, education, occupation, disease status, type of vitiligo, duration of illness, duration of treatment, and the severity of vitiligo.

3.5. Vitiligo Area Scoring Index

It is a quantitative tool designed to measure the extent of skin depigmentation and macular repigmentation in vitiligo patients and their responses to vitiligo therapies in clinical trials. This tool was developed in Vancouver by Hamzavi et al. in 2004 (31). The percentage of vitiligo involvement is calculated using the Palmer method. The axillary region is included with the upper extremities, while the buttocks and inguinal areas are included with the lower extremities. The extent of residual depigmentation is

expressed using the following percentages: Zero, 10%, 20%, 50%, 75%, 90%, and 100%. The scale for vitiligo is divided into three stages: Stage 0: Normal pigmentation; stage I: Incomplete depigmentation; and stage II: Complete depigmentation (32). The tool's validity and reliability have been investigated. To estimate the reliability of the VASI in this study, the test-retest method with a one-month interval was used, in which 15 patients from each group were asked to record the intensity, size, and quantity of depigmentation. The correlation coefficient was calculated to be 89% (31, 33, 34).

3.6. Beck Anxiety Inventory

This 21-item questionnaire is used to assess anxiety. The scoring follows a Likert scale from 0 to 3. The total score of the questionnaire ranges from 0 to 63, with higher scores indicating greater levels of anxiety in the individual. The questionnaire evaluates anxiety across four levels: Scores of 0 - 7 indicate no anxiety, 8 - 15 indicate mild anxiety, 16 - 25 indicate moderate anxiety, and scores higher than 25 (26). In a study by Kaviani and Mousavi, the questionnaire's validity and reliability were examined, showing good validity ($r = 0.72$, $P < 0.001$) and reliability ($r = 0.83$, $P < 0.001$). Additionally, Cronbach's alpha coefficient was calculated as 0.92 (35). In the present study, Cronbach's alpha coefficient was reported as 0.896.

3.7. Beck Depression Inventory Short Form

This 21-item tool was designed by Beck et al. to measure depression. The short form of the Beck Depression Inventory, or BDI-S, consists of 13 items scored on a 4-point Likert scale from 0 to 3 (36). The total score is calculated by summing the item scores and ranges from 0 to 39, with higher scores indicating higher levels of depression. Scores of 0 - 3 indicate normal, 4 - 7 indicate mild depression, 8 - 11 indicate mild to moderate depression, 12 - 15 indicate moderate depression, and 15 - 39 indicate severe depression. Rajabi examined the psychometric properties of the BDI-S, with the tool's Cronbach's alpha coefficient calculated as 0.89 and 0.82 using the split-half method. Additionally, the correlation coefficient between the short (13-item) and full (21-item) forms was 0.67 (37). In the current study, Cronbach's alpha coefficient was reported as 0.838.

3.8. Heartland Forgiveness Scale

This 18-item self-reported instrument was developed by Thompson et al. in 2005 to measure forgiveness and is widely used. The scale consists of three subscales: (1)

forgiveness of self (items 1 - 6), (2) forgiveness of others (items 7 - 12), and (3) forgiveness of situations (items 13 - 18). Scoring is based on a 7-point Likert scale, ranging from 1 (Strongly disagree) to 7 (Strongly agree). The total score ranges from 18 to 126, with higher scores indicating higher levels of forgiveness. In the study by Thompson et al., Cronbach's alpha coefficient was calculated as 0.86 for the total forgiveness score, indicating good internal consistency of the instrument (38). The validity and reliability of the Heartland Forgiveness Scale (HFS) have been reported previously in Iran (39-41). In this study, Cronbach's alpha coefficient for the total forgiveness score was calculated as 0.70.

3.9. Multidimensional Perfectionism Scale (MPS)

This 30-item scale, created by Hewitt and Flett in 1991, divides perfectionism into three types: Self-oriented, other-oriented, and socially prescribed perfectionism. The Multidimensional Perfectionism Scale (MPS) uses a 5-point Likert scale for scoring, ranging from 1 (strongly disagree) to 5 (strongly agree). The total score ranges from 30 to 150, with higher scores indicating higher levels of perfectionism (42). In the preliminary validation of the Iranian version for the three subscales mentioned above, good internal consistency was reported for the scale (43). In the present study, the scale's internal consistency was calculated as $\alpha = 0.90$.

3.10. Spielberger State-Trait Anger Expression Inventory

This tool, designed by Charles Spielberger, has had its psychometric properties determined and standardized. The first section, consisting of 15 items, measures the current state of anger (items 1 - 15). The second section, including 10 items, assesses trait anger (items 16 - 25). The third section, composed of 32 items, measures the expression and control of anger (items 26 - 57) (44). In some studies, the internal consistency of the STAXI-2 and its subscales has been reported as satisfactory (44, 45). In this study, Cronbach's alpha coefficients for the state, trait, expression, and total STAXI-2 scores were calculated as 0.870, 0.866, 0.857, and 0.887, respectively, indicating the scale's good internal consistency.

3.11. Toronto Alexithymia Scale

This 20-item tool is scored using a 5-point Likert scale (from 1 = strongly disagree to 5 = strongly agree). Questions 4, 10, 18, and 19 are reverse scored. The minimum and maximum scores for this scale are 20 and 100, respectively (46). The Toronto Alexithymia Scale has three subscales: Difficulty identifying feelings (DIF), difficulty describing feelings (DDF), and externally

oriented thinking (EOT). The scale's internal consistency has been reported as good (47, 48). In the present study, Cronbach's alpha coefficient was reported as 0.752.

3.12. Data Analysis

Descriptive statistics were used in this study. In the hypothesis testing section, the Mann-Whitney U, Kruskal-Wallis, Spearman correlation coefficient, and Generalized Linear Model were implemented. For all statistical analyses, a significance level of less than 0.05 was considered. Data analysis was performed using SPSS-22 (IBM, Armonk, NY, USA).

3.13. Ethical considerations

This study was approved by the Ethics Committee of Mazandaran University of Medical Sciences with the code IR.MAZUMS.REC.1402.161. All participants completed a written informed consent form and were assured that their participation was entirely voluntary and that their information would be kept confidential. Additionally, vitiligo patients whose depression or anxiety scores were evaluated as severe, and those at risk of suicide, were referred to a psychiatrist or psychologist. The participants were informed about the purpose of the study, assured of their voluntary participation, and guaranteed the confidentiality of their information. All participants provided written informed consent.

4. Results

Most study participants were women (58%), married (61.3%), urban residents (74.8%), and had either a bachelor's degree (26.9%) or a diploma (26.1%). The majority of participants were of moderate economic status (73.1%). The mean age of vitiligo patients was 32.12 ± 17.34 years. Table 1 shows the mean, standard deviation, and mean ranks of patients' characteristics in relation to depression and anxiety. Additionally, the mean and standard deviation for anger, perfectionism, forgiveness, and alexithymia were 118.10 ± 18.24 , 83.91 ± 48.17 , 77.87 ± 11.40 , and 51.03 ± 11.06 , respectively (Table 1).

Table 2 displays significant positive correlations between anxiety and depression with anger, perfectionism, and alexithymia. As the mean scores of these variables increased, the scores for depression and anxiety also significantly increased. Additionally, a significant negative correlation was observed between anxiety, anger, perfectionism, and forgiveness. Therefore, an increase in the mean score of forgiveness led to a significant decrease in the scores for anger, perfectionism, and anxiety (Table 2).

Table 1. Correlation Between Mean Scores of Depressions, Anxiety and Demographic Variables

Variables	Frequency (%)	Depression		Anxiety	
		Mean ± SD	Mean Ranks	Mean ± SD	Mean Ranks
Gender					
Woman	69 (58.0)	5.26 ± 5.30	66.97	13.54 ± 9.04	68.71
Man	50 (42.0)	2.82 ± 3.92	50.38	8.65 ± 8.35	48.74
P-value ^a		0.008		0.001	
Marital status					
Single	46 (38.7)	4.91 ± 5.24	64.86	11.52 ± 9.21	60.25
Married	73 (61.3)	3.81 ± 4.67	56.94	11.48 ± 9.005	59.84
P-value ^a		0.212		0.950	
Occupation					
Employee	15 (12.6)	2.93 ± 4.04	50.70	8.67 ± 7.35	49.63
Self-employed	39 (32.8)	3.10 ± 3.47	55.35	9.44 ± 7.85	51.96
worker	5 (4.2)	4.60 ± 6.14	20.59	14.00 ± 11.20	67.70
Other	60 (50.4)	5.27 ± 5.62	55.42	13.33 ± 9.68	67.18
P-value ^b		0.330		0.097	
Education					
High-school and lower	29 (24.4)	5.24 ± 6.04	63.86	13.21 ± 9.16	66.95
Diploma	31 (26.1)	3.23 ± 3.71	58.15	11.35 ± 9.68	68.18
Associate degree	7 (5.9)	3.14 ± 3.02	57.36	7.57 ± 0.45	45.71
Bachelor's degree	32 (26.9)	4.81 ± 5.71	61.33	11.00 ± 10.37	59.81
Master and higher	20 (16.8)	3.80 ± 3.68	60.73	11.40 ± 10.37	58.05
P-value ^b		0.891		0.638	
Disease status					
Stable	59 (49.6)	3.97 ± 4.32	59.78	9.66 ± 7.06	52.80
Developing	42 (35.3)	5.02 ± 5.64	63.19	12.67 ± 10.43	62.56
Accumulating	13 (10.9)	2.77 ± 4.76	50.8	13.08 ± 9.87	65.65
Developing and accumulating	5 (4.2)	4.60 ± 5.50	61.60	19.20 ± 11.69	85.20
P-value ^b		0.679		0.203	
Type of vitiligo					
Focal	9 (7.6)	4.67 ± 5.67	63.00	8.78 ± 7.41	49.17
Segmental	10 (8.4)	3.70 ± 5.35	56.15	10.50 ± 9.27	55.05
Mixed	1 (0.8)	0.001 ± 0	21.00	8.00 ± 0	48.50
Generalized	82 (68.9)	4.22 ± 4.63	61.06	11.73 ± 8.57	62.00
Acrofacial	17 (14.3)	4.65 ± 5.90	57.85	12.59 ± 12.17	59.68
P-value ^b		0.793		0.829	
Age (y)	119 (100)	34.17		12.32	
P-value		0.131 (-0.14)		0.093 (-0.016)	
Duration of illness (Month)	119 (100)	109.15		106.52	
P-value ^c		0.604 (-0.05)		0.604 (-0.09)	
Duration of treatment (Month)	119 (100)	70.24		74.44	
P-value ^c		0.746 (-0.03)		0.361 (-0.08)	
Illness severity	119 (100)	10.77		10.94	
P-value ^c		0.058 (-0.017)		0.240 (-0.011)	

^a Mann-Whitney.^b Kruskal-Wallis.^c Spearman Correlation.

Table 3 shows that only anxiety had a significant predictive correlation with depression scores. For each unit increase in the anxiety score, the depression score increased by 0.20 units ([Table 3](#)).

Anger, forgiveness, alexithymia, and depression had a predictive role in anxiety. For each unit increase in anger, alexithymia, and depression scores, the anxiety score increased by 0.12, 0.19, and 0.54 units, respectively.

Table 2. Correlation of Mean Scores of Study Variables in Vitiligo Patients (Spearman's Rank Correlation Coefficient)

Variables	Depression	Anxiety	Anger	Perfectionism	Forgiveness
Anxiety	0.446 ^a				
Anger	0.303 ^a	0.295 ^a			
Perfectionism	0.440 ^a	0.356 ^a	0.575 ^a		
Forgiveness	-0.102	-0.209 ^b	-0.246 ^a	-0.361 ^a	
Alexithymia	0.350 ^a	0.441 ^a	0.395 ^a	0.531 ^a	-0.262 ^a

^a Correlation is significant at the 0.01 level (2-tailed).

^b Correlation is significant at the 0.05 level (2-tailed).

Table 3. Predictive Role of Factors Related to Depression in Vitiligo Patients Based on Generalized Linear Model

Parameters	B	Std. Error	Sig.
(Intercept)	-1.420	4.6750	0.761
Gender			
Male	-1.011	0.8035	0.208
Female	0	-	-
Marital status			
Married	-1.242	1.0705	0.246
Single	0	-	-
Vitiligo types			
Focal	-.715	1.6921	0.673
Segmental	-1.090	1.4328	0.447
Mixed	-1.945	4.3785	0.657
Generalized	-1.216	1.8608	0.514
Acrofacial	0	-	-
Age	0.007	0.0443	0.866
Anger	0.004	0.0245	0.856
Perfectionism	0.035	0.0263	0.181
Forgiveness	-0.024	0.0359	0.512
Alexithymia	0.073	0.0424	0.085
Anxiety	0.190	0.0518	0.000

Conversely, each unit increase in the forgiveness score resulted in a 0.13 unit decrease in the anxiety score among the patients (Table 4).

5. Discussion

This study aimed to predict depression and anxiety in vitiligo patients by considering forgiveness, perfectionism, anger, and alexithymia in hospitals affiliated with Babol University of Medical Sciences in 2023.

The mean scores of the study participants indicated that their levels of depression and anxiety were mild. Additionally, over one-third of the patients suffered from mild to severe depression and anxiety. In the US, Cukor et al. reported low levels of depression and moderate levels of anxiety among vitiligo patients (9). However, Nasser et al. and Kussainova et al. found that

most vitiligo sufferers experienced moderate to high levels of anxiety and depression (7, 10). Differences in cultural support for such patients could potentially impact their levels of depression and anxiety, which may explain the varying findings of these studies. Furthermore, the studies used different questionnaires to assess anxiety and depression, which could have led to different results. Nesayan et al. indicated a higher prevalence of anxiety, depression, and other psychological disorders in individuals with vitiligo compared to the general population (11). The present study's results demonstrated a significant correlation between the mean scores for depression and anxiety and gender. Women in the study had significantly higher mean scores for depression and anxiety compared to men. Other demographic variables did not show any significant correlation with depression. Gerogianni et al. also reported a significant correlation

Table 4. Predictive Role of Factors Related to Anxiety in Vitiligo Patients Based on The Generalized Linear Model

Parameters	B	Std. Error	Sig.
(Intercept)	-4.627	7.8358	0.555
Gender			
Male	-1.615	1.3491	0.231
Female	0a	-	-
Marital status			
Married	1.460	1.8014	0.418
Single	0a	-	-
Vitiligo types			
Focal	3.484	2.8233	0.217
Segmental	2.264	2.4010	0.346
Mixed	4.455	7.3415	0.544
Generalized	2.993	3.1158	0.337
Acrofacial	0a	-	-
Age	-0.046	0.0742	0.535
Anger	0.116	0.0397	0.004
Perfectionism	-0.001	0.0445	0.977
Forgiveness	-0.132	0.0591	0.025
Alexithymia	0.189	0.0700	0.007
Depression	0.535	0.1458	0.000

between anxiety, depression, and gender, with women exhibiting higher levels of anxiety and depression than men (49). Similarly, Önen et al. in Turkey found a significant correlation between the female gender and increased mean scores of anxiety and depression in vitiligo sufferers (50). Sawant et al. also showed that women with vitiligo had significantly higher levels of depression compared to men, consistent with the findings of the current study (51). In contrast, Alharbi did not report any significant correlation between gender, anxiety, and depression in vitiligo patients (52). Kao et al. also found no significant correlation between gender and the mean scores for anxiety and depression in such patients, aligning with the present research (53).

These differing results may be attributed to various cultural environments and conditions in the countries studied, which could potentially cause differences in the manifestation of anxiety and depression between women and men (54-56). Additionally, the use of different assessment tools for anxiety and depression in these studies may have contributed to the varying results (57, 58).

The findings of this research exposed a significant correlation between forgiveness, perfectionism, anger, alexithymia, anxiety, and depression scores, suggesting that higher levels of perfectionism, anger, and alexithymia are associated with increased depression and anxiety in patients. Additionally, the findings revealed a negative correlation between forgiveness and both anxiety and depression. In this study, anxiety was

the only predictor of depression, while forgiveness, anger, alexithymia, and depression were predictors of anxiety in vitiligo sufferers. Furthermore, the study found that forgiveness, anger, alexithymia, and depression were predictors of anxiety in vitiligo patients.

Consistent with these findings, Narimani et al. conducted a cross-sectional study on the predictive role of alexithymia and mindfulness in depression and anxiety in women with cancer. The results indicated that personality traits and mindfulness are important factors contributing to depression and anxiety among cancer patients, and improving these indicators can significantly reduce anxiety and depression (8). Besharat et al. found a relationship between perfectionism and anxiety with the mediating role of emotion regulation difficulties. The results showed that perfectionism and emotion regulation difficulties can predict the severity of depression and anxiety symptoms (59). Although the study revealed that perfectionism is correlated with depression and anxiety, it was not a predictor of depression and anxiety among the patients. In Turkey, Namdar also found a significant positive correlation between alexithymia and the presence of anxiety and depression in vitiligo sufferers (30). Stanley et al. identified anger as a contributing factor to the prevalence of anxiety and depression (60).

By analyzing the findings of the present study and comparing them with prior works, it can be concluded that several significant factors, including alexithymia,

anger, and forgiveness, may serve as indicators of anxiety in individuals diagnosed with vitiligo. The results also revealed that anxiety is the only main predictor of depression in such patients.

The limitations of this study include its correlational design and the use of self-report measures to collect data. Although measures with known reliability and validity were chosen, the accuracy of responses largely depended on the participants' readiness, motivation, and memory. Additionally, convenience sampling limited the generalizability of our findings.

Despite these limitations, this study was the first to examine the predictive role of psychological factors in relation to anxiety and depression in vitiligo patients with an acceptable sample size. Therefore, we believe that this study is promising for future researchers to further investigate the question of how addressing such variables can prevent anxiety and depression in vitiligo sufferers.

5.1. Conclusions

The findings of this study emphasize the crucial role of addressing psychological factors in the care of vitiligo patients to enhance their overall well-being and quality of life. By further investigating and implementing interventions targeting these factors, we can gain a deeper understanding of the mental health challenges faced by individuals living with vitiligo. This knowledge can be used to develop more effective strategies for supporting these individuals and promoting their mental health and emotional resilience. Ultimately, a holistic approach to the management and treatment of vitiligo, which includes attention to psychological factors, can lead to improved outcomes and an enhanced quality of life for patients.

Acknowledgements

This article resulted from a research project with code 17494, approved by Mazandaran University of Medical Sciences. We sincerely appreciate the support provided by the Research Deputy of Mazandaran University of Medical Sciences, the Clinical Research Development Unit of Shahid Yahyanezhad Hospital, and Babol University of Medical Sciences.

Footnotes

Authors' Contribution: S. G. Mosavi worked on the data collection and writing the first draft of the article. A. Shirzadiankebia was the advisor. A. Hosseinnataj

performed the data analysis and interpreted the results. H. Azimi Lolaty designed, interpreted the results and supervised the work.

Conflict of Interests Statement: The authors declared there was no conflict of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: This research was approved by Mazandaran University of Medical Sciences with the following ethical code: (IR.MAZUMS.REC.1402.161).

Funding/Support: This article resulted from a research project of code 17494 approved by Mazandaran University of Medical Sciences.

Informed Consent: Written informed consent has been obtained from the involved participants.

References

1. Amer AA, Mchepange UO, Xing-Hua GAO, Yuxiao HONG, Ruiqun QI, Yan WU, et al. Hidden victims of childhood vitiligo: impact on parents' mental health and quality of life. *Acta Dermato-Venereologica*. 2015;95(3). <https://doi.org/10.2340/00015555-1940>.
2. Kostopoulou P, Taieb A. *Psychological interventions*. Switzerland: Springer, Cham; 2019.
3. Lai YC, Yew YW, Kennedy C, Schwartz RA. Vitiligo and depression: A systematic review and meta-analysis of observational studies. *Br J Dermatol.* 2017;177(3):708-18. [PubMed ID: 27878819]. <https://doi.org/10.1111/bjd.15199>.
4. Bidaki R, Majidi N, Moghadam Ahmadi A, Bakhshi H, Sadr Mohammadi R, Mostafavi SA, et al. Vitiligo and social acceptance. *Clin Cosmet Investig Dermatol.* 2018;11:383-6. [PubMed ID: 30046249]. [PubMed Central ID: PMC6054323]. <https://doi.org/10.2147/ccid.S15114>.
5. Madeleine MM, Patel NS, Plasmeijer EI, Engels EA, Bouwes Bavinck JN, Toland AE, et al. Epidemiology of keratinocyte carcinomas after organ transplantation. *Br J Dermatol.* 2017;177(5):1208-16. [PubMed ID: 28994104]. <https://doi.org/10.1111/bjd.15931>.
6. Wang G, Qiu D, Yang H, Liu W. The prevalence and odds of depression in patients with vitiligo: A meta-analysis. *J Eur Acad Dermatol Venereol.* 2018;32(8):1343-51. [PubMed ID: 29222958]. <https://doi.org/10.1111/jdv.14739>.
7. Nasser MAEM, Raggi El Tahlawi SM, Abdelfatah ZA, Soltan MR. Stress, anxiety, and depression in patients with vitiligo. *Middle East Current Psychiatry*. 2021;28:1-10.
8. Narimani M, Jani S, Rezaei R. [The role of alexithymia and mindfulness in predicting depression and anxiety in women with cancer]. *Shenakht J Psychol Psychiatry*. 2020;7(1):78-89. FA.
9. Cukor D, Coplan J, Brown C, Friedman S, Cromwell-Smith A, Peterson RA, et al. Depression and anxiety in urban hemodialysis patients. *Clin J Am Soc Nephrol.* 2007;2(3):484-90. [PubMed ID: 17699455]. <https://doi.org/10.2215/cjn.00040107>.
10. Kussainova A, Kassym L, Akhmetova A, Glushkova N, Sabirov U, Adilgozhina S, et al. Vitiligo and anxiety: A systematic review and meta-analysis. *PLoS One*. 2020;15(11). e0241445. [PubMed ID: 33170870].

[PubMed Central ID: [PMC7654800](https://doi.org/10.1371/journal.pone.0241445)]. <https://doi.org/10.1371/journal.pone.0241445>.

11. Nesayan A, Joneidi M, Asadi Gandomani R, Amiri M. Comparison of mental disorders and general health in individual with and without vitiligo. *J North Khorasan Univ Med Sci*. 2017;9(2):271-8. <https://doi.org/10.18869/acadpub.jnkums.9.2.271>.

12. Toussaint LL, Worthington ELJ, Williams DR. *Forgiveness and health*. Netherlands: Springer; 2015.

13. Griffin BJ, Worthington EL, Lavelock CR, Wade NG, Hoyt WT. *Forgiveness and mental health*. Dordrecht, Netherlands: Springer, Dordrecht; 2015. https://doi.org/10.1007/978-94-017-9993-5_6.

14. Taşçıoğlu G, Çakıcı E, Cirhinioglu FG. Somatization level among psychosomatic dermatology patients: Relationship with dyadic adjustment, gratitude, forgiveness, and perfectionism. *Alpha Psychiatry*. 2021;22(3):165.

15. Limburg K, Watson HJ, Hagger MS, Egan SJ. The relationship between perfectionism and psychopathology: A meta-analysis. *J Clin Psychol*. 2017;73(10):1301-26. [PubMed ID: [28026869](https://doi.org/10.1002/jclp.22435)]. <https://doi.org/10.1002/jclp.22435>.

16. Shannon A, Goldberg JO, Flett GL, Hewitt PL. The relationship between perfectionism and mental illness stigma. *Personality Individual Differences*. 2018;126:66-70.

17. Flett GL, Hewitt PL. *Perfectionism in childhood and adolescence: A developmental approach*. Washington, US State: American Psychological Association; 2022.

18. Aricak OT, Ozbay A. Investigation of the relationship between cyberbullying, cybervictimization, alexithymia and anger expression styles among adolescents. *Computers in Human Behavior*. 2016;55:278-85.

19. Burns JW, Gerhart JI, Bruehl S, Peterson KM, Smith DA, Porter LS, et al. Anger arousal and behavioral anger regulation in everyday life among patients with chronic low back pain: Relationships to patient pain and function. *Health Psychol*. 2015;34(5):547-55. [PubMed ID: [25110843](https://doi.org/10.1037/hea0000091)]. [PubMed Central ID: [PMC4513650](https://doi.org/10.1037/hea0000091)]. <https://doi.org/10.1037/hea0000091>.

20. Han A, Won J, Kim O, Lee SE. Anger expression types and interpersonal problems in nurses. *Asian Nurs Res (Korean Soc Nurs Sci)*. 2015;9(2):146-51. [PubMed ID: [26160244](https://doi.org/10.1016/j.anri.2015.04.001)]. <https://doi.org/10.1016/j.anri.2015.04.001>.

21. Hamidizadeh N, Ranjbar S, Ghanizadeh A, Parvizi MM, Jafari P, Handjani F. Evaluating prevalence of depression, anxiety and hopelessness in patients with Vitiligo on an Iranian population. *Health Qual Life Outcomes*. 2020;18(1):20. [PubMed ID: [32013982](https://doi.org/10.1186/s12955-020-1278-7)]. [PubMed Central ID: [PMC6998062](https://doi.org/10.1186/s12955-020-1278-7)]. <https://doi.org/10.1186/s12955-020-1278-7>.

22. Patel KR, Singam V, Rastogi S, Lee HH, Silverberg NB, Silverberg JI. Association of vitiligo with hospitalization for mental health disorders in US adults. *J Eur Acad Dermatol Venereol*. 2019;33(1):191-7. [PubMed ID: [30242917](https://doi.org/10.1111/jdv.15255)]. <https://doi.org/10.1111/jdv.15255>.

23. Kinnaird E, Stewart C, Tchanturia K. Investigating alexithymia in autism: A systematic review and meta-analysis. *Eur Psychiatry*. 2019;55:80-9. [PubMed ID: [30399531](https://doi.org/10.1016/j.eurpsy.2018.09.004)]. [PubMed Central ID: [PMC6331035](https://doi.org/10.1016/j.eurpsy.2018.09.004)]. <https://doi.org/10.1016/j.eurpsy.2018.09.004>.

24. Martino G, Caputo A, Vicario CM, Catalano A, Schwarz P, Quattropani MC. The relationship between alexithymia and type 2 diabetes: A systematic review. *Front Psychol*. 2020;11:206. [PubMed ID: [32982843](https://doi.org/10.3389/fpsyg.2020.02026)]. [PubMed Central ID: [PMC7484475](https://doi.org/10.3389/fpsyg.2020.02026)]. <https://doi.org/10.3389/fpsyg.2020.02026>.

25. Ricciardi L, Demartini B, Fotopoulos A, Edwards MJ. Alexithymia in neurological disease: A review. *J Neuropsychiatry Clin Neurosci*. 2015;27(3):179-87. [PubMed ID: [25658681](https://doi.org/10.1177/appi.neuropsych.14070169)]. <https://doi.org/10.1177/appi.neuropsych.14070169>.

26. Zohreh M, Sepaskhah M, Ebrahim Moghimi S, Zahra B, Mohamad M. Alexithymia in vitiligo patients: A case-control study. *Iran J Dermatol*. 2018;21(4):138-41.

27. Yilmaz O, Şengül Y, Şengül HS, Parlakkaya FB, Öztürk A. Investigation of alexithymia and levels of anxiety and depression among patients with restless legs syndrome. *Neuropsychiatr Dis Treat*. 2018;14:2207-14. [PubMed ID: [30214210](https://doi.org/10.2147/ndt.S174552)]. [PubMed Central ID: [PMC6120575](https://doi.org/10.2147/ndt.S174552)]. <https://doi.org/10.2147/ndt.S174552>.

28. Luminet O, Bagby RM, Taylor GJ, Luminet O, Bagby R, Taylor GJ, editors. *Alexithymia: Advances in research, theory, and clinical practice*. New York, NY, US: Cambridge University Press; 2018. <https://doi.org/10.1017/9781108241595>.

29. De Berardis D, Fornaro M, Orsolini L, Valchera A, Carano A, Vellante F, et al. Alexithymia and suicide risk in psychiatric disorders: A mini-review. *Front Psychiatry*. 2017;8:148. [PubMed ID: [28855878](https://doi.org/10.3389/fpsyg.2017.00148)]. [PubMed Central ID: [PMC555776](https://doi.org/10.3389/fpsyg.2017.00148)]. <https://doi.org/10.3389/fpsyg.2017.00148>.

30. Namdar ND, Kurtoglu Y. [Alexithymia, anxiety, and depression in patients with vitiligo]. *Annals Med Res*. 2021;28(4):633-7. FA.

31. Hamzavi I, Jain H, McLean D, Shapiro J, Zeng H, Lui H. Parametric modeling of narrowband UV-B phototherapy for vitiligo using a novel quantitative tool: The Vitiligo Area Scoring Index. *Arch Dermatol*. 2004;140(6):677-83. [PubMed ID: [15210457](https://doi.org/10.1001/archderm.140.6.677)]. <https://doi.org/10.1001/archderm.140.6.677>.

32. Komen I, da Graça V, Wolkerstorfer A, de Rie MA, Terwee CB, van der Veen JP. Vitiligo Area Scoring Index and Vitiligo European Task Force assessment: Reliable and responsive instruments to measure the degree of depigmentation in vitiligo. *Br J Dermatol*. 2015;172(2):437-43. [PubMed ID: [25278165](https://doi.org/10.1111/bjd.13432)]. <https://doi.org/10.1111/bjd.13432>.

33. Ghorbanibirgani A, Khalili A, Rokhafrooz D. Comparing nigella sativa oil and fish oil in treatment of vitiligo. *Iran Red Crescent Med J*. 2014;16(6): e4515. [PubMed ID: [25068060](https://doi.org/10.5812/ircmj.4515)]. [PubMed Central ID: [PMC4102993](https://doi.org/10.5812/ircmj.4515)]. <https://doi.org/10.5812/ircmj.4515>.

34. Kawakami T, Hashimoto T. Disease severity indexes and treatment evaluation criteria in vitiligo. *Dermatol Res Pract*. 2011;2011:750342. [PubMed ID: [21747840](https://doi.org/10.4172/derm.21747840)]. [PubMed Central ID: [PMC3130989](https://doi.org/10.4172/derm.21747840)]. <https://doi.org/10.4172/derm.21747840>.

35. Kaviani H, Mousavi AS. [Psychometric properties of the Persian version of Beck Anxiety Inventory (BAI)]. *Tehran Univ Med J*. 2008;66(2):136-40. FA.

36. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry*. 1961;4:561-71. [PubMed ID: [13688369](https://doi.org/10.1001/archpsyc.1961.01710120031004)]. <https://doi.org/10.1001/archpsyc.1961.01710120031004>.

37. Rajabi GR. [Psychometric properties of beck depression inventory short form items (BDI-13)]. *J Iranian Psychologists*. 2004;1(4): FA.

38. Thompson LY, Snyder CR, Hoffman L, Michael ST, Rasmussen HN, Billings LS, et al. Dispositional forgiveness of self, others, and situations. *J Pers*. 2005;73(2):313-59. [PubMed ID: [15745433](https://doi.org/10.1111/j.1467-6494.2005.00311.x)]. <https://doi.org/10.1111/j.1467-6494.2005.00311.x>.

39. Asgari P, Roshani K. Validation of forgiveness scale and a survey on the relationship of forgiveness and students' mental health. *Int J Phys Beh Res*. 2013;2(2):109-15.

40. Dehghan S, Kord Tamini B, Arab A. [Compare the forgiveness, psychological wellbeing and affective control between recovering drug-addicted and healthy subjects]. *J Social Issues Humanities*. 2014;2:10-3. FA.

41. Ebrahimi M, Azkhosh M, Shoaii F, Froughan M, Dolatshahi B. [Psychometric properties of Persian version of Heartland Forgiveness Scale in elderly]. *Iran J Rehabilitation Res*. 2017;3(4):9-20. FA. <https://doi.org/10.21859/ijrn-03042>.

42. Hewitt PL, Flett GL. Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *J Pers Soc Psychol*. 1991;60(3):456-70. [PubMed ID: [2027080](https://doi.org/10.1037/0022-3514.60.3.456)]. <https://doi.org/10.1037/0022-3514.60.3.456>.

43. Besharat MA, Azizi K, Poursharifi H. The relationship between parenting styles and children's perfectionism in a sample of Iranian families. *Procedia-Social and Behav Sci.* 2011;15:1276-9.

44. Spielberger CD. The experience and expression of anger: Construction and validation of an anger expression scale. *Anger and hostility in cardiovascular and behavioral disorder/Hemisphere.* 1985;1(1):5-30.

45. Borobado A, Heidari Nasab L. [Preliminary validation of the questionnaire State-Trait Anger Expression Inventory-2 Child and Adolescent (STAII-2 C/A) amongst a sample of Iranian students aged 12-17 years]. *J Sabzavar Univ Med Sci.* 1970;20(3):281-91. FA.

46. Bagby RM, Parker JD, Taylor GJ. The twenty-item Toronto Alexithymia Scale--I. Item selection and cross-validation of the factor structure. *J Psychosom Res.* 1994;38(1):23-32. [PubMed ID: 8126686]. [https://doi.org/10.1016/0022-3999\(94\)90005-1](https://doi.org/10.1016/0022-3999(94)90005-1).

47. Seo SS, Chung US, Rim HD, Jeong SH. Reliability and validity of the 20-item toronto alexithymia scale in korean adolescents. *Psychiatry Investig.* 2009;6(3):173-9. [PubMed ID: 20046392]. [PubMed Central ID: PMC2796065]. <https://doi.org/10.4306/pi.2009.6.3.173>.

48. Besharat MA. Reliability and factorial validity of a Farsi version of the 20-item Toronto Alexithymia Scale with a sample of Iranian students. *Psychol Rep.* 2007;101(1):209-20. [PubMed ID: 17958129]. <https://doi.org/10.2466/pr0.101.1.209-220>.

49. Gerogianni G, Lianos E, Kouzoupis A, Polikandrioti M, Grapsa E. The role of socio-demographic factors in depression and anxiety of patients on hemodialysis: An observational cross-sectional study. *Int Urol Nephrol.* 2018;50(1):143-54. [PubMed ID: 29159509]. <https://doi.org/10.1007/s11255-017-1738-0>.

50. Önen Ö, Kundak S, Özak Erkuran H, Kutlu A, Çakaloz B. Quality of life, depression, and anxiety in Turkish children with vitiligo and their parents. *Psychiatry Clinical Psychopharmacol.* 2019;29(4):492-501.

51. Sawant NS, Vanjari NA, Khopkar U. Gender differences in depression, coping, stigma, and quality of life in patients of vitiligo. *Dermatol Res Pract.* 2019;2019:6879412. [PubMed ID: 31065260]. [PubMed Central ID: PMC6466925]. <https://doi.org/10.1155/2019/6879412>.

52. Alharbi MA. Identifying patients at higher risk of depression among patients with vitiligo at outpatient setting. *Mater Sociomed.* 2020;32(2):108-11. [PubMed ID: 32843857]. [PubMed Central ID: PMC7428888]. <https://doi.org/10.5455/msm.2020.32.108-111>.

53. Kao YY, Lee WC, Wang RH, Chen JB. Correlation of sociodemographic profiles with psychological problems among hospitalized patients receiving unplanned hemodialysis. *Ren Fail.* 2020;42(1):255-62. [PubMed ID: 32146858]. [PubMed Central ID: PMC7144224]. <https://doi.org/10.1080/0886022X.2020.1736097>.

54. Salk RH, Hyde JS, Abramson LY. Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychol Bull.* 2017;143(8):783-822. [PubMed ID: 28447828]. [PubMed Central ID: PMC5532074]. <https://doi.org/10.1037/bul0000102>.

55. Altemus M, Sarvaiya N, Epperson CN. Sex differences in anxiety and depression clinical perspectives. *Frontiers Neuroendocrinol.* 2014;35(3):320-30. <https://doi.org/10.1016/j.yfrne.2014.05.004>.

56. Hopcroft RL, Bradley DB. The sex difference in depression across 29 countries. *Social Forces.* 2007;85(4):1483-507.

57. Lambert SD, Clover K, Pallant JF, Britton B, King MT, Mitchell AJ, et al. Making sense of variations in prevalence estimates of depression in cancer: A co-calibration of commonly used depression scales using rasch analysis. *J Natl Compr Canc Netw.* 2015;13(10):1203-11. [PubMed ID: 26483060]. <https://doi.org/10.6004/jnccn.2015.0149>.

58. Lovibond PF, Lovibond SH. The structure of negative emotional states: Comparison of the depression anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther.* 1995;33(3):335-43. [PubMed ID: 7726811]. [https://doi.org/10.1016/0005-7967\(94\)00075-u](https://doi.org/10.1016/0005-7967(94)00075-u).

59. Besharat MA, Farahmand H, Ebrahimi F. [The association of perfectionism dimensions with depression and anxiety symptoms: The mediating role of difficulties in emotion regulation]. *Rooyesh-e-Ravanshenasi J (RRJ).* 2020;9(7):1-14. FA.

60. Stanley SK, Hogg TL, Leviston Z, Walker I. From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *J Climate Change Health.* 2021;1:100003.