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Original Article *Özgün Araştırma*

THE RELATIONSHIP BETWEEN PSYCHOLOGICAL PAIN, RUMINATION AND SUICIDE AND ACNE SEVERITY IN ACNE VULGARIS PATIENTS

Akne Vulgaris Tanılı Hastalarda Psikolojik Acı, Ruminasyon ve İntihar ile Akne Şiddeti Arasındaki İlişkisi

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ABSTRACT

Objective: Acne vulgaris is among dermatological diseases that increase suicide risk significantly. We aimed to investigate the relationship between suicide risk and acne severity, psychological pain, and especially brooding rumination in 18-36 years old acne vulgaris patients.

Material and Methods: Our study was conducted with 103 acne vulgaris patients and 87 healthy controls. Study data were collected with a Socio-demographic Data Form, Global Acne Scoring System (GASS), Suicide Probability Scale (SPS), Psychological Pain Scale (PPS), Rumination Response Scale - Short Form (RRS-SF), and Beck Depression Inventory (BDI).

Results: It was determined that median brooding rumination, total SPS scores and hopelessness, hostility subscale scores were statistically significantly higher in the patient group (p values; 0.035, 0.006, 0.032, 0.007). In the patient group, the analysis of the correlations between the GASS and scale scores when the BDI score is controlled demonstrated that there were weak positive correlations between SPS despair and hostility subscale scores and total SPS score and PPS and brooding rumination scores (p: 0.003; r: 0.270), (p:0.014; r: 0.218), (p:0.010; r:0.229). (p:<0.001; r:0.389), (p:0.001, r: 0.304), (p:0.010; r:0.229). It was determined that brooding rumination, PPS and GASS scores contributed significantly to the multiple linear regression model structured estimate of the total SPS score.

Conclusion: Since the suicidal risk of acne patients with acne who present to dermatology clinics could be high, it is important to follow up these patients with the psychiatry clinic, and in addition to acne treatment, therapeutic interventions that aim to reduce ruminative ideation and psychological pain could significantly contribute to the reduction of suicide risk.

Keywords: *Acne vulgaris, suicide, psychological pain, rumination*

ÖZ

Amaç: Akne vulgaris intihar riskini önemli ölçüde artıran dermatolojik hastalıklar arasında yer almaktadır. 18-36 yaş arası akne vulgaris hastalarında intihar riski ile akne şiddeti, psikolojik acı ve özellikle *brooding* ruminasyon arasındaki ilişkiyi araştırmayı amaçladık.

Gereç ve Yöntemler: Çalışmamız 103 akne vulgaris hastası ve 87 sağlıklı kontrol ile gerçekleştirildi. Çalışma verileri Sosyodemografik Veri Formu, Global Akne Skorlama Sistemi (GASS), İntihar Olasılığı Ölçeği (SPS), Psikolojik Ağrı Ölçeği (PPS), Ruminasyon Tepki Ölçeği-Kısa Form (RRS-SF) ve Beck Depresyon Envanteri ile toplanmıştır (BDI).

Bulgular: Hasta grubunda kara kara düşünme, toplam SPS puanları ve umutsuzluk, düşmanlık alt ölçek puan ortalamalarının istatistiksel olarak anlamlı derecede yüksek olduğu belirlendi (p değerleri; 0.035, 0.006, 0.032, 0.007). Hasta grubunda BDÖ puanı kontrol edildiğinde GASS ile ölçek puanları arasındaki korelasyonlar incelendiğinde, SPS umutsuzluk ve düşmanlık alt ölçek puanları ile toplam SPS puanı ile PPS ve kara kara düşünme puanları arasında pozitif yönde zayıf ilişkiler olduğu görüldü (p:0.003) ; r: 0.270), (p:0.014; r: 0.218), (p:0.010; r:0.229), (p:<0.001; r:0.389) (p:0.001, r:0.304), (p:0.010; r:0.229). Kara kara düşünme, PPS ve GASS puanlarının, çoklu doğrusal regresyon modeli yapılandırılmış toplam SPS puanı tahminine anlamlı katkı sağladığı belirlendi.

Sonuç: Dermatoloji kliniklerine başvuran akne hastalarının intihar riski yüksek olabileceğinden bu hastaların psikiyatri kliniği tarafından takip edilmesi önemlidir. Akne tedavisine ek olarak ruminatif düşünce ve psikolojik acıyı azaltmayı amaçlayan terapötik müdahaleler intihar riskinin azaltılmasına önemli ölçüde katkı sağlayabilir.

Anahtar Kelimeler: *Akne vulgaris, intihar, psikolojik acı, ruminasyon*

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INTRODUCTION

Suicide is a significant public health problem. The World Health Organization (WHO) reported that about one million people die as a result of suicide each year, and suicide is the second leading cause of death among 15-29 years old individuals (1). Important risk factors for suicide include psychiatric diseases, history of suicide attempt, hopelessness, living alone, family history of suicide, and stressful life events. It has been reported that factors that contribute to long-term stress should also be investigated when assessing the risk of suicide attempt. However, there is no demographic or the clinical parameter that is not considered an accurate predictor (2). The significance of psychiatric consultation was emphasized in the development of strategies to prevent suicidal behavior in dermatological disease patients, where suicidal risk could be high (3). It should be noted that the risk is especially high among young adults (4). Acne vulgaris, a dermatological disease, increases the risk of suicide significantly. Acne is a chronic inflammatory skin illness that influences placebo follicles and is observed in 80-85% of the adolescent and young adult population (5). It was suggested that acne could lead to emotional and physical disorders, which could in turn lead to social isolation, anxiety, depression, and suicide attempts (6). In a study published in the 1990s, it was reported that 7 out of 16 completed suicides among dermatology patients were due to acne. The same study reported that the mean age of 7 acne patients who committed suicide was 20.4 (7). It was also demonstrated that the severity, form and acne scarring contributed to suicidal behavior. However, it was indicated that the number of studies that aimed to determine suicide risk in acne vulgaris was quite limited and further research is required (3).

Recently, it was suggested that psychological pain could be among the risk factors in suicide (8). It was demonstrated that psychological pain could significantly increase suicide risk independent of the severity of depression (9). It was assumed that there would be no suicide without psychological pain (10).

Rumination is considered as another risk factor in suicide and it was described as a repetitive and passive focus on the symptoms, causes and consequences of problems. It was directly and indirectly (via severe despair) associated with suicidal ideation. The two components of rumination include reflection and brooding rumination (11). Brooding rumination was characterized by dwelling on the consequences of negative emotions and was considered a maladaptive process. Reflection rumination is about thinking about the causes of the depressive mood, and it was suggested that it could serve as a cohesive since it could facilitate problem solving in the long run (12,13).

The above-mentioned previous study findings suggested that suicidal death is common among young adults and the suicide rate is higher in acne patients in the same age group. Thus, we aimed to investigate the correlations between suicide risk and acne severity, psychological pain and especially brooding rumination in 18-36 years old acne vulgaris patients.

MATERIALS AND METHODS

In this study, the patient group consisted of patients with acne vulgaris, and the control group consisted of healthy individuals. The patients included individuals who applied to the Dermatology Outpatient Clinic without any prior systemic acne treatment and were diagnosed with acne vulgaris by a dermatologist. The healthy control group included healthy volunteers in similar age and gender groups with the patients. The study protocol was approved by the Malatya Turgut Özal University Non-invasive Clinical Research Ethics Committee on 03.08.2021 (no: 2021151).

Individuals, who were 18-36 years old and without any neurological or psychological illness that would prevent them from reading and comprehending the scales, were included in the study.

We calculated the effect size based on the study by Yazici et al (14). When the test was two-tailed, alpha .05, power 90%, p1 0.295 and p2 0.079, the required sample size was 84 for the acne group and 57 for the control group (15). In the study, a total of 190 people were reached, 103 in the acne group and 87 in the control group.

All participants declared - voluntary consent before the study. The study was conducted in accordance with the Declaration of Helsinki.

Data Collection Instruments

*Socio-Demographic Data Form***:** The data form was developed by the authors. The form aimed to collect patient demographics such as age, gender, education level, income level, smoking, and parental history.

Global Acne Scoring System (GASS): In the scoring system, employed to determine the clinical severity of acne, the face, upper torso and back are divided into six sections, and a coefficient is assigned to each section (forehead, right cheek and left cheek = 2, nose and chin=1, chest and upper back=3) based on the size of the section and the density and distribution of the pilosebaceous units in the section. Acne lesions are scored (0-4) based on type (no lesion=0, ≥1 black head=1, ≥1 papule=2, ≥1 pustule=3, ≥1 nodule=4). Each region is analyzed and scored separately; the score is determined by multiplying the score for the most severe lesion in that region by the region coefficient. The global acne score is the sum of the six regional scores. The total score varies between 0 and 44, and acne severity is determined with the global acne score (0 points = no

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acne, 1-18 points = mild acne, 19-30 points = moderate acne, 31-38 points = severe acne, >39 scores = very severe acne) (16).

Psychological Pain Scale (PPS): The self-report scale that includes 13 items was devised by Mee et al. (17). The scale includes 5-point Likert type items. A higher scale score indicates higher psychological pain. The validity and reliability of the study were determined by Demirkol et al. in Turkish language, and the Cronbach's alpha coefficient was 0.98 (18).

Suicide Probability Scale (SPS): This scale is a 36-item scale developed by Cull and Gill and adapted into Turkish language by Atlı et.al. (19). The scale includes four subscales: negative self-evaluation, despair, hostility and suicidal ideation. Reliability analysis revealed that the Cronbach's alpha coefficients were 0.78, 0.94, 0.79, 0.70, for the subscales, respectively, and 0.89 for the entire scale.

Ruminative Responses Scale, Short Form (RRS-SF): The scale was developed based on the 21-item long-form that evaluates the degree of the employment of ruminative coping mechanisms by removing the items criticized to measure depression symptoms and includes 10 4-point Likert-type items (20). The scale includes two sub-dimensions: brooding rumination that includes passive comparison of unfulfilled expectations and the current state, and reflection rumination that includes mental efforts to overcome problems and difficulties. The Turkish validity and reliability study revealed that the internal consistency coefficients for the total RRS-SF, reflection rumination and brooding rumination sub-dimensions were 0.85, 0.77, and 0.75 respectively (21).

Beck Depression Inventory (BDI): Beck et al. developed this scale in 1961. The scale consists of 21 items (22). The scale was adapted to Turkish by Hisli (23). A higher total score reflects higher depression symptoms. The Cronbach alpha coefficient of the Turkish version was determined as 0.80 (23).

Procedure

Socio-Demographic Data Form and GASS was applied to the acne patients by a dermatologist. Then, the patients were referred to a psychiatrist. The socio-demographic data form was completed by the psychiatrist for all study participants. Then, all participants completed the suicide risk, the psychological pain, and rumination scales, and the Beck depression inventory.

Statistical Analysis

The study data were analyzed with the SPSS 22 software. Kolmogorov Smirnov test was applied to determine normal distribution. Non-parametric tests, Chi-square test and Mann Whitney U test were employed to analyze data without normal distribution. Multiple linear regression analysis was conducted to estimate the total suicide probability scale score. $p< 0.05$ was considered statistically significant.

RESULTS

The mean age of the 190 participants was 22.88±3.40. The patient group was between the ages of 18-36, and the control group was between the ages of 19-34. Among the participants, 103 (54.2%) were acne patients and 87 (45.8%) were controls. Patient demographics are presented in Table 1.

The comparison of the scale scores of the patient and control groups revealed that the median brooding rumination, total SPS and hopelessness and hostility sub-dimension scores of the patient group were statistically significantly higher (p= 0.035, 0.006, 0.032, 0.007, respectively) (Table 2).

Table 1: Patient and control group demographics and descriptive statistics

		Group		
		Patient*	**Control***	***p* value**
Sex [n (%)]	Male	31 (30.1)	30 (34.5)	0.519[1]
	Female	72 (69.9)	57 (65.5)	
Age	X±S.D.	23.45±4.13	22.21±2.08	0.104[2]
	Median (IQR)	23 (6)	22 (2)	
Marital Status [n (%)]	Married	53 (51.5)	3 (3.4)	**<0.001[1]**
	Single	46 (44.7)	84 (96.6)	
	Divorced/Widowed	4 (3.9)	0	
Education Level [n (%)]	Literate	1 (1.0)	0	**<0.001[1]**
	Primary	4 (3.9)	0	
	Secondary	39 (37.9)	4 (4.6)	
	Tertiary	59 (57.3)	83 (95.4)	
Income Level [n (%)]	Low	11 (10.7)	8 (9.2)	**0.001[1]**
	Medium	81 (78.6)	79 (90.8)	
	High	11 (10.7)	0	
Smoking [n (%)]	Yes	60 (58.3)	17 (19.5)	**<0.001[1]**
	No	43 (41.7)	70 (80.5)	
Acne in Mother [n (%)]	Yes	28 (27.2)		
	No	75 (72.8)		
Acne in Father [n (%)]	Yes	17 (16.5)		
	No	86 (83.5)		

*: Column, $\bar{X}$: Mean, SD: Standard deviation, IQR: Interquartile range, [1]Chi-Square test, [2]Mann-Whitney U test

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Table 2: Patient and control group Beck Depression Inventory, Psychological Pain Scale, Suicide Probability Scale and Rumination Response Scale - Short Form score comparison

		Patient		C ntrol		
		X±SD	**Median (IQR)**	**X±SD**	**Median (IQR)**	***p* value**
BDI		8.34±8.31	7 (15)	6.92±4.33	8 (7)	0.488*
PPS		22.01±8.79	19 (15)	19.11±5.15	18 (6)	0.129*
RRS	Brooding Rumination	10.38±3.71	10 (6)	9.16±2.12	9 (9)	**0.035***
	Reflective Rumination	10.14±3.86	10 (6)	9.90±2.69	10 (2)	0.462*
SPS	Despair	25.50±5.50	26 (9)	23.95±2.96	23 (3)	**0.032***
	Suicide Ideation	24.88±3.77	25 (5)	23.80±4.91	25 (5)	0.125*
	Hostility	11.08±3.59	10 (6)	9.55±1.77	9 (1)	**0.007***
	Negative self	17.32±4.12	17 (6)	17.62±3.78	17 (4)	0.498*
	Total	78.90±11.32	78 (19)	74.93±5.47	76 (6)	**0.006***

*Mann-Whitney U test, X̄ : Mean, SD: Standard deviation, IQR: Interquartile range
BDI: Beck Depression Inventory, PPS: Psychological Pain Scale, SPS: Suicide Probability Scale, RRS-SF: Rumination Response Scale - short form.

The correlations between the GASS and the scale scores when the patient group BDI scores were controlled revealed that there were weak positive correlations with the PPS score (p: 0.003; r: 0.270), the brooding rumination score (p: 0.014; r: 0.218) and SPS despair (p:0.010; r:0.229) and hostility (p: <0.001; r: 0.389) subscales and total scores (p:0.001, r: 0.304) (p:0.010; r:0.229) (Table 3).

Table 3: Correlations between patients' Group Global Acne Scoring System and Psychological Pain Scale, Suicide Probability Scale and Rumination Response Scale - Short Form scores

Control Variable			**GASS**
BDI	PPS	R	0.270*
		p	**0.003**
	Brooding Rumination	R	0.218*
		p	**0.014**
	Reflection Rumination	R	0.099*
		p	0.162
	SPS Despair	R	0.229*
		p	**0.010**
	SPS Suicide Ideation	R	0.025*
		p	0.401
	SPS Hostility	R	0.389*
		p	**<0.001**
	SPS Negative self	R	0.150*
		p	0.066
	SPS Total	R	0.304*
		p	**0.001**

*Partial Correlation, Only the patients were included in the analysis. The tests were controlled for BDI score.
GASS: Global Acne Scoring System BDI: Beck Depression Inventory, PPS: Psychological Pain Scale, SPS: Suicide Probability Scale, RRS-SF: Rumination Response Scale - short form.

It was determined that brooding rumination, PPS score and GASS significantly contributed to the multilinear regression model employed to estimate the total SPS score. The independent variables explained 50.6% of the variation in the dependent variable in the model. In the model, dependent variable was total SPS score, and independent variables were brooding rumination, reflection rumination, PPS and GASS. The unit increase in the brooding rumination score increased the total SPS score by 0.924 units, the unit increase in the PPS score increased the total SPS score by 0.356 units, and the unit increase in the GASS score increased the total SPS score by 1.514 units (Table 4).

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Table 4: Multiple linear regression model established to estimate patient SPS score

Model	Coefficient	p	95% CI for B		Collinearity Statistics	
	B		Lower Limit	Upper Limit	Tolerance	VIF
Constant	57.206	**<0.001**	53.822	60.591		
Brooding Rumination	0.924	**0.001**	0.365	1.484	0.293	3.418
Reflection Rumination	0.187	0.379	-0.232	0.607	0.451	2.217
PPS	0.356	**<0.001**	0.166	0.547	0.444	2.254
GASS	1.514	**0.004**	0.501	2.528	0.725	1.380

Patients were excluded from the analysis. Beck Depression Inventory (BDI), Psychological Pain Scale (PPS), Suicide Probability Scale (SPS), Ruminative Response Scale (RRS-SF), Global Acne Scoring System (GASS)

DISCUSSION

One of the most important findings of our study was the higher suicide probability and brooding rumination scores in acne vulgaris patients when compared to healthy controls. Furthermore, when the severity of depressive symptoms was controlled, a correlation was observed between acne severity and brooding rumination, psychological pain, and suicide probability. It was reported that both active acne lesions and acne scars have negative psychosocial effects on the individual, and increase the possibility of social isolation, depression and suicidal ideation in affected individuals (24). In a study conducted with 165 male patients with acne and 150 healthy controls, no correlation was determined between suicidal ideation, depressive symptoms and acne; however, this finding was explained by the mild severity of acne in about two-thirds of the participants (25). In a large sample study (3775 results) conducted in young adults, it was aimed to determine the relationship between acne and suicidal ideation, mental health and social functions, it was reported that about 1 in 4 adolescents with severe acne exhibited suicidal ideation. In the same study, the prevalence of suicidal ideation among females with severe acne was more than double when compared to those with no or little acne, while it was 3 times higher among males. There were significant correlations between severe acne, depression and suicidal ideation in both females and males (24). In general, previous studies emphasized that patients with moderate to severe acne could be at increased suicide risk and underlined the inherent risk of neglecting the psychosocial factors in patients with acne, particularly those suffering from post-adolescence disease (3). Although there are contradictions between the findings reported by studies on the correlation between acne and suicide, the finding that the increase in the probability of suicide was associated with an increase in acne severity is important and consistent with the current literature. However, unlike previous studies, we also determined that rumination and psychological pain, which was not previously investigated in acne patients, were also associated with acne severity. The current study findings suggested that patients experience higher psychological pain, focus more on the negative consequences, and ideate suicide further when their acne is severe. It could be suggested that these findings could shed light on future studies on the risk of suicide in acne patients.

In the multilinear regression model established to predict the probability of suicide in acne patients in the current study, the dependent variable was the total SPS score, and PPS, reflection and brooding rumination, and GASS scores were independent variables. It was determined that the independent variables except reflection rumination significantly contributed to the model. The independent variables explained 50.6% of the variation in the dependent variable. One unit increase in GASS score led to a 1.514 unit increase in SPS score, one unit increase in the brooding rumination score led to a 0.924 unit increase in SPS score, and one unit increase in the PPS score led to a 0.356 unit increase in SPS score. The model demonstrated that acne severity had the highest impact on the possibility of suicide. This finding was consistent with previous findings reported in the literature that acne increased the suicide risk (6). The current study would contribute to the literature since it emphasized that the analysis of acne severity, brooding rumination and psychological pain could be important in the determination of suicide risk in young adult acne patients in dermatology outpatient clinics.

Our study demonstrated that brooding rumination and psychological pain significantly contributed to the probability of suicide. Consistent with the cognitive psychopathology theories, it was reported that brooding rumination and psychological affect suicide risk (26). In a study conducted with depression patients, it was suggested that psychological pain and rumination play a role in the development of suicidal behavior and ideation (27). It was reported that brooding rumination could serve as a cognitive mechanism. This cognition

feeds the psychological pain related with suicide. Response styles theory argued that an individual's repetitive cognitive focus on the sources, meanings, and outcomes of depression could predict negative psychological outcomes (28). In a literature review that included 12 studies, eleven reported a correlation between rumination and high suicidal behavior and ideation (29). Kerkhof and van Spijker theorized that brooding rumination inherently increases psychological pain since it involves frequent repetition of negative and hopeless ideation and is often uncontrollable (30). Thus, a recent meta-analysis reported a moderate, significant correlation between brooding rumination and suicidal ideation in cross-sectional and prospective studies, suggesting a correlation with suicidal ideation and behavior theories (31). It was reported that brooding rumination is related with non-suicidal self-harm and suicidal ideation and attempts (22,32). In a study conducted with psychiatric patients, it was determined that brooding was more associated with lifelong suicide attempts than suicidal ideation (33). Studies about correlation between rumination and suicide in patients with psychiatric disorders reported that suicide attempts could be associated with total rumination and brooding rumination rather than reflection. It could be suggested that reflection rumination could serve as a positive coping mechanism up to a certain degree of psychological well-being; however, in a negative emotional state, reflection rumination could increase vulnerability to suicidal ideation or attempts (12). A meta-analysis reported that there was a moderate correlation between total rumination and brooding rumination, and none with reflection rumination (31). The determination of the correlation between rumination and suicide is important; however, related studies were conducted with patients with psychiatric disorders; thus, it was important to determine that brooding rumination predicted the possibility of suicide, while reflection rumination had no impact in patients without any psychiatric disorder.

Another strength of the current study was the analysis of significant and novel parameters such as rumination and psychological pain to determine suicide risk in acne patients. Furthermore, the current study excluded patients who were under dermatological treatment (e.g., isotretinoin) that could have psychological effects. One of the limitations of our study was its cross-sectional nature. The sample size was higher than the requirement determined by power analysis. Although the differentiation between the participants was not statistically significant based gender, the difference between the number of participants in both groups was another limitation.

It could be suggested that our analysis of acne patients based on suicide risk factors would contribute to the literature since suicide is the second most common cause of death in the 18-30 age group, and suicide risk is higher in the same group. It could be concluded that psychological pain, brooding rumination and acne severity could predict suicide in acne patients. Since acne patients who apply to dermatology clinics could present a high suicide risk, these patients should be followed up in cooperation with psychiatry. In addition to acne treatment, therapeutic interventions that aim to reduce ruminative ideation and psychological pain could make a significant difference in the reduction of suicide risk.

*Conflict of Interest***:** The authors have no conflicts of interest to declare.

Researchers' Contribution Rate Statement:
Concept/Design: FK, BNK, KU;
Analysis/Interpretation: FK, BNK, KU, BM; Data Collection: FK, BM, BNK; Writer: FK,TS, BM;
Critical Review: FK, BM, BNK, TS, KU; Approver: FK, BM, BNK, TS, KU.

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