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Allergic Skin Diseases as Conditions Requiring an Interdisciplinary Therapeutic Approach

Wiktoria Sobieraj[1], ORCID https://orcid.org/0009-0007-5412-6302
E-mail w.s.sobieraj@gmail.com
[1]Lower Silesian Center for Oncology, Pulmonology and Hematology, Wrocław, Poland

Olga Sławatyniec[2], ORCID https://orcid.org/0009-0007-0373-1588
E-mail olgaslaw2@gmail.com
[2]4th Military Clinical Hospital with Polyclinic, Wrocław, Poland

Anna Kamosińska[2], ORCID https://orcid.org/0009-0005-0718-2112
E-mail anna.kamosinska@interia.pl
[2]4th Military Clinical Hospital with Polyclinic, Wrocław, Poland

Julia Pająk[2], ORCID https://orcid.org/0009-0007-0882-9365
E-mail julia.pajak@onet.eu
[2]4th Military Clinical Hospital with Polyclinic, Wrocław, Poland

Corresponding Author
Olga Sławatyniec, E-mail olgaslaw2@gmail.com

Abstract

Introduction: The increasing incidence of allergic diseases makes them a widespread problem of significant social importance. Visible skin lesions in allergic diseases are associated with a reduced quality of life and a higher prevalence of secondary mental disorders.

Aim: The aim of this study is to analyze the impact of cutaneous manifestations in allergic skin diseases on the psychological well-being of patients and to evaluate the importance of an interdisciplinary therapeutic approach in this field.

Material and Methods: A review of literature evaluating publications from PubMed and Google Scholar databases was conducted, addressing allergic skin diseases, their pathophysiology and connection to the nervous system, with particular emphasis on their impact on mental health and social functioning.

Results: Individuals struggling with allergic skin diseases are exposed to social stigmatization and discrimination from early stages of development. Furthermore, an increased prevalence of depressive and anxiety disorders, as well as sleep disturbances, is observed in this patient group, which is closely related to the presence of chronic pruritus.

Conclusions: To achieve optimal therapeutic outcomes, it is crucial to address the complex needs of patients by implementing solutions such as coordinated care. Collaboration within a multidisciplinary team shortens the diagnostic process and reduces the number of required consultations. The introduction of non-pharmacological therapeutic methods, such as cognitive-behavioral therapy, enables the development of effective coping mechanisms for disease symptoms, which reduces stress and allows for the interruption of the pathological process along the skin-brain axis.

Key words: Skin Diseases; Dermatitis, Atopic; Psychoneuroimmunology, Pruritus, Social Stigma;

1. Introduction

Currently, there is a rapid increase in the incidence of allergic disorders, representing a growing challenge both in Polish society and worldwide. Allergic skin diseases, such as atopic dermatitis (AD), urticaria, and allergic contact dermatitis, pose clinical challenges. Due to their high social visibility, these conditions extend beyond being solely dermatological issues; they

also significantly affect patients' mental health and quality of life [1,2]. Statistics highlight the scale of this phenomenon: the global prevalence of atopic dermatitis is estimated at around 2.6%, affecting more than 204 million people [3]. Contact allergies impact at least 20% of the population [2], and one in five individuals experiences an episode of acute urticaria during their lifetime [4]. Unlike other manifestations of atopy, the skin lesions associated with these conditions are highly exposed, making them subject to social scrutiny, which can lead to stigmatization, increased anxiety, decreased self-esteem, and the development of psychiatric comorbidities [1,5,6].

2. Pathophysiology of Skin Allergies

2.1. Mechanisms and Clinical Manifestations

Allergic skin diseases represent a heterogeneous group of inflammatory disorders whose pathogenesis is based on complex interactions between genetic, environmental, and socio-economic factors. The most important disease entities within this group include atopic dermatitis, allergic contact dermatitis, and urticaria [7]. Defects in the skin barrier function, inflammatory processes in the nervous system, as well as dysregulation and activation of the immune system are key in their development [7,8,9]. A common mechanism in many of these diseases, including atopic dermatitis and allergic contact dermatitis, is type IV delayed hypersensitivity reaction triggered by exposure to exogenous allergens, which leads to the activation of specific T lymphocytes [10]. The pathophysiology of atopic dermatitis - the most common skin disease in pediatric populations (affecting up to 20% of children; in Poland, these rates are lower, ranging between 4.3% and 5.3%) [9,3] - involves defects in the structural proteins of the skin, caused by mutations in the filaggrin gene, as well as activation of the immune response involving Th2, Th17, and Th22 lymphocytes. This results in the release of inflammatory cytokines and tissue damage [8,11]. Urticaria, on the other hand, is primarily associated with type I immediate hypersensitivity reactions, which cause mast cell activation and the subsequent release of bioactive mediators such as histamine and leukotrienes. These substances lead to vasodilation, increased permeability of blood vessels, and the formation of hives and itching [12]. The skin serves as a window into a patient's overall health status; therefore, changes observed on its surface provide valuable information about internal processes occurring within the body. The range of tissue reactions that determine the clinical manifestations of skin allergies is limited and exhibits high reproducibility across different disease entities, regardless of the underlying immune mechanism or etiology [7,13].

2.2 The Skin-Brain Axis

Current knowledge in the fields of psychodermatology and psychoneuroimmunology indicates the existence of a complex, bidirectional communication system referred to as the skin-brain axis. Numerous studies have examined how emotional states affect the progression of skin diseases and, by extension, the mental health of patients. Psychodermatology has emerged as a distinct discipline that bridges dermatology, psychiatry, and psychology. The functional connection between the skin and the brain is rooted in their common origin - both derive from the same embryonic layer, the ectoderm. [15] This integration is facilitated by the neuro-immuno-cutaneous system (NICS), in which neurotransmitters, neuropeptides, and cytokines act as mediators between the skin and the central nervous system. [16]

The skin not only serves as a protective barrier but also functions as a sensory, immune, and endocrine organ, playing a crucial role in our perception. Through a network of afferent somatosensory fibres, it transmits thermal, chemical, and inflammatory stimuli from the peripheral tissues via the dorsal roots and spinal cord to cortical structures of the brain. [15] The somatosensory system also enables us to experience pleasant touch, which has garnered increasing interest since the discovery of specialized C-tactile fibers adapted to receiving gentle tactile stimulation, such as stroking [17]. Consequently, the skin acquires an emotional dimension and plays a vital role in interpersonal communication. From a psychological perspective, the skin fulfills the functions described in the *moi-peau* (skin-ego) concept: it acts as a “container” that stores positive stimuli, an "interface" protecting against external aggression, and a key "locus" for communication and building interpersonal relationships. As a result, visible skin damage profoundly interferes with an individual's psychological well-being [8,18].

2.3. Itch-Scratch Cycle: A Self-Perpetuating Mechanism of Epidermal Barrier Dysfunction

Pruritus (itch) is one of the most common dermatological symptoms reported by patients, yet it remains a phenomenon that is difficult to manage effectively. It is defined as an unpleasant sensation that provokes the scratch reflex. There is evidence suggesting that, evolutionarily, pruritus developed as a defense mechanism against parasites; however, in the case of chronic dermatoses, it becomes dysfunctional and traumatic [19]. The somatosensory cortex, the insula, and the limbic system are primarily responsible for processing the intensity, localization, and unpleasant sensations associated with this phenomenon, generating a

powerful urge to scratch [18]. Chronic inflammation and pruritogens, such as histamine, capsaicin, and substance P, play a vital role in the pathophysiology of pruritus by activating specific receptors and triggering signaling pathways [19].

Scratching provides temporary relief by activating the brain's reward and motivational centers, particularly the striatum and limbic system, which gives it a habitual character and makes breaking the cycle difficult, despite the awareness of progressive skin damage [19]. The disruption of the epidermal structure renders it more susceptible to allergens and irritants, which exacerbates the itch and perpetuates skin lesions, such as lichenification [18,19]. The itch-scratch mechanism serves as a bridge between physiology and psychology, given its strong association with stress and emotional state [20]. Stress activates the hypothalamic-pituitary-adrenal axis, releasing neuropeptides, notably substance P, which lowers the itch threshold [15,16]. Additionally, itch intensity is a strong predictor of sleep disturbances, which correlate with depressed mood, anxiety, and, in extreme cases, suicidal ideation (studies have shown a 44% higher risk of suicidal ideation and a 36% higher risk of suicide attempts in AD patients compared to the general population) [8,18]. Interestingly, pruritus exhibits psychogenic and social characteristics - simply observing others scratching activates the same cortical centers as a real stimulus (so-called "contagious itch"). In the past, outbreaks of itching and rash in schools have even been described and attributed to mass hysteria [18].

An interdisciplinary understanding of the pathophysiology of allergic skin reactions reveals that visible manifestations are not merely cosmetic defects, but the result of a profound destabilization within the neuro-immuno-cutaneous system. Therefore, an integrated treatment approach that incorporates targeted pharmacotherapy and psychological interventions is essential [15,18].

3. Psychological Aspects of Visible Allergic Skin Changes

3.1. The Impact of Visually Apparent Allergic Skin Changes on Patients' Self-perception and Body Image

The term "body image" refers to the way an individual perceives their physical appearance. This concept also encompasses the thoughts, emotions, and behaviors that a person develops in relation to their appearance [21,22]. Skin manifestations such as erythema, edema, or urticaria associated with allergic diseases are easily noticeable both to the patients

themselves and to those around them. Given that the skin is the body's most conspicuous organ, these lesions substantially distort the body image of those affected. Studies in people with chronic dermatological conditions have shown that dissatisfaction with their body image is common across all age groups, and this tendency is slightly more prevalent among women than men [23]. Possible factors influencing an individual's perception of their body image include the perceived severity of the disease and its impact on daily functioning [23].

Individuals whose skin lesions occur in more visible areas tend to have lower self-esteem and poorer quality of life compared to those whose lesions are located in areas usually covered by clothing. Lesions affecting the hands, especially when accompanied by facial symptoms, have particularly negative consequences on a person's perceived quality of life. Patients in this group frequently report feeling that they are the subject of unwanted attention, experiencing rejection, and feelings of social isolation, which affect both their personal and professional lives. The discomfort caused by these hand lesions makes it difficult for them to perform everyday tasks that require manual dexterity [24,25]. Problems with simple activities such as writing or tying shoes can lead to frustration and a sense of loss of independence.

Allergic diseases often begin in childhood [26]. During this period of intensive development, the construction of self-confidence is fundamentally tied to the individual's body image. [27,28] Older children and adolescents are particularly vulnerable to peer criticism. Due to the recurring and noticeable skin lesions, they experience shame and chronic stress related to how others react to them. This can result in having fewer friends and avoiding intimate relationships. There is evidence that severe atopic dermatitis in childhood is associated with significant delays in social development [29]. Increased isolation due to school absences negatively affects academic performance and future career prospects [30].

3.2. The Experience of Disease-Related Stigmatization

Stigmatization is a multi-dimensional concept that has evolved over time. People suffering from visible skin diseases may face two types of stigmatization: external stigmatization, also known as public stigma; and internal stigmatization, referred to as self-stigma. Self-stigmatization occurs when individuals internalize preconceived stereotypes and prejudices about their condition. External stigmatization, on the other hand, involves discrimination and prejudice directed toward a specific group of people, ultimately leading to

social exclusion [31,32].

In a study conducted among patients with atopic dermatitis and chronic spontaneous urticaria, 78.6% of those with atopic dermatitis and 57.3% of those with chronic spontaneous urticaria reported experiencing external stigmatization. No correlation was found between stigmatization and objective measures of disease severity (EASI for atopic dermatitis, UAS7 for chronic spontaneous urticaria), suggesting that patients with milder symptoms are just as susceptible to stigmatization. The study also revealed a link between stigmatization and sleep disturbances, as well as depression and anxiety among the participants [32].

Patients with visible skin diseases face stigmatization both in childhood and adulthood. The peak incidence of bullying occurs between the ages of 13 and 15; common forms include verbal abuse and exclusion, while physical violence is less frequent. It is estimated that only 33.2% of victims report their experiences to someone [33].

An additional issue faced by adults with visible allergic conditions is discrimination in the workplace. Up to 33.9% of patients with atopic dermatitis reported experiencing such discrimination, including being bypassed when assigned tasks, being laughed at by colleagues, or being taken advantage of. Workers who experienced discrimination were less likely to attend work (67.7% vs. 16.5%; $p<0.05$) and reported lower concentration and productivity (71.0% vs. 23.1%; $p<0.05$). For 9.3% of patients with atopic dermatitis, their condition hindered their ability to secure desired jobs [30].

According to studies, 63% of patients with chronic spontaneous urticaria also experience stigmatization in public settings. One-third of them reported being subjected to intrusive glances from strangers, and questions about the contagiousness of their condition were frequently asked. One in six patients encountered situations where people refused to shake their hands or avoided physical contact [34]. Lack of public awareness about the nature and symptoms of allergic diseases can lead to unnecessary concerns regarding interactions with individuals who suffer from them. Common misconceptions include linking skin conditions to poor hygiene, neglect, or contagiousness [35].

3.3. Psychiatric Correlations: The Prevalence of Anxiety, Depression, and Sleep Disorders in Allergic Patients

Dermatological diseases with an allergic basis are characterized by their chronicity and recurrence. Stress associated with exacerbations of symptoms such as itching and pain, as well as the spread of lesions to larger areas, has a detrimental impact on patients' mental health [36]. The relationship between stress and skin diseases is complex, but two main mechanisms can be identified. In the first mechanism, stress may exacerbate skin disease symptoms by affecting the immune system and increasing inflammation in the body. Chronic inflammation can also directly affect the brain, leading to mood disorders. In the second mechanism, chronic dermatological conditions can negatively impact an individual's self-perception and sense of attractiveness, resulting in social avoidance and decreased quality of life [37].

An increased prevalence of anxiety disorders has been observed in children with chronic urticaria. This anxiety may be due to the unpredictability of the disease and concerns about exacerbations of symptoms. Studies in children have found that 43.2% had at least one psychiatric diagnosis, with anxiety disorders being particularly common, a significantly higher rate than in control groups. A higher incidence of psychiatric diagnoses was also observed among participants who reported triggers for their urticaria [38]. Patients with these conditions also showed elevated levels of the neurotransmitter P, which is involved in the pathogenesis of depression; moreover, the severity of depressive symptoms correlated with the severity of urticaria [39].

In a population-based cohort study, it was found that patients with atopic dermatitis had a significantly increased risk of developing depression (14%) and anxiety disorders (17%). These associations were present across all degrees of disease severity, with the incidence of depression increasing linearly with the severity of atopic dermatitis [40]. Inadequate disease control can lead to patient resignation and helplessness, resulting in decreased compliance and reduced clinical outcomes. Atopic dermatitis also shares similarities with attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorders in terms of chronic inflammation and genetic factors. A meta-analysis of 24 studies involving over 71 million participants found that patients with atopic dermatitis had a 28% increased risk of developing ADHD and an 87% increased risk of autism spectrum disorders compared to the general population [41]. An increased risk of attempted suicide has also been reported in patients with atopic dermatitis [42,43]. Predictive factors included high disease severity, co-existing

depressive symptoms, young age, and sleep disturbances.

Sleep disorders play a key role in linking physical symptoms with psychological issues. They are strongly associated with physical manifestations, particularly itching. Patients with eczema often report difficulty falling asleep and waking up at night, leading to fragmented sleep and chronic fatigue. They also frequently experience leg cramps and twitching during sleep, which may be indicative of restless legs syndrome. Similar findings have been observed in children, who, in addition to shortened sleep duration, experience unusual events during sleep such as increased activity, breathing difficulties, nightmares, and nocturnal enuresis. The total time spent awake due to sleep disturbances in children with atopic dermatitis was 103 minutes, twice that of the control group (50 minutes). Sleep disorders reduce quality of life and are associated with a high risk of depression. Patients with poor quality of life and sleep disturbances represent a group with specific needs that require an interdisciplinary approach [44,45,46].

4.1. Integrated Care Model

Psychiatric disorders that co-occur with allergic diseases represent a complex issue, involving the interplay of biological and psychosocial factors [37]. In many cases, it is difficult to determine the causal relationship or identify which disorder is primary. A significant challenge is the underdiagnosis of depression and anxiety disorders by physicians who refer patients for consultation. To address the comprehensive needs of these patients, a holistic approach and multidisciplinary teams composed of allergologists, dermatologists, psychiatrists, and psychologists are essential. Establishing specialized clinics focusing on allergic dermatology and mental health, or implementing coordinated care programs, can help accelerate the diagnostic process, thereby improving patients' quality of life and reducing the number of consultations required. Each specialist in the team evaluates the patient from their own professional perspective, allowing for a "mixing of skills" that provides more comprehensive care than individual specialists working alone [47,48,49].

4.2. Non-pharmacological interventions

Patients with allergic diseases could derive substantial benefits from the integration of non-pharmacological interventions into the standard of care. This stems from the biopsychosocial model of disease (Figure 1), which recognizes the influence of psychological and social factors on the triggering and exacerbation of cutaneous symptoms. Non-

pharmacological therapeutic methods, such as Cognitive-Behavioral Therapy (CBT), not only assist patients in coping with the awareness and acceptance of the disease and its sequelae but also result in actual improvement of the skin condition by reducing stress and teaching effective itch-management strategies [50,51,52].

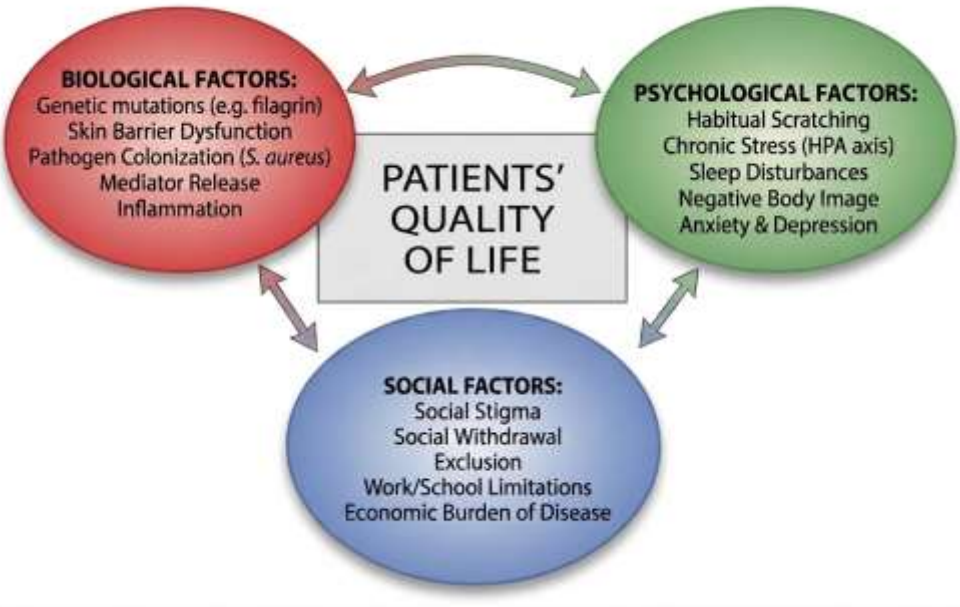

Figure 1. Biopsychosocial model of allergic skin diseases.

The literature describes the positive impact of various psychological interventions on patients' mental well-being and itch intensity, with CBT-based techniques being considered particularly effective. These include Habit Reversal Training (HRT), relaxation techniques, and cognitive restructuring. Developed in 1973, HRT aims to modify maladaptive behavioral patterns by teaching patients to replace undesirable behaviors with neutral actions. HRT consists of three key elements: awareness training, the implementation of a competing response (e.g., fist clenching), and motivational support. Studies demonstrate that combining HRT with pharmacological treatment yields significantly better results in improving skin condition than pharmacotherapy alone [51]. Such a solution, alongside other CBT techniques, appears especially promising for AD, where itch, pain, stress, and sleep disturbances interact synergistically, leading to reduced quality of life and progression of skin lesions [53].

Patients with AD often employ avoidance behaviors toward triggers and various social situations, motivated by a desire to minimize symptoms and a fear of negative social evaluation. Paradoxically, this leads to the reinforcement of the stress response and a significant decline in quality of life. Therefore, modern CBT approaches in AD include exposure-based therapy,

which focuses on the extinction of conditioned anxiety responses and the reduction of safety behaviors related to skin exposure [54].

Among various relaxation techniques, Mindfulness-Based Stress Reduction (MBSR) stands out. MBSR is an 8-week program developed by Jon Kabat-Zinn that utilizes meditation, mindfulness practices, body scanning, and yoga to lower perceived stress levels and minimize anxiety. Its efficacy is well-documented primarily in the treatment of anxiety disorders, depression, and sleep disturbances; however, clinical data also support the application of MBSR in patients with AD. In this group, significant reductions in eczema severity and pruritus, as well as an increase in quality of life, have been observed [53, 55].

European guidelines (EADV/ESDaP) [52] emphasize the necessity of forming multidisciplinary teams - comprising dermatologists, psychiatrists, psychologists, and dermatology nurses - to provide holistic support to patients suffering from skin diseases and experiencing heightened stress. The synergy of modern targeted pharmacotherapy with behavioral interventions currently represents the optimal therapeutic model for allergic skin diseases, particularly in cases of AD resistant to conventional treatment, and allows for the interruption of the multidimensional pathological process along the skin-brain axis [50, 52,53].

4.3. Patient Education

Therapeutic patient education (TPE) is a continuous, patient-centered component of medical care. Defined by the WHO as a method that enhances patients' ability to manage chronic diseases independently, TPE in the context of allergic skin diseases involves providing information about the etiology and triggers of the condition, as well as teaching practical skills such as proper use of topical medications and effective itching management strategies. These interventions can be delivered individually or in structured group sessions, such as "atopy schools." Clinical evidence demonstrates that comprehensive patient education significantly reduces the severity of skin symptoms and improves patients' quality of life [56]. TPE is essential for ensuring compliance with treatment recommendations and helping patients overcome feelings of fear and social stigma [56].

5. Conclusions

Allergic skin diseases, due to their prevalence and the discomfort they cause, represent a significant challenge in contemporary clinical practice. For an effective diagnostic and therapeutic approach, it is essential to understand the multidimensional nature of these

conditions. The relationship between the skin and the functioning of the nervous and immune systems proves to be far more complex and profound than traditionally assumed; indeed, it is the disruption of this delicate balance that leads to visible changes in the skin. Furthermore, the detrimental impact of symptoms such as chronic pruritus on daily functioning and quality of life cannot be overlooked. Combined with low self-esteem and social stigmatization, these factors place a considerable psychosocial burden on patients. The prevalence of psychiatric comorbidities, such as depression and anxiety, is significantly higher among individuals with allergic skin diseases than in the general population. Consequently, these conditions impair both the physical and emotional well-being of patients, necessitating a comprehensive and integrated care model. To achieve optimal therapeutic outcomes, a multidisciplinary approach involving allergists, dermatologists, and mental health professionals is essential.

Behavioral interventions that empower patients to develop effective coping strategies and mitigate stress are crucial to the recovery process. Finally, routine assessment of mental health during standard allergy consultations is strongly advisable to ensure holistic patient care.

Disclosure

Author Contributions

Conceptualization: Wiktoria Sobieraj, Anna Kamosińska, Olga Sławatyniec, Julia Pająk, Wiktoria Łuniewska

Methodology: Olga Sławatyniec, Wiktoria Sobieraj

Investigation: Wiktoria Sobieraj, Anna Kamosińska, Olga Sławatyniec, Julia Pająk, Wiktoria Łuniewska

Resources: Julia Pająk, Wiktoria Sobieraj, Anna Kamosińska, Olga Sławatyniec, Wiktoria Łuniewska

Writing - original draft: Anna Kamosińska, Julia Pająk, Wiktoria Łuniewska

Writing - review and editing: Olga Sławatyniec, Wiktoria Sobieraj

Visualization: Olga Sławatyniec

Supervision: Julia Pająk

Project administration: Wiktoria Sobieraj

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