MANAGEMENT OF SEVERE PEDIATRIC ATOPIC DERMATITIS

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Abstract. *Atopic dermatitis (AD) is a chronic inflammatory skin condition that often begins in early childhood and can persist into adulthood. It is characterized by intense itching, erythema, and a disrupted skin barrier, significantly impacting patients' quality of life. Severe cases of pediatric atopic dermatitis present unique diagnostic and management challenges. The aim of this study is to present a clinical case of severe pediatric atopic dermatitis and highlight the importance of comprehensive diagnostic tools for assessing disease severity. In this article, we provide an overview of existing systems for evaluating the severity of atopic dermatitis, focusing on their applicability in pediatric cases. Additionally, we introduce a practical approach to using a severity assessment system in the clinical observation and management of such cases, emphasizing its role in optimizing treatment outcomes.*

Key words: *atopic dermatitis, children, severity of the disease, SCORAD, erythema, pruritus, skin, pediatric dermatology.*

ВЕДЕНИЕ ТЯЖЕЛОЙ ФОРМЫ АТОПИЧЕСКОГО ДЕРМАТИТА У ДЕТЕЙ

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Аннотация. *Атопический дерматит (АД) — хроническое воспалительное заболевание кожи, которое часто начинается в раннем детстве и может сохраняться во взрослом возрасте. Он характеризуется интенсивным зудом, эритемой и нарушенным кожным барьером, что существенно влияет на качество жизни пациентов. Тяжелые случаи детского атопического дерматита представляют уникальные диагностические и лечебные проблемы. Целью данного исследования является представление клинического случая тяжелого детского атопического дерматита и подчеркивание важности комплексных диагностических инструментов для оценки тяжести заболевания. В этой статье мы приводим обзор существующих систем оценки тяжести атопического дерматита, уделяя особое внимание их применимости в педиатрических случаях. Кроме того, мы представляем практический подход к использованию системы оценки тяжести при клиническом наблюдении и ведении таких случаев, подчеркивая ее роль в оптимизации результатов лечения.*

Ключевые слова: *атопический дерматит, дети, тяжесть заболевания, SCORAD, эритема, зуд, кожа, детская дерматология.*

BOLALARDA ATOPIK DERMATITNING OG‘IR SHAKLINI BOSHQARISH

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Annotatsiya. *Atopik dermatit (AD) surunkali yallig‘lanishli teri kasalligi bo‘lib, ko‘pincha erta bolalikdan boshlanadi va balog‘at yoshiga qadar davom etishi mumkin. Bu kuchli qichishish, eritema va buzilgan teri to‘sig‘i bilan tavsiflanadi, bu bemorlarning hayot sifatiga sezilarli ta'sir qiladi. Bolalarda atopik dermatitning og‘ir holatlari o‘ziga xos diagnostika va davolash muammolarini keltirib chiqaradi. Ushbu tadqiqotning maqsadi bolalarda og‘ir atopik dermatitning klinik holatini taqdim etish va kasallikning og‘irligini baholash uchun keng qamrovli diagnostika vositalarining muhimligini ta'kidlashdir. Ushbu maqolada biz atopik dermatitning og‘irligini baholash uchun mavjud tizimlar haqida umumiy ma'lumot beramiz, ularning pediatrik holatlarda qo‘llanilishiga e'tibor qaratamiz. Bundan tashqari, biz bunday holatlarni klinik kuzatish va boshqarishda jiddiylikni baholash tizimidan foydalanishga amaliy yondashuvni joriy qilamiz, uning davolash natijalarini optimallashtirishdagi rolini ta'kidlaymiz.*

Kalit so‘zlar: *atopik dermatit, bolalar, kasallikning og‘irligi, SCORAD, eritema, qichishish, teri, bolalar dermatologiyasi.*

Introduction. Atopic dermatitis is one of the most common chronic inflammatory skin disorders, significantly affecting the quality of life of children and their families worldwide [35]. Recent data suggest that up to 20% of children and 2-10% of adults are affected globally, with considerable variation among regions and socioeconomic groups [48, 66, 69]. In industrialized countries such as the United States and the United Kingdom, the prevalence in children ranges from 15-20%, while in developing nations, it remains below 10% [11, 25, 37]. In Asia, urban areas in countries like Japan and South Korea report rising rates of the disease, often associated with environmental and lifestyle changes [66, 73]. Severe cases, which constitute around 10% of pediatric patients, impose a disproportionately high burden on healthcare systems and families due to their chronic nature and complexity [15].

The pathogenesis of atopic dermatitis is multifactorial, involving genetic predisposition, immune dysregulation, environmental factors, and defects in the epidermal barrier [12, 63]. Genetic studies have highlighted the importance of mutations in the FLG gene, which encodes filaggrin, a key protein in maintaining the skin's barrier function [47, 65]. Filaggrin deficiency leads to increased water loss, heightened sensitivity to environmental allergens, and microbial colonization [34]. Immunologically, the disease is driven by a Th2-skewed response, characterized by elevated levels of interleukins such as IL-4, IL-13, and IL-31, which promote inflammation and pruritus [19, 71]. Additional triggers include allergens, pollutants, microbial dysbiosis, psychological stress, and climatic variations, all of which exacerbate disease activity [40, 64, 70].

Clinically, atopic dermatitis presents with a range of manifestations that vary by age and disease severity [32, 57, 59]. In infants, lesions are typically acute, erythematous, and exudative, often involving the face and extensor surfaces [17, 51]. During childhood, the disease evolves into a more chronic phase, with lichenification and excoriations predominating, particularly in the flexural areas [3]. In adolescents and adults, lesions may become more widespread, with chronic lichenified plaques and persistent itching [72]. The severity of atopic dermatitis is categorized as mild, moderate, or severe, based on the extent of skin involvement, symptom intensity, and impact on the patient's quality of life [41]. Severe forms are characterized by extensive skin lesions, relentless pruritus, sleep disturbances, and systemic complications [4].

The assessment of disease severity is critical for tailoring treatment and monitoring progress [2]. Among the tools commonly used are the SCORAD index, which integrates objective signs like erythema and edema with subjective symptoms such as itching and sleep loss, and the EASI score, which evaluates the severity and extent of skin lesions in different body regions [30, 34, 36, 42]. Other tools include the Patient-Oriented Eczema Measure (POEM), which assesses symptom burden from the patient's perspective, and the Investigator Global Assessment (IGA), a clinician-rated measure of disease severity [39, 42, 56]. Emerging biomarkers, including thymus and activation-regulated chemokine (TARC) and periostin, hold promise for improving diagnostic accuracy and monitoring treatment responses [8, 60, 67].

Vitamin D has emerged as a critical factor influencing the development and clinical course of atopic dermatitis, particularly in children [61]. Vitamin D plays a pivotal role in modulating immune responses and maintaining the integrity of the epidermal barrier [9, 33]. Its immunomodulatory effects include the promotion of regulatory T-cell activity, suppression of Th2-skewed immune responses, and enhancement of antimicrobial peptide production, which collectively mitigate inflammation and reduce the risk of infections [1, 16]. Several studies have demonstrated a correlation between low serum levels of vitamin D and increased disease severity in pediatric atopic dermatitis [13, 22, 27, 49, 53, 58]. For instance, vitamin D deficiency has been linked to heightened skin barrier dysfunction and a greater propensity for microbial colonization, particularly by Staphylococcus aureus [10, 49, 54, 74]. Supplementation with vitamin D has shown promise in reducing disease severity and improving overall skin health in children with atopic dermatitis, although the optimal dosage and long-term effects require further investigation [13, 22, 27, 29]. Given these findings, assessing and addressing vitamin D status is increasingly recognized as an integral component of comprehensive disease management [5, 24, 68].

Diagnosis of atopic dermatitis is primarily clinical, guided by established criteria such as those of Hanifin and Rajka [6, 28, 36]. These include major criteria like pruritus and chronic relapsing dermatitis, along with minor features such as xerosis, elevated serum IgE levels, and a family history of atopy [62]. Laboratory investigations, including serum IgE levels, eosinophil counts, and skin biopsies, are employed in complex cases to confirm the diagnosis or rule out differential conditions [14].

The management of atopic dermatitis involves a multimodal approach aimed at restoring the skin barrier, controlling inflammation, and alleviating symptoms [26]. Regular use of emollients and moisturizers is foundational for reducing transepidermal water loss and maintaining skin hydration [45]. Anti-inflammatory treatments, including topical corticosteroids and calcineurin inhibitors, are first-line therapies for acute flares [23, 55]. In severe cases, systemic therapies such as cyclosporine, methotrexate, and biologics like dupilumab are employed [38]. Dupilumab, an IL-4 and IL-13 inhibitor, represents a significant advance in targeting the immunopathology of atopic dermatitis [43]. Adjunctive

treatments such as antihistamines, phototherapy, and psychological support are also essential components of comprehensive care [21].

Studying severe pediatric atopic dermatitis is of paramount importance for several reasons [44]. First, the disease imposes a significant public health burden, affecting not only the physical health of children but also their emotional well-being and social development [4]. Second, gaps in our understanding of the pathogenesis, particularly in severe cases, limit the effectiveness of current therapies [43, 50]. Third, the advent of targeted biologics and other innovative treatments necessitates updated clinical guidelines and evidence-based strategies for disease management [20]. Fourth, the rising prevalence of atopic dermatitis globally underscores the need for international collaboration in research and healthcare delivery [18].

The article aims to contribute to the growing body of literature on severe pediatric atopic dermatitis by presenting a detailed clinical case analysis. Utilizing established diagnostic criteria such as those of Hanifin and Rajka, alongside severity assessment tools like the SCORAD index and laboratory findings, the study provides insights into the challenges and opportunities in managing this complex condition. By addressing current gaps in knowledge and exploring emerging treatment modalities, the article seeks to inform clinical practice and improve outcomes for children affected by severe atopic dermatitis.

Our case. A reliable method for assessing the clinical severity of patients with atopic dermatitis is crucial for evaluating the effectiveness of new treatments. The SCORAD [7, 31, 42, 46, 52] index is a widely used tool that evaluates the extent, intensity, and subjective symptoms of atopic dermatitis and has been validated for clinical and research purposes. In this regard, we assessed the severity of the disease in a pediatric patient with severe atopic dermatitis using the SCORAD system. Below, we present a clinical case and an assessment of the severity of the condition based on this method.

Patient U.U., 6 years old, was admitted to the Department of Pediatric Dermatology at the Tash-PMI Clinic on 16/11/24. At admission, complaints of redness, severe dryness of skin, peeling and rashes, itching of high intensity, anxiety and sleep disorders were reported. During pregnancy, a prenatal ultrasound scan was performed, but no abnormalities were detected. The patient has undergone outpatient treatments at his local clinic, which provided only temporary relief. Then, the patient came to the dermatology department of the Clinic of the Tashkent Pediatric Medical Institute to receive inpatient treatment. The birth was on time, naturally, at 38 weeks. The birth weight was 3150 g, height 46 cm. The Apgar score - 7/8 points. The child is sick from the first 6 months of life. The family history is burdened, the maternal grandfather had atopic dermatitis, and the mother suffers from allergic rhinitis.

Physical examination shows no abnormalities in the musculoskeletal, respiratory, cardiovascular, or abdominal systems. The patient's skin is normal, with no blistering or other skin abnormalities. There is no tenderness when palpating the ureteral points, and bladder and bowel function are normal. Overall, the patient's physical examination is unremarkable.

Upon objective examination, the patient's general condition was satisfactory, with clear consciousness and an active posture. Her body temperature was 36.6°C. The visible mucous membranes were clear, and no enlarged lymph nodes were noted. The musculoskeletal system showed no abnormalities. Respiratory examination revealed vesicular breathing at a rate of 18 respiratory movements per minute. Cardiac auscultation detected clear heart sounds with a regular rhythm, and blood pressure was recorded at 100/60 mmHg. The abdomen was of normal shape and symmetry, participated in respiration, and was soft and painless upon palpation. The liver was palpable at the edge of the right costal arch. No blistering or other skin abnormalities were observed. Pasternatsky's sign was negative, and there was no pain elicited during palpation of the ureteral points. Bladder and bowel function were normal.

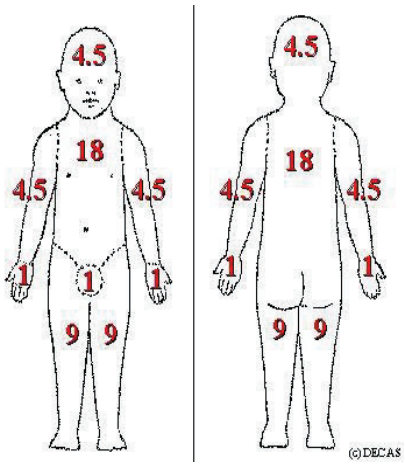
Local status: The pathological skin process is widespread, symmetrical, and subacute with an inflammatory nature. The lesions consist of moderate erythema, papules, fine scaling, lichenification, and excoriations, predominantly localized on the skin of the scalp, face and neck, the retroauricular region, trunk, flexural surfaces of the limbs, and the hands (Pic 1-4). The lesions are partially covered with serous-hemorrhagic crusts. The periorbital and perioral regions are involved in the pathological skin process. Hyperpigmentation of the periorbital skin is observed, along with the appearance of a fold under the lower eyelid (Dennie-Morgan infraorbital fold) (Pic 5). In the perioral region, signs of angular cheilitis are noted, including redness, scaling, and the formation of cracks on the skin (Pic 6). On the skin of the elbow, popliteal, and gluteal folds, as well as on the flexural surfaces of the elbow and wrist joints, the dorsal neck, hands, and feet, lichenified papules and areas of lichenification are observed, accompanied by an accentuation of the skin pattern, thickening of the folds, hyperkeratosis, and a folded appearance of the lesions (Pic 7). The skin is dry, with generalized fine scaling. White dermographism. The hair and nails remain unaffected. Subjectively, the patient experiences intense itching, restlessness, and sleep disturbances.

Before the treatment we assessed the severity of our patient using the SCORAD (SCORing Atopic Dermatitis) index developed by the European Task Force on Atopic Dermatitis in 1993. (Table 1).

Table 1.

SCORAD index

A - EXTENT:



№	Part of the body	The affected area
1.	The front surface of the head (4,5%)	4.5
2.	The back surface of the head (4,5%)	3
3.	The front surface of the body (18%)	4.5
4.	The back surface of the body (18%)	4.5
5.	Genitals (1%)	0
6.	The inner surface of the left palm (1%)	0
7.	The back of the left palm (1%)	1
8.	The inner surface of the right palm (1%)	0
9.	The back of the right palm (1%)	1
10.	The front surface of the left hand (4,5%)	2
11.	The back surface of the left hand (4,5%)	3
12.	The front surface of the right hand (4,5%)	2
13.	The back surface of the right hand (4,5%)	3
14.	The front surface of the left foot (9%)	0
15.	The back surface of the left foot (9%)	3
16.	The front surface of the right foot (9%)	0
17.	The back surface of the right foot (9%)	3
	A - SCORE	34.5

B – INTENSITY:

Criteria	Absent	Mild (1)	Moderate (2)	Severe (3)
Erythema (redness)			2	
Papulation / oedema			2	
Oozing /crusting			2	
Excoriation			2	
Lichenification			2	
Dryness			3	
B - SCORE				13

C – SUBJECTIVE SYMPTOMS:

Pruritus

0	1	2	3	4	5	6	7	8	9	10

Sleep loss

0	1	2	3	4	5	6	7	8	9	10

C - SCORE: 16
Total SCORAD score = A/5 + 7*B/2 + C = 34.5/5 + 7*13/2 + 16 = 68.4
Score out of 103:
< 25 – Mild form
> 25 - < 50 – Moderate form
> 50 – Severe form
Severity: Severe form

To establish the diagnosis in patients, we performed the assessment of the diagnostic criteria of J.M. Hanifin and G. Rajka (1980). The assessment revealed the presence of 4 major and 12 minor criteria of the atopic dermatitis in patient. (Table 2).

Table 2.

J.M. Hanifin and G. Rajka criteria

№	Name of criteria	The presence of a sign
	Major criteria:	
1.	Pruritus (itching)	+
2.	Typical morphology and distribution of skin lesions	+
3.	Chronic or chronically-relapsing dermatitis	+
4.	Personal or family history of atopy	+
	Minor criteria:	
1	Xerosis	+
2	Ichthyosis/palmar hyperlinearity/keratosis pilaris	
3	Immediate (type I) skin test reactivity	
4	Elevated serum IgE	+
5	Early age of onset	+
6	Tendency toward cutaneous infection (S.aureus and herpes simplex)	
7	Tendency toward nonspecific hand or foot dermatitis	+
8	Nipple eczema	
9	Cheillitis	+
10	Recurrent conjunctivitis	
11	Dennie-Morgan infraorbital fold	+
12	Orbital Darkening	
13	Anterior neck folds	
14	Keratoconus	+
15	Anterior subcapsular cataracts	+
16	Facial pallor or facial erythema	
17	Pytiriasis alba	
18	Itch when sweating	+
19	Intolerance to wool and lipid solvents	+
20	Perifollicular accentuation	
21	Food intolerance (total)	
22	Course influenced by environmental/emotional factors	+
23	White dermographism / delayed branch	+

A number of laboratory studies were carried out:

Complete Blood Count: Hb - 118 g/L; RBC - 3,5*10 12/L; MCH – 25.5 pg; PLT - 280*10 9/L; WBC - 4.5 *10 9/L; Lymphocytes – 3.0 10 9/L; ESR - 7 mm/hour.

Blood biochemistry: Bilirubin, total - 16.0 mkM/L; conjugated bilirubin - 3.0 mkM/L; ALT - 25 U/L; AST – 28 U/L; total protein – 64 g/l; albumin - 42 g/l; calcium - 2.24 mmol/L.

IgE level: 231 IU/ml.

Vitamin D: 25-OH D – 12.3 ng/ml.

Urinalysis: without pathologies.

Stool test: without pathologies.

Ultrasound of the liver: without pathologies.

Ultrasound of the kidneys: without pathologies.

Ophthalmology report: periorbital darkening, infraorbital fold (Dennie-Morgan symptom).

Otorhinolaryngology report: without pathologies.

Neurologist report: without pathologies.

Based on anamnesis, clinical manifestations, Hanifin and Rajka criteria, SCORAD index score and laboratory data, the final diagnosis was made: Atopic dermatitis, erythematous-squamous with lichenification clinical form, children age period, severe course.

Concomitant diagnosis: none.

According to Standards of diagnosis and treatment skin and venereal diseases in children of the Ministry of Health of the Republic of Uzbekistan (2021) the following treatment was performed:

1. Avoidance or reduction of trigger factors, educational programmes

2. Levocetirizine 5 mg/ml - 5 drops (1.25 mg) 2 times a day after meals

3. Sodium thiosulfate 30% - 5.0 ml + phys. 0.9% solution - 100.0 ml 1 time a day after meals

4. Colecalciferol 15.000 IU/ml – 4 drops (2.000 IU) 1 time a day in the morning

5. Enterosorbent (hydrolyzed lignin 355 mg, lactulose 120 mg) – 1 tab 3 times a day before meals

6. Aevit - 1 caps 2 times a day.

Topical therapy:

7. Methylprednisolone aceponate 0.1% cream + Alisa cream 2 times a day.

8. Emolient cream (glycerol, vaseline – paraffin) 2 times a day.

As a result of the treatment on the part of the skin-pathological process, positive dynamics was observed in the form of a decrease of SCORAD score (from severe course – 68.4 points to mild – 22), normalization of IgE level (from 231 IU/ml to 32.0 IU/ml), increase of Vitamin D rate (from 25-OH D – 12.3 ng/ml to 25-OH D – 27.9 ng/ml) a disappearance of skin lesions, some diagnostic criteria and significant improvement (more than 75% of damaged area) of the skin-pathological process (Pic 8-11).

Discharged from the hospital after 10 days with significant clinical improvement.

Conclusions. The management of severe pediatric atopic dermatitis (AD) requires a multifaceted approach tailored to the individual patient, considering the chronic and relapsing nature of the disease. This case report highlights the complexity of diagnosing and treating severe pediatric AD by integrating anamnesis, clinical manifestations, Hanifin and Rajka criteria, the SCORAD index, and laboratory investigations. The clinical case described underscores the importance of comprehensive evaluation to confirm the diagnosis and assess disease severity, as well as to guide effective treatment strategies.

The application of the Hanifin and Rajka criteria provided a structured framework for diagnosis, ensuring no key clinical feature was overlooked. The SCORAD index served as a valuable tool for objectively quantifying disease severity and monitoring treatment efficacy over time. Laboratory investigations further aided in identifying potential comorbidities, triggers, and systemic involvement, enabling personalized therapeutic interventions.

The successful management of severe pediatric AD in this case emphasizes the necessity of a multidisciplinary approach that combines pharmacological therapies, including systemic treatments when indicated, with non-pharmacological measures such as skincare optimization, trigger factors avoidance and educational programmes. Close follow-up and regular reassessment are essential to address the dynamic nature of the disease and ensure sustained improvement in clinical outcomes and quality of life.

This case reinforces the importance of integrating clinical expertise with evidence-based tools to enhance the early recognition, accurate diagnosis, and effective management of severe pediatric AD. Ongoing research and clinical efforts are vital to further optimizing therapeutic strategies and improving the prognosis for children affected by this debilitating condition.

Ethics approval and consent to participate. The study was approved by the Local Ethical Council of the Tashkent Pediatric Medical Institute (Protocol of ethical review №8 from 31.01.2024). Before starting the study, an explanation of the purpose and methods of the study was done, and then voluntary consent was obtained from each respondent.

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Conflict of interest. The authors declare no conflict of interest.

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Pic. 1



Pic. 2



Pic. 3



Pic. 4



Pic. 5



Pic. 6



Pic. 7



Pic. 8



Pic. 9



Pic. 10



Pic. 11

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