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Psychosocial Aspects of Adult Acne: Data from 13 European Countries

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The link between acne and psychiatric morbidities has been demonstrated in many studies; however, large scale studies aiming to reveal the psychosocial impact of acne are rare. The aim of this study was to assess the psychological burden of adult acne patients. This analysis was based on a multicenter study including 213 acne patients and 213 controls from 13 European countries. The Hospital Anxiety and Depression Scale (HADS), Dermatology Life Quality Index, and EuroQol 5 dimensions 3 levels scores of the patients with acne were analyzed. Patients with acne ($n = 213$) had higher HADS scores for anxiety (mean ± standard deviation 6.70 ± 3.84) and depression (3.91 ± 3.43) than the controls ($p < 0.001$ for both). For patients with acne, 40.6% reported that they were very concerned about their skin disease, 12.3% had suicidal ideation, and, among those, 10 (4%) patients implied that acne was the cause of their suicidal thoughts. After adjusting for other variables, patients who had suicidal ideation ($p = 0.007$, and adjusted odds ratio 3.32 [95% confidence interval (CI): 1.39–7.93]) and stressful life events ($p < 0.001$, and adjusted OR 5.85 [95% CI: 2.65–12.86]) had a greater chance of fulfilling the HADS criteria for anxiety. This study highlights the need for a psychotherapeutic approach in order to recognize the concerns of acne patients and optimize their treatment.

Key words: acne vulgaris; anxiety; depression; health concerns; quality of life; multicenter study.

SIGNIFICANCE

Acne is one of the commonest dermatological diseases and this is a first large-scale case control study aiming to reveal psychosocial impact. This analysis was based on a multicenter study including 213 acne patients over 18 years and 213 age-sex matched controls. We found that patients with acne are more likely to express anxiety, depression, pain and discomfort, and suicidal thoughts than the general population. Clinicians must be alert to these symptoms and where present consider the possibility of an underlying psychiatric component. This awareness may improve recognition of patient concerns and allow clinicians to optimize treatment.

Acne is one of the most common dermatological diseases, with a prevalence of 85% in adolescents, although it may also appear or extent in adult ages (1). A systematic analysis in the "Global Burden of Disease Study 2010" reported that acne is the 8th most frequent disease worldwide (2). Acne may affect individuals not only physically but also sociopsychologically. In previous studies, psychological comorbidities, such as depression, social anxiety, and suicidal thoughts, have been mostly reported in adolescent populations with acne (3, 4). Other psychological effects of acne, including embarrassment, impaired self-image, lowered self-esteem, self-consciousness, frustration, and anger, have also been identified (5). Based on surveys, approximately 30–50% of patients between 12–20 years of age with acne exhibit psychological responses, including anxiety, depression, lowered self-esteem, and low self-confidence (6). However, there is a lack of knowledge regarding the psychosocial burden of acne in adult ages.

It is important to understand the co-existing psychological issues that affect acne patients' psychological well-being in order to optimize the therapeutic approach (7). The aim of this study was to investigate population

characteristics, dermatological quality of life, depression, anxiety, and suicidal thoughts in adult patients with acne and compare them with those of healthy controls across 13 European countries.

MATERIALS AND METHODS

This study was based on a multicenter, observational, cross-sectional study in 13 European countries (8). Patients were recruited from dermatological outpatient clinics from November 2011 to February 2013. Patients met the inclusion criteria if they were over 18 years of age, understood the local language, and did not have psychosis. Data were provided for 213 acne patients out of the total 3,635 outpatients in the main study, and 213 age- and sex-matched controls were randomly chosen out of 1,359 healthy subjects. The control group consisted of healthy workers without any dermatological disease. All patients participating in the study, including controls, were examined by a dermatologist. Sociodemographic variables (sex, age, ethnicity, marital status), self-reported socioeconomic status (low, middle, high), and education (primary education, secondary education, higher education, university) were recorded. Additionally, primary and secondary dermatological diagnoses, severity of the disease (mild, moderate, severe), the presence of another chronic disease, suicidal ideation (yes, no), and whether the skin disease was the cause of the suicidal ideation (yes, no) were recorded. Emotional stress was assessed with the following question: "Have you experienced any stressful life events during the last 6 months?". To the question, "What is your level of concern about your skin disease?", patients could answer "high", "medium", or "low". The following questionnaires were also given to each participant: *The Dermatology Life Quality Index* (*DLQI*; (9) consists of 10 questions concerning patients' perceptions of the impact of skin diseases on different aspects of their health-related quality of life over the last week. Each question is scored from 0 to 30, giving a possible score range from 0 (no impact of skin disease on quality of life) to 30 (maximum impact on quality of life). Categories are as follows: 0–1, no effect at all on the patient's life; 2–5, small effect on the patient's life; 6–10, moderate effect on the patient's life; 11–20, very large effect on the patient's life; and 21–30, extremely large effect on patient's life. *The Hospital Anxiety and Depression Scale* (*HADS*; (10) is a well-validated scale to assess depression and anxiety. It includes 7 items assessing anxiety and 7 for depression, each with 4 possible responses. For each dimension of anxiety and depression, a score

from 0 to 7 is considered a normal case, from 8 to 10 a borderline case, and from 11 to 21 a case in need of further examination or requiring treatment.

The *EuroQol 5 dimensions 3 levels* (*EQ-5D-3L*; (11) is composed of two parts: the EQ-5D-3L descriptive system and the EQ Visual Analogue Scale (EQ-VAS). This scale provides a simple descriptive profile and a single index value for general health status. Participants are asked to choose one of 3 possible answers for 5 questions on mobility, self-care, usual activities, pain and discomfort, and anxiety and depression: level 1 (no problems), level 2 (some problems), or level 3 (extreme problems). The EQ-VAS records participants' self-rated health on a vertical visual analogue scale from 0 to 100 (0 = "worst imaginable health state," 100 = "best imaginable health state").

Descriptive statistics are given as number and percentage for categorical variables and as the mean and standard deviation (SD) for numeric variables. Comparisons between two independent groups were made using the Mann-Whitney U test when they were not normally distributed. More than two independent group comparisons were made using a one-way analysis of variance (ANOVA) when they were normally distributed and using the Kruskal-Wallis when they were not. Categorical variables were compared using a χ^2 test. Spearman's correlation coefficient test was used to analyze the association between numerical variables. A logistic linear regression analysis was used to determine the responsible factors. The statistical alpha (level of significance) level was accepted as $p < 0.05$.

RESULTS

Of the 3,635 patients with dermatological disease who completed the original study (8), 213 (5.9%) were acne patients, 132 (62%) were women, and 81 (38%) were men, and the mean ± SD age was 24.4 ± 7.1 years. The control group consisted of 132 women and 81 men, with a mean ± SD age of 24.6 ± 6.3 years. The following 13 countries were involved in the study: Belgium, Germany, Denmark, Spain, France, Hungary, Italy, the Netherlands, Norway, Poland, Russia, Turkey, and the United Kingdom. Turkey, Italy, and the United Kingdom contributed the most acne patients to the sample, with 75 (35%), 31 (14.5%), and 30 (14 %) patients, respectively.

Table I. A comparison of the results of the Dermatology Life Quality Index (DLQI), Hospital Anxiety and Depression Scale (HADS), and EuroQol 5 dimensions (EQ-5D) questionnaires among acne patients from different countries

Country	n	DLQI Mean ± SD	HADS Anxiety Mean ± SD	HADS Depression Mean ± SD	EQ-5D Mobility Mean ± SD	EQ-5D Self-care Mean ± SD	EQ-5D Usual activities Mean ± SD	EQ-5D Pain or discomfort Mean ± SD	EQ-5D Anxiety or depression Mean ± SD	EQ-5D Health state Mean ± SD
Turkey	75	6.47 ± 4.11	6.36 ± 3.31	3.79 ± 3.24	1.03 ± 0.16	1.01 ± 0.12	1.04 ± 0.20	1.12 ± 0.33	1.80 ± 0.52	79.1 ± 12.7
Italy	31	5.97 ± 5.27	6.87 ± 3.59	4.06 ± 3.53	1.00 ± 0.00	1.03 ± 0.18	1.06 ± 0.25	1.39 ± 0.50	1.39 ± 0.50	82.1 ± 11.1
UK	30	6.87 ± 5.70	7.67 ± 4.79	3.80 ± 3.60	1.03 ± 0.18	1.00 ± 0.00	1.03 ± 0.18	1.10 ± 0.31	1.37 ± 0.49	83.3 ± 13.2
Norway	23	8.74 ± 7.30	6.74 ± 4.89	3.65 ± 3.79	1.13 ± 0.34	1.00 ± 0.00	1.26 ± 0.45	1.39 ± 0.50	1.70 ± 0.82	75.3 ± 20.4
Russia	13	6.00 ± 4.60	6.77 ± 2.89	4.23 ± 2.92	1.15 ± 0.38	1.15 ± 0.38	1.15 ± 0.38	1.38 ± 0.51	1.77 ± 0.44	64.1 ± 22.0
Belgium	11	4.18 ± 5.79	7.73 ± 4.34	4.45 ± 4.48	1.00 ± 0.00	1.00 ± 0.00	1.20 ± 0.42	1.30 ± 0.48	1.70 ± 0.67	71.9 ± 22.2
Spain	9	0.78 ± 1.39	5.33 ± 3.00	2.22 ± 1.99	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	87.2 ± 12.5
Poland	6	3.83 ± 2.93	2.67 ± 1.86	2.33 ± 1.97	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.17 ± 0.41	1.33 ± 0.52	92.8 ± 5.1
Germany[a]	4	5.25 ± 4.50	7.00 ± 2.16	5.75 ± 2.36	1.00 ± 0.00	1.00 ± 0.00	1.25 ± 0.50	1.75 ± 0.50	1.50 ± 0.58	75.0 ± 19.2
Denmark[a]	3	8.33 ± 8.02	7.00 ± 6.08	7.33 ± 4.73	1.67 ± 1.15	1.00 ± 0.00	1.67 ± 0.58	1.67 ± 0.58	1.67 ± 0.58	76.7 ± 22.6
Hungary[a]	3	2.00 ± 2.65	7.33 ± 5.69	4.67 ± 4.51	1.00 ± 0.00	1.00 ± 0.00	2.00 ± 1.00	1.67 ± 0.58	1.67 ± 0.58	91.0 ± 1.4
The Netherlands[a]	3	8.67 ± 8.02	5.00 ± 4.36	4.33 ± 4.93	1.33 ± 0.58	1.00 ± 0.00	1.67 ± 0.58	1.33 ± 0.58	1.00 ± 0.00	65.7 ± 12.5
France[a]	2	5.00 ± 4.24	8.50 ± 2.12	5.50 ± 6.36	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	2.00 ± 0.00	1.50 ± 0.71	80.0
p		0.001	0.124	0.801	0.108	0.059	0.019	0.003	<0.001	0.005

[a]Not included in the statistical analysis.
SD: standard deviation.

Table II. Characteristics of the study population

	Patients (n = 213)	Controls (n = 213)	p
Age, years, mean ± SD (range)	24.4 ± 7.1 (18–66)	24.6 ± 6.3 (18–66)	0.078
Duration of skin disease, years, mean ± SD (range)	5.8 ± 5.2 (1–32)		
Sex, n (%)			
Male	81 (38.0)	81 (38.0)	1.000
Female	132 (62.0)	132 (62.0)	
Education, n (%)			
Low education level	46 (21.6)	32 (15.2)	0.181
Higher education level	80 (37.6)	79 (37.4)	
University	87 (40.8)	100 (47.4)	
Ethnicity, n (%)			
Home	196 (92.5)	191 (91.8)	0.812
Foreign	16 (7.5)	17 (7.5)	
Marital status, n (%)			
Single	159 (77.6)	142 (66.7)	0.018
Married	44 (21.5)	67 (31.5)	
Divorced	1 (0.5)	4 (1.9)	
Widowed	1 (0.5)	0 (0.0)	
Socioeconomic status, n (%)			
Low	32 (15.1)	54 (25.8)	0.010
Middle	161 (75.9)	145 (69.4)	
High	19 (9.0)	10 (4.8)	
Stressful life event, n (%)			
Yes	85 (40.5)	63 (30.1)	0.027
No	125 (59.5)	146 (69.9)	
Suicidal ideation, n (%)			
Yes	26 (12.3)	14 (8.0)	0.160
No	185 (87.7)	162 (92.0)	
Level of concern about skin disease, n (%)			
Low	31 (14.6)		
Medium	95 (44.8)		
High	86 (40.6)		
Disease severity, n (%)			
Mild	77 (36.7)		
Moderate	97 (46.2)		
Severe	36 (17.1)		

SD: standard deviation.

All data are summarized in **Table I** by country. **Table II** shows the patient and control groups' sociodemographic characteristics, acne severity, level of concern about their disease, and the presence of suicidal ideation. The mean ± SD duration of skin disease was 5.8 ± 5.2 years. Forty percent (n = 86) of the patients had had a high level of concern about their acne, and 40% (n = 85) had had a stressful life event, which was statistically significant compared to controls (p = 0.027). Among the 26 (12%) patients with suicidal ideation, 10 (5%) implied that acne was the cause of their suicidal thoughts.

The results of the DLQI, HADS, and EQ-5D questionnaires for patients and in comparison with the controls are given in **Table III**. The mean HADS anxiety scores were 6.70 ± 3.84 for patients with acne and 5.40 ± 3.43 for controls, and the mean HADS depression scores were 3.91 ± 3.43 for patients with acne and 2.71 ± 2.71 for controls (p < 0.001 for both comparisons). Also, HADS anxiety scores ≥ 11 (clinical case) were reached by 32 (15.1%) acne patients (controls n = 20 [9.4%], p < 0.001), and HADS depression scores ≥ 11 (clinical case) were reached by 12 (5.7%) acne patients (controls n = 5 [2.3%], p = 0.003). In comparing the patients with controls in terms of effect size, we observed that HADS anxiety scores (0.36), HADS depression scores (0.39), and EQ-5D subscale scores for anxiety or depression (0.56) and health state (–0.55) had medium effect sizes in patients with acne, which could be clinically relevant.

The mean total DLQI score for all acne patients was 6.2 ± 5.2, meaning that acne had a moderate effect on patient's life. Thirty-two (15%) of acne patients had a DLQI score ≥ 11, meaning acne had a very or extremely large impact on their quality of life. **Table IV** shows Spearman's correlation analysis between questionnaires and age, severity of disease, duration of disease, and level of concern regarding the disease. We observed that there was a statistically significant, moderate correlation between DLQI scores and disease severity and between DLQI scores and levels of patient concern about their acne disease (r = 0.251, p < 0.001; r = 0.422, p < 0.001, respectively). Moreover, the level of patient concern about acne was positively correlated with HADS and EQ-5D scores and negatively correlated with EQ-VAS scores. Age had only weak correlation with pain and discomfort scores on the EQ-5D.

The regression analysis for clinical anxiety and depression (HADS score ≥ 11) is given in **Table V**. The data showed that the female sex had an increased likelihood of having abnormal anxiety (OR 2.451 [95% CI: 1.072–5.607]). Patients with a stressful life event in the past 6 months (OR 5.85 [95% CI: 2.659–12.867]) and patients with suicidal ideation (OR 3.323 [95% CI: 1.39–7.936])

Table III. Results of the Dermatology Life Quality Index, Hospital Anxiety and Depression Scale, and EuroQol 5 dimensions questionnaires among patients and controls

	Patients n = 213 Mean ± SD (95% CI)	Controls n = 213 Mean ± SD (95% CI)	Effect size (95% CI lower/upper limit)	p-value Patients vs. controls
Dermatology Life Quality Index	6.19 ± 5.23 (5.49–8.90)			
Hospital Anxiety and Depression Scale				
Anxiety	6.70 ± 3.84 (6.18–7.22)	5.40 ± 3.43 (4.93–5.86)	0.36 (–016/0.82)	< 0.001
Depression	3.91 ± 3.43 (3.45–4.37)	2.71 ± 2.71 (2.35–3.08)	0.39 (–0.07/0.75)	< 0.001
EuroQol 5 dimensions				
Mobility	1.05 ± 0.24 (1.02–1.09)	1.06 ± 0.24 (1.03–1.09)	–0.04 (–0.07/–0.01)	0.544
Self-care	1.02 ± 0.14 (1.00–1.04)	1.01 ± 0.12 (1.00–1.03)	0.08 (0.06/0.09)	0.694
Usual activities	1.11 ± 0.33 (1.07–1.16)	1.10 ± 0.30 (1.06–1.14)	0.03 (–0.01/0.07)	0.726
Pain or discomfort	1.25 ± 0.43 (1.19–1.30)	1.18 ± 0.38 (1.13–1.23)	0.17 (0.12/0.22)	0.092
Anxiety or depression	1.59 ± 0.58 (1.51–1.67)	1.30 ± 0.46 (1.24–1.36)	0.56 (0.48/0.62)	< 0.001
Health state (EQ-VAS)	79.0 ± 15.6 (76.9–81.2)	86.7 ± 12.1 (85.1–88.4)	–0.55 (–2.69 1.08)	< 0.001

Table IV. Correlations between disease severity, duration of skin disease, level of concern regarding disease, and scales

	Age		Disease severity		Duration of skin disease		Level of concern over skin disease	
	rho	p	rho	p	rho	p	rho	p
Dermatology Life Quality Index	−0.077	0.264	0.251	< 0.001	0.041	0.569	0.422	< 0.001
Hospital Anxiety and Depression Scale								
Anxiety	0.059	0.393	−0.002	0.971	0.022	0.761	0.266	< 0.001
Depression	0.076	0.275	0.103	0.138	0.038	0.598	0.279	< 0.001
EuroQol 5 dimensions								
Mobility	0.050	0.471	−0.041	0.554	0.084	0.238	0.144	0.036
Self-care	0.069	0.324	−0.058	0.403	0.014	0.846	0.157	0.023
Usual activities	0.133	0.053	0.117	0.093	0.054	0.45	0.180	0.009
Pain or discomfort	0.197	0.004	0.083	0.232	0.149	0.036	0.126	0.068
Anxiety or depression	0.004	0.950	0.046	0.506	−0.093	0.191	0.310	< 0.001
Health state	−0.131	0.061	−0.134	0.055	−0.029	0.685	−0.214	0.002

had significantly higher chances of having an abnormal anxiety level after adjusting for other variables.

DISCUSSION

This study outlines a broad assessment of the psychosocial burden of 213 acne patients attending outpatient dermatology clinics across Europe. We found that the mean HADS anxiety and depression scores in acne patients were higher than those of controls. Also, almost 15% of acne patients had clinically significant anxiety, and 6% had depression, which was statistically higher than controls. Lukaviciute et al. (12) reported higher percentages, finding that 38.4% of acne patients had anxiety and that 23.1% patients had depression. Golchai et al. (3) found that 68.3% of 82 acne patients had anxiety, but the percentage of those with depression and the mean depression scores were lower than those of controls. In the current study, we only included abnormal/clinical anxiety cases (HADS score ≥ 11) to avoid overinterpretation, whereas some of these studies included borderline cases (HADS score = 8–10), so our anxiety and depression prevalences seem lower than what these studies found. In line with our study, Kouotou et al. (13) conducted a study with 181 acne patients and reported that only 7.7% of patients had anxiety and 6.6% of patients had depression. In contrast, Aktan et al. (14) found no differences in the subscale

scores for anxiety and depression in acne patients versus control subjects. Although anxiety seems to be a more common problem than depression in most of studies, the prevalence of anxiety and depression appear to be highly variable. These discrepancies may be attributed to the differences in study populations, which were mostly adolescents; differences in the interpretation and cut-offs for HADS scores; the use of another screening instrument for depression/anxiety; and/or variable sociocultural features of different countries.

Considering the general health of acne patients, the mean subscale scores of the EQ-5D for depression/anxiety demonstrated statistically significant higher scores and lower VAS scores versus those of controls. To our knowledge, EQ-5D studies in acne are extremely scarce (15–17). These studies also found similar results. Increased mean scores of anxiety/depression as well as lower VAS scores in patients with acne reflect that these patients had a significant psychological burden.

Surprisingly, our results showed that HADS scores for anxiety and depression and EQ-5D scores were not correlated with disease severity or duration of disease but only correlated with the level of concern regarding the disease. DLQI scores were only correlated with disease severity. In accordance with our findings, Niemeier et al. (18) reported that mental problems were not correlated with the objective severity of acne. Welp & Gieler (19),

Table V. Anxiety (Hospital Anxiety and Depression Scale (HADS) anxiety score ≥ 11) and depression (HADS depression score ≥ 11) in acne patients: Relationships with confounders and risk values

	Anxiety HADS score ≥ 11		Depression HADS score ≥ 11	
	p	OR (95% CI)	p	OR (95% CI)
Age	0.574	1.019 (0.954–1.090)	0.445	1.035 (0.947–1.131)
Female sex	0.034	2.451 (1.072–5.607)	0.621	1.387 (0.379–5.074)
Foreign origin	0.303	0.327 (0.039–2.745)	0.763	1.406 (0.153–12.880)
Marital status (reference: single)	1.000		0.924	
Married	0.959	1.023 (0.429–2.439)	0.490	1.641 (0.401–6.712)
Divorced	0.999	0.000 (0.000)	0.999	0.000 (0.000)
Widowed	1.000	0.000 (0.000)	1.000	0.000 (0.000)
Socioeconomic status (reference: low)	0.025		0.014	
Middle	0.008	0.331 (0.145–0.754)	0.004	0.143 (0.038–0.537)
High	0.547	0.681 (0.195–2.382)	0.163	0.197 (0.020–1.933)
Presence of stressful life event	< 0.001	5.850 (2.659–12.867)	0.064	3.524 (0.929–13.369)
Presence of suicidal ideation	0.007	3.323 (1.392–7.936)	0.137	2.830 (0.719–11.142)

OR: odds ratio; CI: confidence interval.

Yazici et al. (20), Uslu et al. (21), and Aktan et al. (14) also found no correlation between clinical status and psychometric findings in acne patients. On the one hand, all these results point out that psychological change does not necessarily correlate with disease severity, as Niemeier et al. (22) stated; on the other hand, they may indicate that rather than the severity of the disease, individual factors, such as personality disorders, temperaments, or body image perceptions, could initiate or exacerbate mental problems and determine the psychosocial burden of acne patients. There are some studies supporting this explanation. For example, Sarkar et al. (23) reported that personality disorders were present in 29.2% of 65 patients with acne. The most common personality disorders were obsessive compulsive personality disorder, anxious (avoidant) personality disorder, and borderline personality disorder. Also, patients with a personality disorder had a higher number of anxiety and depressive disorders (23). Ozturk et al. (24) found that the temperament properties of worry and pessimism and dependence and the character properties of social acceptance and integrated conscience were more prevalent in acne patients than in healthy controls, and they recommended focused interventions for temperament and character assessments in patients with acne vulgaris. Therefore, the presence of conflicting results that indicate a correlation between acne severity and depression (in particular) and anxiety remains to be solved (12, 25).

Taking into account risk factors for anxiety and depression, being female emerged as a significant factor for anxiety, but not depression. Previous studies have also shown that female acne patients are more likely to have anxiety and depressive disorders (26). In a recent review, it was suggested that sex-specific stress, such as menstruation, triggers hormonal fluctuations and leads to psychiatric disorders in acne patients (27). Another point was that there was no statistically significant difference between acne patients and controls regarding the presence of suicidal ideation. However, it is notable that the logistic regression analyses revealed that patients with suicidal ideation had a 3-times higher chance of having anxiety, but not depression. This is interesting because depression is usually considered to be a risk factor for suicidal thoughts and attempts. In fact, there are also controversial results about the link between acne, suicidal ideation, and anxiety/depression in the current literature. Purvis et al. (28) reported that problem acne was associated with an increased probability of depressive symptoms, anxiety, and suicide attempts, but they found that the number of suicide attempts were independent from the presence of depression or anxiety, concluding that it was important to ask, especially in adolescence, about suicidal ideation directly. Rehn et al. (29) investigated the association between depression, anxiety, and suicidal ideation in young males with acne and did not find any relationship between acne and the presence of depressive symptoms and suicidal ideation. They denoted that suicidal ideation is irrespective of the presence of depressive symptoms. Saitta et al. (30) pointed out that awareness of suicide risk in young patients is particularly important because younger patients demonstrate a higher frequency of poor self-esteem, interpersonal conflict with friends, and difficulties at school, which are general risk factors for suicide during a vulnerable period like adolescence (31, 32). Halvorsen et al. (4) suggested that acne is an independent risk factor for suicidal ideation in adolescents. We found no difference between patients and controls in terms of suicide ideation. Undoubtedly, one should consider that the vast majority of all these studies were carried out in young age groups, whereas the age range in our study group was broader.

Furthermore, patients who reported a stressful event in the last six months had a five times greater chance of having anxiety. Recently, Bondade et al. (33) studied 100 acne patients and reported that undesirable life events were present in 65 patients and 50 controls, which was statistically significant. Although the role of stressful life events and stress in precipitation or exacerbation of acne is still an unknown, these factors can contribute to psychiatric comorbidity in acne as shown in many studies and also in ours. So, in order to optimize the patient's wellbeing, treatment should include not only conventional acne treatments but also a psychosomatic approach that includes stress management, relaxation techniques, educational programs, and appropriate medication for patients with a psychiatric comorbidity.

The most important strength of this study is that it is the first acne study to evaluate the psychosocial aspects of acne across Europe in adults, was not restricted to the adolescent age group, and was not restricted to a given geographic location or culture. On the other hand, the fact that the total number of patients with acne was not large, given the very high prevalence of the condition, was a limitation. A possible selection bias was that the recruitment centers were mainly academic centers and may not have been representative of clinical practice across each country.

In conclusion, we found that patients with adult acne may be more likely to express anxiety and depression than the general population, although the association between adult acne and depression was less substantial. Being female, having undergone stressful life events, and thinking suicidal thoughts were associated with anxiety symptoms. In addition, general health appears to be impaired in patients with acne. Clinicians must be alert to these symptoms and, when they are present, consider the possibility of an underlying psychiatric component. This awareness may improve the recognition of patient concerns and allow clinicians to optimize treatment and prevent or reduce patients' non-compliance with the treatment plan.

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