



Relation of depression and anxiety with severity of acne vulgaris and quality of life

Abstract

Background and aims: Depression and anxiety in acne vulgaris (AV) patients are not necessarily caused by isotretinoin, rather they could be caused by the condition itself. The current study attempted to disentangle the effects of AV and medications used for its treatment on depression and anxiety. Its aims were to detect how depression and anxiety are related to severity of AV and how they influence the quality of life. **Methods:** Sixty-nine consecutive drug naïve AV patients, meeting inclusion criteria, were assessed. Sociodemographic and clinical data were gathered using a specially designed proforma. AV severity was measured by Global Acne Grading Scale. Anxiety and depression were assessed by Hospital Anxiety and Depression Scale. Quality of life was assessed through World Health Organization quality of life scale (abbreviated). The groups (with or without anxiety or depression) were compared using Mann-Whitney U and Fisher's exact test. **Results:** Eleven (15.94%) patients had syndromal anxiety and four (5.79%) had syndromal depression. Patients with anxiety, unlike those with depression, had significantly more severe AV ($p=0.01$), worse quality of life scores in all the subscales compared to their non-anxious counterparts. **Conclusions:** Anxiety is more prevalent in untreated AV than depression and is associated with significantly higher severity of the condition. It also adversely influences the quality of life in this population. Depression, though marginally worsens the quality of life in this population, does not however influence the severity of AV. The study was limited by its cross-sectional design.

Keywords: Syndrome, symptom, severity

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INTRODUCTION

Psychiatric comorbidities are commonly associated with acne vulgaris (AV).[1] Commonest psychiatric disorders associated with it are depression[2] and anxiety.[3] It has been seen that acne (along with psoriasis) is associated with higher depression scores and frequent suicidal ideas than other dermatological conditions like alopecia areata or atopic dermatitis.[4] Acne occurs mainly in puberty, a time when one goes through various psychological stressors related to external world. It is also the time when one's personality is developed. It is therefore thought that presence of acne can influence personality traits that the individual is going to possess. Some behavioural and clinical features like shame, stigma, and self-image which are often not quantifiable and not syndromes are also formed and shaped by the presence of dermatological conditions like acne. Thus, it has been reported that acne can lead to negative perception of self, a reduced confidence, and a compromised social functioning because of the embarrassment associated with it.[5] The pathogenesis of acne is multifactorial. It involves the interplay of several processes, some of which may be influenced by stress. An alteration in the pattern of keratinization (hyperkeratosis) in the pilosebaceous follicles leads to comedo formation. The hyperkeratosis of the infundibulum possibly results

from a change in composition of the extracellular matrix which affects the adhesion, migration, and proliferation of keratinocytes. This process may be under the influence of androgens as the infundibular keratinocytes have a greater capacity to convert testosterone to dihydrotestosterone. Androgens are known to increase the size and activity of sebaceous glands. This results in an increase in sebum production. This coupled with follicular plugging due to hyperkeratosis promotes the proliferation of the anaerobic bacteria *Propionibacterium* acnes which is a normal resident of the follicle. The various metabolites and chemotactic factors produced by this bacterium lead to inflammation resulting in papules and pustules of acne. Certain systemic conditions, like polycystic ovarian syndrome, causing hyperandrogenism may lead to hirsutism, hypomenorrhoea, and acne. Dietary factors like high glycemic food, stress, and emotions,[6] use of oil and cosmetics (acne cosmetica), and humid climate can also act as potential triggering factors for acne. Studies have indicated that human sebocytes express functional receptors for corticotropin-releasing hormone, melanocortin's, beta-endorphin, vasoactive intestinal polypeptide, neuropeptide Y, and calcitonin gene-related peptide.[7] After ligand binding, these receptors modulate the production of inflammatory cytokines, proliferation, differentiation, lipogenesis, and androgen metabolism in

sebocytes. By means of their autocrine, paracrine, and endocrine actions, these neuroendocrine factors appear to transmit centrally and topically induced stress to the sebaceous gland, ultimately affecting the clinical course of acne.[8] Increased corticosteroids and adrenal androgens released during periods of emotional stress are known to worsen acne. Substance P may yield a potent influence on the sebaceous glands by provocation of inflammatory reactions via mast cells[9] which in turn stimulate lipogenesis. This may be followed by proliferation of *Propionibacterium* acnes. This implies the connections of acne with psychiatric comorbidities are established through various pathways. It is now interesting to see how they influence one another in terms of severity and overall outcome and not merely focusing on the symptomatology that had been explored by the existing studies till date.

The first aim of the current study was to see how prevalent syndromal anxiety and depression were in AV patients. Subsequently the second aim was to see how anxiety and depression would make a difference in the overall clinical picture of acne patients and their quality of life. It was hypothesized that the patients who have comorbid anxiety or depression would have more severe AV and worse quality of life than those without.

METHODS

Participants

The study was a cross-sectional study conducted in the outpatients' clinic of dermatology department of a tertiary hospital in the eastern part of India after obtaining approval from the institutional ethics committee. Patients were recruited after they gave written informed consent. Patients on medications which may result in acne (notably systemic or topical steroids, antiepileptics, lithium, etc.) and those with past history or family history of psychiatric disorders were excluded from the study. Females who were pregnant or lactating were also not included. Thus, out of 112 patients that we assessed, 43 had to be excluded. The final sample consisted of 69 consecutive drug naïve patients aged between 12 and 50 years.

Assessments

The diagnosis of AV was made by qualified dermatologists (AG or SS) and the severity scoring too was performed by them. The subsequent psychiatric assessments were done by a qualified psychiatrist (AKJ). Sociodemographic and clinical data was gathered using a proforma specially designed for the study which included all the relevant parameters as described in literature including age, sex, marital status, family type, monthly income, education, residence, current and past employment status, past medical history among others. The parameters which have been described in literature to influence acne were also recorded. Notable among them were menstrual history, polycystic ovarian disease, hirsutism, application of oil, cosmetics, stress, and dietary habits.

The severity of acne was assessed by Global Acne Grading System (GAGS).[10] It assesses acne severity by scoring it over six different regions and the global score

which is a sum of six regional sub-scores gives the overall severity. Each sub-score is derived by multiplying the factor allotted for individual region with the factor allotted for the lesion of greatest severity within the respective region. The regional factors were derived from consideration of surface area and distribution and density of pilosebaceous units (factors: two for forehead, two for each cheek, one for nose, one for chin, three for both chest and back). As for the type of lesion, the comedone would be considered as the least severe lesion followed by papule, pustule, and nodule in increasing order of severity (factors: one for \geq one comedone, two for \geq one papule, three for \geq one pustule, and four for \geq one nodule).

Anxiety and depression were assessed by Hospital Anxiety and Depression Scale (HADS).[11] This relatively old scale, with validity demonstrated even in recurrent anxiety[12] consists of 14 items, seven each to assess depression and anxiety. Each item has a maximum score of three. Scores of 11 or more on either depression or anxiety denotes significant psychological morbidity.[13]

Quality of life was assessed through the abbreviated version of World Health Organization (WHO) Quality Of Life scale (WHOQOL BREF).[14] It is a 26-item questionnaire which is scored on a Likert scale from one to five and generates scores on the following broad domains: physical health, psychological health, social relationships, and environment.

Statistical analysis

The collected data was statistically analysed using Statistical Package for the Social Sciences (SPSS) 16.0. Based on HADS subscale score (≥ 11 or < 11), patients were grouped as with or without anxiety and depression. Data normality was examined using Shapiro-Wilk test statistic and histogram analysis. The groups were compared using Mann-Whitney U and Fisher's exact test for continuous and categorical variables, respectively. The level of significance was set at $p < 0.05$ (2-tailed).

RESULTS

Out of a total of 69, the patients mostly were from urban background (N=60), unmarried (N=63), and were students, homemakers, or unskilled workers (N=58). Eleven patients had syndromal anxiety and four patients had syndromal depression. Group comparison between the patients with anxiety and patients without revealed that they were comparable in age, years of education, gender distribution, and marital status (Table 1). However, the anxious patients had significantly more severe acne ($p=0.01$), and significantly poorer scores in the general ($p=0.016$), experience ($p=0.005$), ability ($p=0.047$), satisfaction ($p=0.031$), and depression ($p=0.015$) subscales of WHOQOL BREF than their non-anxious counterparts. In the distribution of family income, significantly higher proportion of patients with anxiety belonged to the middle-income group compared to those without anxiety. However, in all other parameters, including residence (rural/semiurban/urban), family type (nuclear/extended/others [e.g. living in hostel]), medication history,

Table 1: Comparison of patients with and without anxiety

	Without anxiety Mean (SD) N=58	With anxiety Mean (SD) N=11	p
Age	18.71 (2.89)	22.63 (7.51)	0.110
Years of education	11.63 (2.81)	10.00 (4.60)	0.461
GAGS	18.28 (4.24)	21.55 (3.47)	0.010*
QoL General	14.72 (2.64)	12.72 (2.05)	0.016*
QoL Experience	14.59 (2.33)	12.67 (1.51)	0.005*
QoL Ability	14.17 (2.08)	12.67 (1.95)	0.047*
QoL Satisfaction	15.44 (1.68)	14.22 (1.39)	0.031*
QoL Depression	14.41 (3.34)	11.63 (2.80)	0.015*
	n (%)	n (%)	p
Gender (male)	32 (55.17)	5 (45.45)	0.556
Marital status (others)	54 (93.10)	9 (81.81)	0.227
Income			
Middle	23 (39.65)	0 (0)	0.046*
Low	32 (55.17)	11 (100)	
high	3 (5.17)	0 (0)	
Residence			
Urban	46 (79.31)	9 (81.81)	0.907
Semiurban	9 (15.52)	1 (9.09)	
Rural	3 (5.17)	1 (9.09)	
Family type			
Nuclear	37 (63.79)	7 (63.64)	0.892
Extended	19 (32.76)	3 (27.27)	
Others	2 (3.45)	1 (9.09)	
Medication history ¹ (positive history)	32 (55.12)	5 (45.45)	0.518
Oil application ¹ (positive history)	30 (51.72)	3 (27.27)	0.140
Cosmetic use ¹ (positive history)	33 (56.89)	7 (63.64)	0.680
Other procedures ^{1,2} (positive history)	10 (17.24)	0 (0)	0.139
Sweat (positive)	31 (53.45)	9 (81.81)	0.083
Stress ³ (positive)	8 (13.79)	3 (27.27)	0.266
Diet (non-veg)	55 (94.83)	11 (100)	0.444

SD: Standard Deviation; GAGS: Global Acne Grading System; QoL: Quality of Life. *p<.05. ¹in the last two months; ²e.g., bleaching, epilation; ³in the last six months

menstrual history, features of hyperandrogenism, application of oil or cosmetics, pattern of sweating, stress, and dietary habits, the two groups did not have any statistically significant differences.

Four patients had syndromal depression. Group comparison between the depressed and non-depressed patients however did not reveal any statistically significant differences in any of the sociodemographic or clinical parameters (Table 2). They also had comparable scores in all domains of quality of life.

Table 2: Comparison of patients with and without depression

	Without depression Mean (SD) N=65	With depression Mean (SD) N=4	p
Age	18.86 (2.96)	27.00 (11.13)	0.107
Years of education	11.52 (2.87)	9.00 (6.68)	0.429
GAGS	18.74 (4.39)	19.75 (1.26)	0.519
QoL General	14.55 (2.63)	12.00 (1.63)	0.045
QoL Experience	14.30 (2.38)	13.99 (0.99)	0.643
QoL Ability	14.05 (2.09)	12.00 (1.88)	0.096
QoL Satisfaction	15.31 (1.71)	14.27 (0.98)	0.113
QoL Depression	14.15 (3.39)	11.00 (2.00)	0.062
	n (%)	n (%)	p
Gender (male)	36 (55.38)	1 (25)	0.240
Marital status (others)	60 (92.31)	3 (75)	0.237
Income			
Middle	19 (29.23)	2 (50)	0.377
Low	41 (63.07)	2 (50)	
High	3 (4.61)	0 (0)	
Residence			
Urban	52 (80)	3 (75)	0.869
Semiurban	9 (13.85)	1 (25)	
Rural	4 (6.15)	0 (0)	
Family			
Nuclear	42 (64.61)	2 (50)	0.385
Extended	21 (32.31)	1 (25)	
Others	2 (3.07)	1 (25)	
Medication history ¹ (positive history)	34 (52.31)	3 (75)	0.398
Oil application ¹ (positive history)	32 (49.23)	1 (25)	0.350
Cosmetic use ¹ (positive history)	37 (56.92)	3 (75)	0.480
Other procedures ^{1,2} (positive history)	9 (13.85)	1 (25)	0.541
Sweat (positive)	39 (60)	1 (25)	0.172
Stress ³ (positive)	10 (15.38)	1 (25)	0.613
Diet (non-veg)	63 (96.92)	3 (75)	0.479*

SD: Standard Deviation; GAGS: Global Acne Grading System; QoL: Quality of Life. *p<.05. ¹in the last two months; ²e.g., bleaching, epilation; ³in the last six months. *Fischer's exact test applied

DISCUSSION

The first aim of the study was to see the prevalence of anxiety and depression in the acne vulgaris patients and it was seen that 16% (n=11) had syndromal anxiety and six per cent (n=four) had syndromal depression. The apparent impression of low prevalence is probably because the figures show syndromal condition and not just symptomatic presentations. Most of the previous studies have reported symptoms rather than syndrome (Table 3). Symptoms of anxiety and depression occurring as a consequence of a skin

Table 3: Study with design and result

Study	Design	Result
Gupta and Gupta.[4]	Cross-sectional comparison study	Prevalence of suicidal ideation was higher in mild to moderate acne patients compared to general medical illness
Magin et al.[19]	Cross-sectional study. Samples obtained from specialist and general dermatology clinic	No difference in depression and anxiety scores but some personality traits (introversion, neuroticism) and self-assessed health status predicted psychological outcome
Uslu et al.[20]	Cross-sectional	Subjective severity (not objective) of acne was related to anxiety, depression, and self-esteem
Kaymak et al.[21]	Comparison study (treated with or without isotretinoin)	Depression, anxiety, and quality of life improved in the isotretinoin group
Magin et al.[22]	Longitudinal (12 months) study	No association between the presence of acne or its severity and psychological morbidities including depression and anxiety
Lukaviciute et al.[23]	Cross-sectional	38.4% of the patients had anxiety symptoms, 23.1% had depressive symptoms, and 12.9% had suicidal thoughts due to acne
Akinboro et al.[24]	Cross-sectional	Acne (especially with facial hyperpigmentation) was associated with significant level of anxiety poorer quality of life
Davern and O'Donnell.[25]	Cross-sectional	Acne patients with high perceived stigma had poorer health related quality of life and higher anxiety
Sereffican et al.[26]	Cross-sectional	66% patients had social anxiety disorder; all patients had significantly higher score of anxiety (in HADS) compared to controls

HADS: Hospital Anxiety and Depression Scale

condition are not uncommon and improve with amelioration of the skin disorder and hence is often transient. Thus, a transient set of anxiety and depressive symptoms would not be uncommon in this cohort, especially in younger age group but having anxiety and depression as diagnosable disorders would be rare.

The second aim of the study was to see the impact of anxiety and depression on acne vulgaris patient. To see that, patients with anxiety were compared with patients without and likewise for depression. The patients with anxiety had significantly higher severity of acne and poorer overall quality of life. But the study found no significant difference in any sociodemographic or clinical parameter between depressed and nondepressed patients. Anxiety disorder like many other psychiatric conditions is known to negatively impact the quality of life but depression making no difference in the picture came as a surprise.

The size of the groups with patients with anxiety or depression was much smaller than those without. This might have produced this somewhat unusual result and one should cautiously generalise the findings. Considering the present study to be a cross sectional one, it can be argued that many subjects presenting initially with anxiety can indeed have latent depression within waiting to be surfaced as it is widely known that anxiety is one of the prominent manifestations of depression.[15] Further as in this study, the subject group mostly comprised of young adults. Studies have shown young adults often manifest anxiety as their first symptom of depression even prior to core symptoms like anhedonia or suicidal thoughts are observed.[16,17] An endocrinological outlook can also prove to be helpful. Stress hormones are known to be correlated with a higher incidence of acne.[18] Stress when coexisting with nascent depression is known to be associated with a higher incidence of acne. This might have

happened in the current study where stress, anxiety, and acne vulgaris were clinically detectable but not syndromal depression. However, it stands undoubted that carefully designed future studies should address this issue.

The main strengths of the current study were the consecutive sampling, assessment by qualified professionals (both psychiatrist and dermatologists) assessing the impacts of syndromal depression and anxiety on acne patients. But there were some limitations too. Firstly, a hospital-based study meant that the average severity of acne of the samples was higher as they sought help coming to the hospital. So, the true picture of all acne patients could not be represented in the current study. Secondly a cross-sectional design meant any long-term impact of anxiety or depression on acne patients could not be assessed. A future study with community sampling, longitudinal design, and a larger sample size should come up with more robust findings.

Conclusion

Anxiety is more prevalent in untreated AV than depression. It is associated with higher severity of the underlying condition. It also adversely influences the quality of life in the targeted population. Depression though does not influence the severity of AV worsens quality of life to some extent. Being a hospital-based cross-sectional study, the present study warrants further research and future exploration in the field.

AUTHOR CONTRIBUTIONS

AKJ: Concepts, data analysis, manuscript editing, guarantor; **SS:** Design, clinical studies, manuscript preparation, guarantor; **AG:** Definition of intellectual content, data acquisition, manuscript review, guarantor; **SC:** Design, statistical analysis, manuscript preparation, guarantor.

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