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Rosacea and Anxiety Disorders - Psychosocial Impact, Quality of Life and Integrated Management

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Abstract

Introduction and purpose: Rosacea is a chronic inflammatory facial skin disease that may be associated with significant psychosocial burden. Studies indicate that affected individuals may experience anxiety, reduced self-esteem and lower quality of life compared with the general population. This review aims to summarize current evidence on the epidemiology, pathophysiology, psychosocial impact and integrated management of rosacea with coexisting anxiety disorders.

Materials and methods: A literature review was performed using PubMed and Google Scholar, focusing on English-language publications. Priority was given to systematic reviews, meta-analyses, randomized controlled trials and observational studies.

State of knowledge: Rosacea is a common chronic inflammatory skin disease in adults, more frequently reported in women and individuals with fair skin. Its etiopathogenesis is thought to involve immune dysregulation, neurovascular abnormalities and skin-brain axis dysfunction. Facial manifestations are associated with an increased risk of social anxiety, internalized stigma and reduced quality of life. Studies indicate that patients with rosacea may have an over twofold increased risk of anxiety disorders compared with the general population. Evidence suggests that dermatological treatment, combined with cognitive-behavioral therapy and stress management, can improve skin symptoms and psychological well-being.

Conclusions: The bidirectional link between rosacea and anxiety disorders highlights the need for holistic management. Combining dermatological treatment with mental health assessment and psychological support may improve quality of life, reduce psychosocial burden and help interrupt the cycle of stress and disease exacerbation.

Keywords: rosacea. anxiety disorders, quality of life, mental health, psychodermatology, stress

Content

Introduction

Rosacea is a chronic inflammatory skin disease that primarily affects the central part of the face and is characterized by episodic or persistent erythema, telangiectasia, papulopustular lesions and in some cases ocular involvement [1-3]. The disease follows a relapsing and progressive course and its clinical presentation is marked by considerable heterogeneity, which complicates the clear classification of patients [2,3]. The contemporary understanding of rosacea pathogenesis indicates its multifactorial nature, involving vascular dysregulation, abnormal activation of innate and adaptive immunity, neurogenic factors, as well as genetic and environmental predispositions [1-3]. Despite significant advances in understanding disease mechanisms, rosacea remains an incurable condition requiring long-term symptomatic treatment [3].

Dermatological diseases, particularly those of a chronic and visible nature, play a significant role in patients' mental health. It is estimated that 30% to 60% of dermatological conditions are associated with psychiatric symptoms or disorders such as anxiety, depression or adjustment

disorders [4]. This relationship has a biological basis in the functioning of the neuro-immuno-cutaneous system (NICS), which integrates the nervous, immune and cutaneous systems [4]. Rosacea is classified as a psychophysiological disorder whose course may be modulated by stress and emotional factors, while the disease itself constitutes a substantial psychological burden for patients [4]. Studies indicate that individuals with rosacea have an increased risk of anxiety and depressive disorders compared with the general population [4,5]. The visible location of skin lesions contributes to reduced self-esteem, impaired social functioning and decreased quality of life, potentially leading to a vicious cycle of mutually exacerbating dermatological and psychological symptoms [1,4].

Understanding the bidirectional relationship between rosacea and mental health is an essential element of a holistic approach to patient care and justifies the need for interdisciplinary collaboration between dermatologists and psychiatrists or psychologists [4].

Materials and methods

A literature review was performed using PubMed and Google Scholar, focusing on studies published in English. Priority was given to systematic reviews, meta-analyses, randomized controlled trials and observational studies. Selected studies were screened for relevance and data were extracted regarding epidemiology, pathophysiology, psychosocial impact and management of rosacea and its association with anxiety disorders.

Results

Rosacea - Epidemiology, Etiopathogenesis and Clinical Characteristics

Epidemiology

Prevalence

Rosacea is a chronic inflammatory disease of the facial skin with variable prevalence in the general population. The global prevalence is estimated to range from 1% to 3%, however, epidemiological data reveal substantial regional differences [3,5]. Population-based studies conducted in Northern Europe report prevalence rates as high as 10-22%, whereas significantly lower values (0.09%) have been reported in other regions, such as the Faroe Islands [3,5]. These discrepancies may result from genetic factors, methodological differences and varying levels of disease detection.

Age, Sex and Skin Phototype Differences

Rosacea is most commonly diagnosed in adults aged 30-60 years, with peak symptom severity occurring in the fourth and fifth decades of life [1,5]. The disease is more common in women, however, more severe forms, including phymatous rosacea, are predominantly observed in men [1,3]. Rosacea has traditionally been associated with fair skin phototypes (Fitzpatrick I-II) and Northern European ancestry [1,3]. Nevertheless, increasing evidence suggests that the disease also occurs in individuals with darker skin phototypes, although it may be underdiagnosed in this group due to the lower visibility of erythema and telangiectasia [3,5].

Etiopathogenesis

The etiopathogenesis of rosacea is multifactorial and involves complex interactions between the vascular, immune and nervous systems, as well as environmental and genetic factors [1-3].

Vascular Dysregulation

One of the key pathogenic mechanisms is vascular dysregulation, leading to excessive reactivity of facial blood vessels [1,2]. Ion channels of the transient receptor potential (TRP) family, particularly TRPV1 and TRPV4, play an important role responding to stimuli such as heat, alcohol, emotional stress and spicy foods [3,4]. Activation of these receptors results in vasodilation, increased blood flow and sensations of burning and skin redness.

Immune System Dysregulation

Excessive activation of innate immunity is central to rosacea pathogenesis. Patients exhibit increased expression of Toll-like receptor 2 (TLR2), leading to enhanced production of cathelicidins, including the peptide LL-37 [2,3]. LL-37 displays strong pro-inflammatory and pro-angiogenic properties, stimulating the release of cytokines (including IL-1β, IL-6, IL-8) and vascular growth factors [2-4]. Concurrently, the NLRP3 inflammasome is activated, amplifying the inflammatory response through caspase-1 activation and maturation of IL-1β and IL-18 [2,3]. Increasing evidence also points to the involvement of adaptive immunity, particularly Th1 and Th17 lymphocytes, whose elevated numbers are found in the skin lesions of patients with rosacea [2-4].

The Skin-Brain Axis

A significant element in rosacea pathogenesis is the functioning of the skin-brain axis, which forms part of the neuro-immuno-cutaneous system [4]. Psychological stress may activate cutaneous nerve endings and induce the release of neuropeptides such as substance P and CGRP, which enhance inflammation, vasodilation and mast cell degranulation [2,4]. These mechanisms provide the biological basis for the observed association between rosacea and anxiety and depressive disorders [4].

Environmental and Genetic Factors

Important environmental factors include UV radiation, temperature changes, alcohol, diet and exposure to irritating cosmetics [1-3]. UV radiation promotes the formation of reactive oxygen species (ROS), extracellular matrix degradation and vascular damage [2,3]. Genetic factors also play a significant role. Approximately 30-40% of patients with rosacea report a positive family history and twin studies indicate a substantial genetic contribution [1,3]. Genes related to immune responses (including HLA-DRA) have been identified and may increase susceptibility to disease development [3].

Clinical Presentation and Disease Course

Clinical Forms

Traditionally, four subtypes of rosacea have been distinguished: erythematotelangiectatic, papulopustular, phymatous and ocular [1,3]. Currently, a phenotype-based approach recommended by the Global Rosacea Consensus is increasingly applied. This approach focuses on dominant clinical features such as persistent erythema, flushing, inflammatory lesions, telangiectasia and ocular symptoms [2,3]. It better reflects disease heterogeneity and enables individualized treatment.

Disease Course and Relapsing Nature

Rosacea is a chronic, relapsing condition with periods of remission and exacerbations triggered by environmental factors and psychological stress [1,4]. Untreated disease may lead to symptom progression, permanent vascular changes and significant impairment of quality of life [4]. The chronic course and visible lesion location favor the development of anxiety and depressive disorders, further emphasizing the importance of a holistic therapeutic approach [4].

Anxiety Disorders - Definition, Epidemiology, Risk Factors and Impact

Definition, Classification and Clinical Characteristics

Anxiety disorders represent one of the most frequently diagnosed groups of mental disorders in the general population. They are characterized by persistent, excessive fear or anxiety disproportionate to actual threat, leading to reduced quality of life and impaired social and occupational functioning [6].

Anxiety disorders typically follow a chronic course, although symptom severity may decrease with age. Many individuals experience comorbidity of different anxiety forms or other mental disorders, increasing treatment complexity and affecting daily functioning [6]. DSM-5 and ICD-11 classifications allow systematic differentiation of specific entities, facilitating diagnosis and planning of both pharmacological and psychotherapeutic treatment [7]. Table 1 presents the most commonly diagnosed anxiety disorders along with their basic clinical features.

Table 1. Most Commonly Diagnosed Anxiety Disorders - Clinical Characteristics (authors' own elaboration based on the literature [6,7,8]).

Disorder	Abbreviation	Clinical Characteristics
Generalized Anxiety Disorder	GAD	Chronic, excessive and difficult-to-control anxiety concerning everyday situations and activities
Panic Disorder (with or without agoraphobia)	PD	Sudden and intense episodes of anxiety accompanied by somatic symptoms such as palpitations, shortness of breath and dizziness
Social Anxiety Disorder	SAD	Fear of negative evaluation in social situations, leading to avoidance behaviors or significant distress in daily functioning
Specific Phobias	-	Marked and disproportionate fear of specific objects or situations

Epidemiology and Risk Factors

Anxiety disorders are widespread - it is estimated that up to one-third of the population may experience at least one episode of clinically significant anxiety during their lifetime [6]. Significant differences are observed by sex, age and cultural environment, with women having nearly twice the risk compared with men [6].

Risk factors may be divided into biological, psychological and social categories. Biological factors include genetic predisposition, neurobiological differences and prior stressful experiences [6]. Psychological factors encompass personality traits, a tendency toward excessive worrying and previous traumatic experiences. Social risk factors include isolation, lack of social support, chronic stress and dysfunctional family relationships [8,9].

Additionally, in patients with chronic dermatological diseases such as rosacea, psychosocial factors, including reduced self-esteem related to skin appearance, may further increase the risk of anxiety disorders [8]. Studies also indicate that anxiety in such populations is often underdiagnosed and undertreated despite the availability of effective therapies [6].

Impact of Anxiety Disorders on Quality of Life and Functioning

Anxiety disorders significantly affect patients' quality of life, leading to reduced social interactions, occupational difficulties and decreased satisfaction with daily life [6,8]. Social and occupational functioning is particularly impaired in social anxiety disorder, which results in avoidance of situations requiring interpersonal interaction [7]. The chronic nature of anxiety disorders and their frequent comorbidity with other mental conditions increase patient burden and necessitate a comprehensive therapeutic approach. In populations with chronic dermatological diseases, anxiety symptoms may further exacerbate stress and reduce quality of life, highlighting the importance of early recognition and treatment [6,8].

Association of Rosacea with Anxiety Disorders

Prevalence

Studies indicate that individuals with rosacea have a higher risk of anxiety and depressive disorders compared with the general population [10-13]. A population-based study conducted in Finland found that patients with rosacea had a 60% higher likelihood of experiencing anxiety and depressive symptoms than healthy individuals [10]. Similar results were obtained in a

Danish cohort study, in which the risk of anxiety disorders was significantly higher among patients with rosacea, particularly in severe disease forms [11]. Moreover, meta-analyses confirm these observations, indicating more than a twofold increased risk (OR > 2) of anxiety disorders in individuals with rosacea compared with controls [12,13].

Pathophysiological Mechanisms Linking Rosacea and Anxiety Disorders

Rosacea is a chronic, relapsing inflammatory skin disease with complex etiopathogenesis, in which immune dysregulation and neurovascular abnormalities play a central role [14,15]. Increasing evidence suggests that these same biological mechanisms may simultaneously promote the development of anxiety symptoms, explaining the frequent coexistence of rosacea and anxiety disorders [15,16].

One of the fundamental pathogenic elements in rosacea is hyperactivity of the innate immune system, leading to increased expression of Toll-like receptor 2 (TLR2) and overproduction of antimicrobial peptides such as cathelicidin and its active form LL-37 [14,15]. LL-37 induces an inflammatory cascade involving activation of neutrophils, macrophages and mast cells, along with increased secretion of pro-inflammatory cytokines, resulting in chronic cutaneous inflammation [15]. Chronic immune activation may also exert systemic effects on the hypothalamic-pituitary-adrenal (HPA) axis, which plays a key role in the pathophysiology of anxiety disorders [16].

Neuroinflammation and dysregulation of the autonomic nervous system represent another important mechanism linking the two conditions [15,16]. In rosacea, hypersensitivity of cutaneous nerve endings and excessive activation of transient receptor potential (TRP) ion channels, including TRPV1 and TRPA1, are observed. These channels respond to stimuli such as stress, alcohol, spicy foods and temperature changes [15]. Their activation leads to the release of vasodilatory neuropeptides such as calcitonin gene-related peptide (CGRP), pituitary adenylate cyclase-activating peptide (PACAP) and substance P, resulting in erythema, burning sensations and flushing [15]. These same neuropeptides are involved in regulating stress and anxiety responses within the central nervous system [16].

Psychological stress and anxiety may further exacerbate skin symptoms through increased sympathetic nervous system activity and elevated catecholamine release, leading to additional vasodilation and activation of inflammatory skin cells [15,16]. This creates a

pathophysiological vicious cycle in which dermatological symptoms intensify anxiety and anxiety, in turn, worsens rosacea manifestations [14,16].

The immuno-gut-brain axis also plays a role in this bidirectional relationship. Disturbances in skin and gut microbiota observed in patients with rosacea may modulate inflammatory responses and nervous system function, promoting anxiety symptoms [14,15]. Pro-inflammatory cytokines such as interleukin-6 (IL-6), interleukin-17 (IL-17) and tumor necrosis factor-α (TNF-α) can influence neurotransmission and neuroplasticity, further linking cutaneous inflammatory processes with anxiety disorder pathogenesis [15,16].

In summary, shared pathophysiological mechanisms between rosacea and anxiety disorders include chronic immune activation, neuroinflammation, stress-axis dysregulation and neurovascular abnormalities. Understanding these connections is crucial for a holistic therapeutic approach that addresses both dermatological treatment and mental health assessment and support [14-16].

Psychosocial Impact of Rosacea and Its Role in Anxiety

Due to its facial manifestation, rosacea may lead to significant psychosocial consequences for patients. The appearance of erythema and inflammatory lesions may be misinterpreted by others, historically resulting in stereotypical perceptions of the disease as a consequence of alcohol abuse or a difficult personality [8]. Such social misconceptions promote internalized stigma, whereby patients adopt negative stereotypes about themselves, leading to feelings of low self-worth, shame and social withdrawal [17].

A study by Kıratlı Nalbant et al. demonstrated that patients with rosacea and acne vulgaris exhibit high levels of internalized stigma, strongly correlated with reduced quality of life and poorer subjective health perception [17]. Notably, in rosacea, internalized stigma levels were high regardless of disease severity, suggesting that even mild skin changes may elicit substantial psychosocial responses [17].

Consequently, patients may avoid social interactions and develop anxiety symptoms, including heightened social anxiety [8]. Heisig et al. emphasized that patients with rosacea often fear negative evaluation by others, which may result in social withdrawal and diminished self-esteem [8]. Furthermore, anxiety may exacerbate disease symptoms, for example by triggering

more frequent facial flushing, thereby creating a vicious cycle of escalating physical and psychosocial symptoms [8].

At the same time, studies indicate that effective dermatological therapy can alleviate anxiety symptoms and improve quality of life. Treating skin lesions not only reduces erythema and inflammation but also positively affects self-esteem and decreases social avoidance [8].

A holistic approach combining dermatological treatment with psychological support can significantly improve patients' quality of life and reduce psychosocial consequences of rosacea, such as social anxiety and withdrawal [8,17].

Quality of Life and Psychological Burden in Rosacea

Rosacea is a chronic skin disease whose symptoms affect not only physical health but also mental well-being, self-esteem and social functioning [18]. The Dermatology Life Quality Index (DLQI) is widely used to assess health-related quality of life, evaluating domains such as symptoms and feelings, daily activities, leisure, work or school functioning, interpersonal relationships and treatment burden [18,19]. Table 2 presents the interpretation of DLQI score ranges and their impact on patients' lives.

Table 2. DLQI Score Interpretation for Impact on Patients' Quality of Life (adapted from Seetan et al. [18]).

Grade	Score Range	Interpretation of Impact on Patient's Life
1	0-1	No impact on patient's life
2	2-5	Low impact on patient's life
3	6-10	Moderate impact on patient's life
4	11-20	Very large impact on patient's life
5	21-30	Extremely large impact on patient's life

In a study conducted in Jordan, patients with rosacea had significantly higher mean DLQI scores (11.32 ± 5.4) than healthy individuals (4.28 ± 2.3, $p < 0.001$), indicating a marked disease-specific impairment of quality of life [18]. Most control participants (85%) fell into DLQI grade 1, whereas only 11% of patients with rosacea achieved this score. More than 60% of patients scored within grades 3-5, corresponding to a very large or extremely large impact on quality of life [18].

Similar observations were confirmed in a meta-analysis including 52 studies involving 13,453 patients with rosacea. The mean DLQI score was 8.61, indicating a moderate impact on quality of life [19]. Compared with healthy individuals, patients with rosacea had significantly higher DLQI scores, confirming the negative effect of the disease on daily functioning and well-being [19]. Importantly, rosacea treatment led to a clear improvement in quality of life, with significantly lower DLQI scores after therapy than before treatment, demonstrating the positive impact of dermatological interventions on patient well-being [19].

Beyond quality of life, patients' emotional status is also an important aspect of functioning. The Hospital Anxiety and Depression Scale (HADS) is commonly used to assess anxiety and depressive symptom severity and their potential impact on daily life [18]. Based on score ranges, three levels of symptom severity are distinguished, each with different clinical and functional implications [18]. Table 3 presents the interpretation of HADS severity levels.

Table 3. Severity Levels of Symptoms Assessed by the Hospital Anxiety and Depression Scale (HADS) (adapted from Seetan et al. [18]).

Severity Level	Score Range	Clinical Significance for the Patient
Low	0-7	Mild symptoms, minimal impact on daily functioning
Moderate	8-10	Noticeable symptoms, may affect daily life and well-being
High	≥11	Significant symptoms, may require clinical intervention or psychological support

Patients with rosacea exhibited significantly higher HADS scores than healthy individuals, with mean scores of 9.38 ± 3.2 in the anxiety subscale and 8.19 ± 4.3 in the depression subscale, compared with 3.88 ± 2.18 and 3.41 ± 1.87 in controls ($p < 0.001$) [18]. More than half of patients (57%) experienced moderate or severe anxiety and nearly one-third (31%) had moderate or severe depression. Regression analyses demonstrated that greater disease severity and a higher number of skin lesions were significant predictors of poorer quality of life and increased anxiety and depression, highlighting the importance of mental health assessment in the care of patients with rosacea [18].

Integrated Management of Rosacea - Dermatological and Psychological Approaches

Impact of Dermatological Treatment on Mental Health in Rosacea

Effective dermatological treatment of rosacea plays a significant role not only in reducing skin symptoms but also in improving patients' mental health. Visible disease manifestations such as persistent erythema, flushing and papulopustular lesions are strongly associated with social anxiety, stress and social avoidance [8,20]. Studies indicate that improvement in skin clinical status leads to a significant reduction in anxiety and depressive symptoms and enhances quality of life [8]. Effective control of erythema and flushing may interrupt the vicious cycle in which stress and anxiety exacerbate skin symptoms, which in turn intensify psychological distress [8].

Interdisciplinary Management and Patient Education in Rosacea

Given the multifactorial nature of rosacea and its significant psychosocial consequences, the need for an interdisciplinary approach to patient care is increasingly emphasized. Collaboration between dermatologists and psychiatrists or psychologists enables early recognition of anxiety, depressive and adjustment disorders, which are often overlooked in routine clinical practice [8,13]. Population studies and systematic reviews highlight the need for routine mental health assessment in patients with rosacea, particularly in cases with severe clinical manifestations [13].

An important component of interdisciplinary management is patient psychoeducation. Providing reliable information about the chronic nature of the disease, trigger factors and therapeutic options facilitates better disease coping and reduces anxiety related to its course [8]. Educating patients about stress mechanisms and their impact on skin symptoms may support more adaptive coping strategies and increase treatment adherence [21].

Psychological Interventions in Rosacea Management

Psychological interventions constitute an important adjunct to dermatological treatment in patients with rosacea and comorbid anxiety disorders. Cognitive-behavioral therapy (CBT) is of particular importance, having demonstrated potential effectiveness in reducing social anxiety and fear of blushing in patients with severe rosacea [20]. CBT helps patients modify maladaptive beliefs regarding others' reactions and reduce avoidance behaviors. Additionally, stress-reduction techniques such as relaxation training and adaptive coping strategies may

decrease emotional symptom severity and indirectly alleviate skin symptoms [8,21]. Patients who seek social support also exhibit better psychological functioning [21].

Psychological support tailored to cultural context and individual patient needs can enhance a sense of disease control, reduce stigma and improve quality of life. Incorporating psychological interventions into comprehensive rosacea management promotes a more holistic patient-centered approach and increases the effectiveness of long-term care [13,21].

Conclusions

Rosacea is a chronic inflammatory skin disease that may be associated with an increased risk of anxiety disorders, particularly in patients with more severe or persistent disease. The relationship between rosacea and anxiety is complex and bidirectional, with cutaneous inflammation and psychological factors influencing each other.

This association is supported by evidence pointing to shared biological mechanisms, including immune and neurovascular dysregulation, as well as psychosocial factors such as facial involvement, stigmatization and reduced self-esteem. These interacting processes may lead to a vicious cycle in which psychological distress exacerbates skin symptoms, while worsening disease further increases emotional burden.

These findings underscore the need for a holistic, interdisciplinary approach to rosacea management. Combining effective dermatological treatment with routine assessment of mental health and appropriate psychological support may improve clinical outcomes and overall quality of life in this patient population.

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