

Sleep Quality and Quality of Life Assessment in Children Aged 6 to 12 Years with Atopic Dermatitis

Saba Ekta¹, Rizwana Barkat², P. P. Pravakar³, Bankey Behari Singh⁴

¹Senior Resident, Department of Paediatrics, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India

²Senior Resident, Department of Skin & Venereal Disease, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India

³Assistant Professor & HOD, Department of Skin & Venereal Disease, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India

⁴Associate Professor & HOD, Department of Paediatrics, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India

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Corresponding Author: Dr. Saba Ekta

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Abstract:

Background: Atopic Dermatitis (AD) is related with significant pruritus and skin lesions, which substantially impair sleep quality and overall quality-of-life (QoL). The study evaluated the sleep quality and QoL in kids aged 6 to 12 years diagnosed with AD and to determine the association between disease severity and these outcomes.

Methods: A total of 100 children detected with AD based on the Hanifin and Rajka criteria were included. Data collection involved the SCORing Atopic Dermatitis (SCORAD) index for disease severity, the Children's Sleep Habits Questionnaire (CSHQ) for sleep quality, and the Children's Dermatology Life Quality Index (CDLQI) for QoL. Statistical analysis was performed using SPSS, with associations evaluated through Chi-square tests, ANOVA, and linear regression.

Results: The study found that 55% of children had moderate AD, 25% had mild AD, and 20% had severe AD. Sleep disturbances were prevalent, with 30% of children showing abnormal sleep quality. QoL assessments revealed that 35% of children experienced moderate impairment, while 15% and 10% reported very large and extremely large effects, respectively. Significant associations were found between AD severity and both sleep quality ($p < 0.001$) and QoL ($p < 0.001$). Higher SCORAD scores were strongly correlated with poorer sleep quality and greater QoL impairment.

Conclusion: The results show how significantly AD affects children's sleep and QoL, especially in those with moderate to severe forms of the condition. The study emphasises the necessity of all-encompassing management plans that take into account the psychological and physical components of AD.

Recommendation: Future studies should focus on longitudinal designs to estimate the long-term impacts of AD on sleep and quality of life. Furthermore, it is advised to conduct intervention studies targeted at enhancing sleep hygiene and offering psychological support to kids with AD.

Keywords: Atopic Dermatitis, Sleep Quality, Quality of Life, Pediatric Dermatology, SCORAD Index.

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Introduction

Atopic Dermatitis (AD), generally known as eczema, is a chronic inflammatory skin condition that affects a considerable portion of the pediatric population, with prevalence rates ranging from 12% to 30% in children worldwide. This prevalence is steadily increasing, making AD a growing public health concern [1]. AD is characterized by intense pruritus, erythema, and skin lesions, which can severely impact the quality of life (QoL) of affected individuals. Recent studies have emphasized the multidimensional burden of AD, highlighting its profound impact on sleep quality and overall QoL in children [2].

Sleep disturbances are a common and significant issue for children with AD. Up to 60% of pediatric AD patients experience sleep problems, which are primarily attributed to nocturnal pruritus and the consequent scratching behavior [3]. These disturbances not only affect the child's sleep architecture but also have wider implications, including impaired neurocognitive function, behavioral issues, and decreased daytime functioning. Moreover, the cyclical nature of pruritus and sleep disruption creates a vicious cycle, exacerbating the overall burden of the disease.

QoL in children with AD is significantly compromised due to both the physical symptoms of the disease and its psychological and social ramifications. The constant itching and visible skin lesions can lead to social stigmatization and emotional distress, further impacting the child's self-esteem and mental health. Instruments such as the Children's Dermatology Life Quality Index (CDLQI) have been widely used to quantify the impact of AD on QoL, revealing substantial impairments in daily activities, school performance, and interpersonal relationships [4].

Recent advancements in the understanding of AD have shed light on the complex interplay between genetic, immunological, and environmental factors in its pathogenesis. This has paved the way for novel therapeutic approaches, including targeted biologics and systemic therapies that aim to modulate the underlying inflammatory pathways [5]. For instance, the use of Janus kinase (JAK) inhibitors like upadacitinib has shown promise in reducing the severity of AD symptoms and improving patient-reported outcomes, including sleep quality and QoL.

The study evaluated the sleep quality and QoL in kids aged 6 to 12 years diagnosed with AD and to determine the association between disease severity and these outcomes.

Methodology

Study Design: A hospital-based, cross-sectional study.

Study Setting: The study took place at Anugrah Narayan Magadh Medical College and Hospital, Bihar, India, spanning for 2 years (2020-2023).

Participants: The study included 100 children diagnosed with AD.

Inclusion Criteria

- Children diagnosed with AD based on the Hanifin and Rajka diagnostic criteria
- Age range of 6–12 years

Exclusion Criteria

- Presence of other medical conditions requiring treatment
- Current psychiatric illness under treatment
- Documented sleep disorders
- Parents unable to read and understand the questionnaire

Bias: Standardized tools and validated questionnaires were employed to minimize bias. Translations of questionnaires were meticulously back-translated to ensure their accuracy.

Variables: Variables included demographic information, history of present illness, personal history, past medical history, clinical examination findings, AD severity, sleep quality, Quality of Life.

Data Collection: A pre-made proforma was used to collect data, which included demographics, a thorough history of the current illness, personal history, past medical history, and results of the clinical examination. The degree of AD was assessed using the SCORAD index. To assess sleep quality and QOL, parents completed the Children's Sleep Habits Questionnaire (CSHQ) and the CDLQI.

Procedure

1. Assessment of Atopic Dermatitis Severity: The SCORAD index, combining three subscores, was used:

- **Extent Score:** Calculated using the "Rule of 9" for body surface area.

- **Intensity Score:** The evaluation is conducted using six clinical findings for atopic dermatitis: erythema, oozing/crusting, edema/papulation, lichenification, excoriation, and dryness. These findings are scored on a scale of 0 to 3.

- **Pruritus and Sleep Loss Scores:** Assessed using a Visual Analog Scale of 0–10, considering the average extent over the past three days or nights. The final SCORAD is calculated as: $SCORAD = A/5 + 7(B/2) + C$.

2. Children's Sleep Habits Questionnaire: A 33-item parent-reported questionnaire assessing eight sleep domains, scored on a three-point frequency scale.

3. Children's Dermatology Life Quality Index: A 10-question instrument evaluating the impact of skin disease on QOL over the past week. Each question is scored from 0 to 3, with a maximum total score of 30.

Statistical Analysis: The data were analysed using SPSS version 20.0. The qualitative data were expressed as frequencies or percentages, while the quantitative data were reported as mean \pm standard deviation. The Chi-square test evaluated the relationships between categorical variables. ANOVA examined the associations between categorical and numerical variables. The connection between clinical factors and outcome indicators was investigated using linear regression. A p-value below 0.05 was deemed statistically significant for all analyses.

Ethical Considerations: The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

Result

Table 1 presents the demographic attributes of the study participants, showing the distribution by

gender and age groups. The majority were male (52%), and the age distribution was relatively even across the 6-12 years range.

Table 1: Demographic Characteristics

Demographic Variable	Percentage (%)
Gender	
Male	52%
Female	48%
Age group (years)	
6-8	40%
9-10	35%
11-12	25%

Table 2 summarizes the severity of AD among participants using the SCORAD index. The majority of children had moderate AD (55%).

Table 2: Severity of Atopic Dermatitis (SCORAD Scores)

SCORAD Score	Percentage (%)
Mild (0–25)	25%
Moderate (26–50)	55%
Severe (>50)	20%

Table 3 details the sleep quality of the children as measured by the CSHQ. This table shows the distribution of CSHQ scores, indicating the proportion of children with normal, borderline, and abnormal sleep quality.

Table 3: Sleep Quality Assessment (CSHQ Scores)

CSHQ Total Score	Percentage (%)
Normal (<41)	30%
Borderline (41-50)	40%
Abnormal (>50)	30%

Table 4 presents the impact of AD on the QoL of children, as measured by the CDLQI. This table categorizes the impact on QoL from no effect to extremely large effect based on CDLQI scores.

Table 4: Quality of Life Assessment (CDLQI Scores)

CDLQI Total Score	Percentage (%)
No effect (0–1)	10%
Small effect (2–6)	30%
Moderate effect (7–12)	35%
Very large effect (13–18)	15%
Extremely large effect (19–30)	10%

Table 5 shows the relation between AD severity and sleep quality. There is a significant relationship, with $p < 0.05$ indicating statistical significance. This table illustrates the significant correlation between AD severity and sleep quality, highlighting that more severe AD correlates with poorer sleep.

Table 5: Association Between SCORAD Severity and Sleep Quality (CSHQ Scores)

SCORAD Severity	Normal Sleep	Borderline Sleep	Abnormal Sleep	p-value
Mild	20	4	1	<0.001
Moderate	10	30	15	<0.001
Severe	0	6	14	<0.001

Table 6 demonstrates the substantial correlation between AD severity and QoL, with higher SCORAD scores correlating with greater impairment in quality of life.

Table 6: Association Between SCORAD Severity and Quality of Life (CDLQI Scores)

SCORAD Severity	Mild	Moderate	Severe
No Effect	10	0	0
Small Effect	10	20	0
Moderate Effect	5	20	10
Very Large Effect	0	10	5
Extremely Large Effect	0	5	5
p-value	<0.001	<0.001	<0.001

Table 7 provides the results of linear regression analysis, showing the correlation between SCORAD scores and both CSHQ and CDLQI scores. This table indicates strong positive correlations between AD severity and both sleep quality and quality of life, with higher severity leading to poorer outcomes in both measures.

Table 7: Linear Regression Analysis

Variable	Coefficient	Standard Error	t-value	p-value
CSHQ Score	0.65	0.10	6.50	<0.001
CDLQI Score	0.75	0.08	9.38	<0.001

Discussion

The study included 100 children diagnosed with AD aged between 6 and 12 years. The gender distribution was fairly balanced, with 52% male and 48% female participants. The age groups were also well-represented, with 40% in the 6–8 years range, 35% in the 9–10 years range, and 25% in the 11–12 years range. This demographic distribution ensures a comprehensive assessment across different age groups and both genders.

The severity of AD was evaluated using the SCORAD index, revealing that the majority of the children had moderate AD (55%), followed by mild (25%) and severe (20%) cases. This distribution highlights that more than half of the children experienced a moderate level of AD severity, indicating a substantial impact on their daily lives and necessitating appropriate management strategies.

The CSHQ was used to calculate sleep quality among the participants. The results indicated that 30% of the children had normal sleep quality, 40% had borderline sleep quality, and 30% had abnormal sleep quality. These findings suggest that a significant proportion of children with AD experience sleep disturbances, which can adversely affect their overall health and well-being.

The impact of AD on the QoL was measured using the CDLQI. The results showed that 10% of the children reported no effect on their QoL, 30% reported a small effect, 35% reported a moderate effect, 15% reported a very large effect, and 10% reported an extremely large effect. This distribution underscores the significant burden that AD places on children, affecting various aspects of their daily lives and emotional well-being.

The association between AD severity and sleep quality was statistically significant, with higher SCORAD scores correlating with poorer sleep quality ($p < 0.001$). Children with severe AD were more likely to have abnormal sleep quality compared to those with mild or moderate AD. Similarly, a substantial association was found between AD severity and QoL, with higher SCORAD scores linked to greater impairment in QoL ($p < 0.001$). Children with severe AD reported very large to extremely large effects on their quality of life.

Linear regression analysis further confirmed these associations, showing strong positive correlations between SCORAD scores and both CSHQ and CDLQI scores. Higher severity of AD was correlated with worse sleep quality (coefficient = 0.65, $p < 0.001$) and greater impact on quality of life (coefficient = 0.75, $p < 0.001$). These results indicate that as the severity of AD raises, the negative impact on both sleep quality and QoL becomes more pronounced.

The findings from this study highlight the significant challenges faced by children with AD, specifically those with moderate to severe forms of the condition. The strong associations between AD severity, sleep disturbances, and impaired quality of life emphasize the need for comprehensive management strategies that address not only the physical symptoms of AD but also its psychological and social impacts. Interventions aimed at improving sleep quality and mitigating the overall burden of AD could lead to better health outcomes and enhanced quality of life for affected children. These results underscore the importance of early and effective treatment plans tailored to the individual needs of children with AD.

Recent studies have explored the impact of AD on sleep quality and life quality in children aged 6 to 12 years. A study comparing children with moderate-to-severe AD to healthy controls found that children with AD experienced significantly more wake after sleep onset (WASO) and lower sleep efficiency. The severity of AD was strongly correlated with sleep disturbances [6].

A study tested the reliability of PROMIS Pediatric Sleep Measures in children with AD and found high reliability and significant correlation with disease severity and QoL. The study proposed an algorithm for screening and managing sleep disturbances in pediatric AD patients [7]. A study assessing the impact of AD on the life quality of children aged 1-6 years found that children with AD had significantly lower QoL, with itching, discomfort, and sleep disorders being the major factors affecting their daily lives [8].

A cross-sectional study found that younger children with AD had a more impaired QoL compared to older children. The study emphasized the need for age-specific treatment and counseling [9]. Analysis of 68 pediatrics with AD showed that the Eczema

Area and Severity Index (EASI) scores correlated with various QoL measures and parental assessments of severity, itch, and sleep loss. The study highlighted the strong impact of eczema severity on sleep and overall QoL [10].

A prospective study evaluated sleep quality in children with AD during flares and after intensified treatment, finding that despite clinical improvements, objective sleep quality measures did not notably change post-treatment. Parental perception improved, highlighting a discrepancy between perceived and actual sleep quality [11]. A study found that children with less severe AD were more likely to see improvements in their QoL over time. Lower initial SCORAD scores were associated with better QoL at follow-up, suggesting the importance of early and effective management [12].

Conclusion

The study found significant associations between the severity of AD and both sleep quality and QoL in children. Higher SCORAD scores were correlated with poorer sleep and greater impairment in quality of life, highlighting the need for comprehensive management strategies for children with AD.

Limitations: The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: Future studies should focus on longitudinal designs to estimate the long-term impacts of AD on sleep and quality of life. Furthermore, it is advised to conduct intervention studies targeted at enhancing sleep hygiene and offering psychological support to kids with AD.

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List of abbreviations:

AD: Atopic Dermatitis.

QoL: Quality of Life.

SCORAD: SCORing Atopic Dermatitis.

CSHQ: Children's Sleep Habits Questionnaire.

CDLQI: Children's Dermatology Life Quality Index.

WASO: Wake After Sleep Onset.

EASI: Eczema Area and Severity Index.

JAK: Janus Kinase.

PROMIS: Patient-Reported Outcomes Measurement Information System.

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References

1. Kisieliene I, Mainelis A, Rudzeviciene O, Bylaite-Bucinskiene M, Wollenberg A. The Burden of Pediatric Atopic Dermatitis: Quality of Life of Patients and Their Families. *Journal of Clinical Medicine*. 2024 Mar 15;13(6):1700.
2. Chang YS, Chiang BL. Mechanism of sleep disturbance in children with atopic dermatitis and the role of the circadian rhythm and melatonin. *International journal of molecular sciences*. 2016 Mar 29;17(4):462.
3. Spergel JM, Paller AS. Atopic dermatitis and the atopic march. *Journal of Allergy and Clinical Immunology*. 2003 Dec 1; 112(6): S118-27.
4. Fishbein AB, Silverberg JI, Wilson EJ, Ong PY. Update on atopic dermatitis: diagnosis, severity assessment, and treatment selection. *The Journal of Allergy and Clinical Immunology: In Practice*. 2020 Jan 1;8(1):91-101.
5. Rangel RA, Seabra CR, Ferrarez CE, Soares JL, Choi M, Cotta RG, Figueiredo AA, Bessa Jr JD, Murillo B J. Quality of life in enuretic children. *International braz j urol*. 2021 Mar 29;47(3):535-41.
6. Fishbein A, Mueller K, Kruse L, Boor P, Sheldon S, Zee P, et al. Sleep disturbance in children with moderate/severe atopic dermatitis: A case-control study. *J Am Acad Dermatol*. 2018;78:336-341.
7. Fishbein A, Lor J, Penedo F, Forrest C, Griffith J, Paller A. Patient-Reported Outcomes for Measuring Sleep Disturbance in Pediatric Atopic Dermatitis: cross sectional study of PROMIS Pediatric Sleep Measures and Actigraphy. *J Am Acad Dermatol*. 2020.
8. Shariati M, Kalmarzi R, Hasani S, Goodarzi E, Hasanzadeh J, Ataee P, et al. The impact Atopic dermatitis on the life quality of childrens 1-6 year. *Int J Pediatr*. 2018;6:7003-7011.
9. Đurović MR, Janković J, Tomić Spirić V, Relić M, Sojević Timotijević Z, Ćirković A, et al. Does age influence the quality of life in children with atopic dermatitis? *PLoS ONE*. 2019;14.
10. Sambhi P, Warburton K, Montgomery R, Thompson M, Majeethia P, Clark S. PA26 Paediatric atopic dermatitis: correlation between Eczema Area Severity Index, quality of life and visual analogue scale severity scores reported by children and their parents, and in different age groups. *Br J Dermatol*. 2023.
11. Kahn D, Iturriaga C, Bertrán K, Fernández I, Pérez-Mateluna G, Borzutzky A, et al. Sleep quality in children with atopic dermatitis during flares and after treatment. *Sleep Sci*. 2020; 13:172-175.

12. Gazibara T, Reljić V, Janković S, Perić J, Nikolic M, Maksimovic N. Quality of life in children with atopic dermatitis: A one-year prospective cohort study. *Indian J Dermatol Venereol Leprol.* 2021;1-5.