

## Pediatric Scabies: Association with Sleep Disorders, Anxiety, Depression, and Impaired Quality of Life

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**ABSTRACT Introduction:** Scabies is a contagious, infectious skin disease that is observed worldwide. Scabies affects individuals of all ages, although it exhibits significant differences between childhood and adulthood. While the number of publications documenting the co-occurrence of anxiety, depression, and impaired quality of life (QoL) in adult patients with scabies is increasing, the presence of these issues in pediatric patients remains a topic of curiosity.

**Objectives:** In this study, we aimed to investigate the presence of sleep disorders, QoL, anxiety, and depression in children with scabies.

**Methods:** In this analytical case-control study, 68 scabies patients and 69 healthy controls aged 6–17 years were included.

**Results:** In patients with scabies, sleep quality was significantly poorer compared to the control group ( $P<0.001$ ). There was no difference between the two groups in terms of RCADS (Revised Children's Anxiety and Depression Scale) and total anxiety and depression scores. In the control group, the number of individuals with upper and upper-middle socioeconomic levels was higher ( $P=0.036$ ). A moderate correlation was found between impairment in dermatology-related QoL and deterioration in sleep quality in patients with scabies ( $r=0.606$ ,  $P<0.001$ ).

**Conclusion:** This study found that sleep disorders are common among children diagnosed with scabies, negatively impacting their QoL compared to healthy controls. We believe that obtaining information about both night and day sleep patterns during dermatological follow-ups of children diagnosed with scabies and providing recommendations on sleep hygiene as part of the treatment process may have positive effects on a child's QoL.

## Introduction

Scabies is a contagious, infectious skin disease that is common worldwide and is caused by the mite *Sarcoptes scabiei var hominis* (*S. scabiei*). Scabies observed in humans can affect all races and social classes in every climatic condition [1]. Scabies, which affects individuals of all ages, is most commonly seen in infants and children and differs from adults in many ways during childhood [2]. Nocturnal pruritus, frequently observed in pediatric patients diagnosed with scabies, significantly affects children's sleep patterns and quality, with the quality and duration of sleep influencing the child's daily performance, emotional state, and mental health. Children who do not get adequate sleep may experience restlessness, irritability, and difficulty coping with their emotions [3]. Prolonged sleep disturbances can increase the risk of depression and anxiety disorders in children, adversely impacting their QoL [4]. Therefore, whether anxiety and depression accompany psychiatric disorders in pediatric scabies patients is a subject of interest.

## Objectives

In this study, we aimed to investigate sleep disturbances, QoL, presence of anxiety disorders, and depression in children diagnosed with scabies.

## Methods

### Sample

This analytical case-control study included a total of 68 scabies patients and 69 healthy controls aged 6–17 years who presented to our hospital (Dermatology and Family Medicine clinics) between June 2023 and March 2024. Informed consent was obtained from all participants. This study was conducted in accordance with the Helsinki Declaration. Prior to commencement, the study protocol was approved by the Clinical Research Ethics Committee of Research Hospital (approval number: 19.06.2023/07, date: 19.06.2023). G\*Power (V3.1) software (Informer Technologies, Inc., Los Angeles, USA) was used to calculate the required sample size. Using data from a previous study, the effect size in sample size calculation was found to be 0.44 [5]. Based on a power of 80% and a 5% level of significance, the total sample size required was calculated as 65.

### Implementation

The diagnosis of scabies was based on the 2020 International Alliance for the Control of Scabies (IACS) Consensus Criteria [6]. Individuals under 6 years old (non-literate) and over 17 years old, those with chronic systemic diseases, other pruritic dermatoses, psychiatric disorders, and using

any mood-altering drugs were excluded from the study. All participants completed a sociodemographic data form and socioeconomic status index questionnaire. Parents of participants completed the DSM-5 Level 2- Sleep Disturbance Scale, and participants completed the Revised Children's Anxiety and Depression Scale. Additionally, children diagnosed with scabies were asked to complete the Children's Dermatology Life Quality Index (CDLQI).

### Data Collection Instruments

#### Clinical and Dermatoscopic Evaluation

Patients underwent a full-body skin examination, and suspected areas for parasites were imaged using hand dermatoscopy (DermLite DL4, x10; in polarized and non-polarized modes). According to the 2020 IACS Consensus Criteria, patients diagnosed with "confirmed scabies" were included if dermoscopically at least one mite burrow was visualized. Additionally, during dermatological examination, lesion type and locations were recorded. The topographical distribution of lesions and affected skin surface were categorized into 14 regions: interdigital spaces, legs, hands, feet, wrists, abdomen, arms, chest, elbows, breasts and areola, axilla, back, genital/groin, and buttocks. Based on the number of areas with lesions, patients were classified into categories: 1–3 regions, 4–6 regions, 7–9 regions, and  $\geq 10$  regions [6].

#### Sociodemographic Data Form

This form, prepared by the researchers, included information regarding the participants and their family members. It recorded demographic details such as age, sex, education level, settlement, number of siblings, ages, sexes, and education levels of other family members, duration between disease onset and diagnosis, and history of scabies treatment.

#### Socioeconomic Status (SES) Index

This index is classified based on four primary variables, including the community's location and type of housing, average education level of household members, employment status and positions of household members, and assets owned by the household. Scores on this index range from a minimum of 4 to a maximum of 20 points. According to these scores, the community is categorized into five socioeconomic levels labeled from highest to lowest: A (upper), B (upper-middle), C1 (middle), C2 (lower-middle), and D (lower), based on this classification [7].

#### Children's Dermatology Quality of Life Index (CDLQI)

This scale consists of ten questions that can be directed towards children aged 4–16 years. It evaluates the previous week using a 4-point Likert scale. Higher scores indicate

more severe impairment in QoL. We used the Turkish version of the scale, the validity and reliability of which was determined by Didar Balci et al. [8]. The total score determines the extent to which QoL is affected: 0–1 points: no effect, 2–6 points: small effect, 7–12 points: moderate effect, 13–18 points: large effect, 19–30 points: very large effect [8].

### DSM-5 Level 2 - Sleep Disturbance Scale

This form, filled out by parents/legal guardians, evaluates specific sleep disturbances in children and adolescents aged 6–17 years using the 8-item PROMIS (Patient-Reported Outcomes Measurement Information System) Short Form for Sleep Disturbances. We used the Turkish version of the scale, the validity and reliability of which was confirmed by Erkurhan et al. [9]. Each item asks the parent/legal guardian to rate the severity of their child's sleep disturbance over the previous 7 days on a 5-point scale (1=never; 2=rarely; 3=sometimes; 4=often; and 5=always). The total score ranges from 8 to 40, with higher scores indicating more severe sleep disturbances [9].

### Revised Children's Anxiety and Depression Scale (RCADS)

Developed to assess depression and anxiety in children and adolescents based on DSM-IV diagnostic criteria, the RCADS consists of 47 items. The RCADS Child Form uses a 4-point Likert-type scale where individuals rate the frequency of symptoms and behaviors related to anxiety and depression (never=0, sometimes=1, often=2, always=3). In addition to the total anxiety score (sum of five anxiety subscales) and the total anxiety-depression score (overall sum of all subscales), it includes six subscales: separation anxiety, generalized anxiety, panic, social phobia, obsession/compulsion, and depression. The Turkish validity and reliability study was conducted by Görmez et al. [10].

### Statistical Analysis

The data were transferred to computer environment and analyzed using IBM SPSS (version 21.0) package program. Descriptive statistics in the study are presented as mean  $\pm$  standard deviation or median, depending on the normal distribution of the data. Pearson's chi-squared test or Fisher's exact test was used to compare categorical variables. Shapiro-Wilk Test was used to assess the normal distribution of variables. Accordingly, for variables where it was determined that they did not conform to normal distribution and showed statistical significance in comparisons between two independent groups, the Mann-Whitney U Test was used. For variables where it was confirmed that variables conformed to normal distribution, the Student's t test was used to compare two independent groups. Skewness-Kurtosis normality distribution test was used to determine whether

the measurements were suitable for normal distribution. According to Tabachnick and Fidell (2013), Skewness-Kurtosis values should be between +1.5 and -1.5. Statistical significance level was set at  $P<0.05$ .

## Results

The study included a total of 68 scabies patients and 69 control individuals. Among the patient group, 36 (52.9%) were female and 32 (47.1%) were male, while in the control group, 37 (53.6%) were female and 32 (46.4%) were male. A total of 137 children were included. The mean age was found to be  $12.16 \pm 3.34$  years (range 6–17 years) in the patient group and  $12.62 \pm 3.14$  years (range 7–17 years) in the control group. Demographic data, socioeconomic levels, sleep disorder scale scores, and RCADS scores for anxiety and depression are shown in Table 1. There was no statistically significant difference between the two groups in terms of age, sex, or RCADS total anxiety and depression scores; there was a statistical difference in socioeconomic level between the patients and the control group ( $P=0.036$ ). Accordingly, the rate of participants at upper (A) and upper-middle (B) socioeconomic levels was higher in the control group. According to the sleep disorders scale score, a statistically significant deterioration in sleep quality was observed in the scabies patient group ( $P<0.001$ ). Clinical characteristics of scabies patients are presented in Table 2. The mean duration of disease among scabies-infected children was  $9.49 \pm 10.27$  weeks. Regional involvement evaluation indicated that the majority (55.9%) had involvement in 4–6 body regions ( $N=38$ ). It was noted that 27 patients (39.7%) received one type, and 21 patients (30.9%) received two types of antiparasitic treatments. Eighteen patients (26.5%) did not receive any antiparasitic treatment for scabies. Data analyses of patients' QoL and psychological tests are presented in Table 2. No significant relationships were found between disease duration, socioeconomic status, and Total Anxiety & Depression score, CDLQI, and sleep quality ( $P>0.05$ ) (Table 3). A positive correlation of low-to-very low intensity was observed between the number of antiparasitic treatments received by patients and CDLQI and Sleep Disorders Scale scores, respectively (rs: 0.334,  $P=0.005$ ; rs: 0.256,  $P=0.035$ ) (Table 3). A moderate positive correlation was found between CDLQI score and Sleep Disorders Scale ( $r=0.606$ ,  $P<0.001$ ), and a low positive correlation was observed between Total Anxiety & Depression score and CDLQI score ( $r=0.311$ ,  $P=0.010$ ) (Table 3). A weak positive correlation was found between Sleep Disorders Scale and Total Anxiety & Depression score ( $r=0.467$ ,  $P<0.001$ ). When examining the classification of CDLQI in scabies patients, it was observed that 36.8% of patients experienced a very large effect on their QoL (Table 4).

**Table 1. Demographic Features and Comparisons of Socioeconomic Status Index, Sleep Disorders Scale, RCADS (total anxiety and Total Anxiety & Depression Scores) Between Patients and Controls.**

	Children Diagnosed With Scabies (N=68)	Controls (N=69)	p-value
Age (years), mean ± SD	12.16±3.34	12.62±3.14	0.406 <sup>t</sup>
Sex, N (%)			
Female	36 (52.9%)	37 (53.6%)	0.936 <sup>X<sup>2</sup></sup>
Male	32 (47.1%)	32 (46.4%)	
SES index, N (%)			
A (upper socioeconomic level)	0 (0%) <sup>a</sup>	5 (7.2%) <sup>b</sup>	0.036 <sup>f</sup>
B (Upper-middle socioeconomic level)	2 (2.9%) <sup>a</sup>	8 (11.6%) <sup>b</sup>	
C1 (middle socioeconomic level)	15 (22.1%) <sup>a</sup>	16 (23.2%) <sup>a</sup>	
C2 (lower-middle socioeconomic level)	45 (66.2%) <sup>a</sup>	36 (52.2%) <sup>a</sup>	
D (lower socioeconomic level)	6 (8.8%) <sup>a</sup>	4 (5.8%) <sup>a</sup>	
Sleep Disorders Scale, mean± SD	22.86±7.87	16.86±6.20	<0.001 <sup>t</sup>
Total Anxiety Score, mean± SD	33.68±20.83	33.70±19.29	0.996 <sup>t</sup>
Total Anxiety & Depression Score, mean± SD	42.60±26.69	42.20±24.63	0.927 <sup>t</sup>

Abbreviations: t: Independent Sample t-test; X<sup>2</sup>: Pearson's chi-squared test; f: Fisher-Freeman-Halton exact test, a,b: Different letters indicate statistically significant differences between groups. SD = standard deviation; SES = socioeconomic status.

**Table 2. Disease-Related Information, Psychological Tests, and Life Qualities Among Scabies Patients.**

	Children Diagnosed With Scabies (N=68)	
	Mean±SD	Median (Q1-Q3)
Duration of scabies(weeks)	9.49±10.27	5.5 (4.0-13.5)
CDLQI	14.60±7.11	13.5 (10.0-20.0)
RCADS-Child		
Separation Anxiety	5.65±4.27	4.5 (3.0-8.0)
Generalized Anxiety	6.71±4.26	6.0 (3.0-9.0)
Panic	6.65±6.10	4.0 (2.0-11.0)
Social phobia	9.10±5.89	8.5 (4.25-13.75)
Obsessions/compulsion	5.62±4.18	5.0 (2.0-8.0)
Depression	8.93±6.69	8.0 (4.0-13.0)
Total anxiety scores	33.68±20.83	30.5 (16.25-48.0)
Total anxiety & depression scores	42.60±26.69	38.5 (19.0-61.25)
	n(%)	
Clinical localization		
1-3 region	5 (7,4%)	
4-6 region	38 (55,9%)	
7-9 region	16 (23,5%)	
≥10 region	9 (13,2%)	
Treatment number		
None	18 (26.5%)	
1 type of treatment	27 (39.7%)	
2 types of treatment	21 (30.9%)	
3 types of treatment	1 (1.5%)	
4 types of treatment	1 (1.5%)	

Abbreviations: CDLQI = Children's Dermatology Life Quality Index; RCADS = Revised Child Anxiety & Depression Scale; SD = standard deviation.

**Table 3. Correlation of Scabies Patients' Data With Total Anxiety & Depression Scores, CDLQI and Sleep Disorders Scale (N=68).**

	Total Anxiety & Depression	CDLQI	Sleep Disorders Scale
Duration of scabies, weeks			
rs	0.094	0.153	0.082
P	0.444	0.212	0.505
Treatment number			
rs	-0.003	0.334	0.256
P	0.980	0.005	0.035
SES			
rs	0.093	0.115	0.093
P	0.451	0.351	0.450
CDLQI			
r	0.311	1	0.606
P	0.010		<0.001
Sleep disorders scale			
r	0.467	0.606	1
P	<0.001	<0.001	

Abbreviations: r: Pearson correlation; rs: Spearman correlation. CDLQI = Children's Dermatology Life Quality Index; SES = socioeconomic status

**Table 4. Banding of the Children's Dermatology Life Quality Index (CDLQI) with the Scores for Patients With Scabies.**

Effect Severity	Score	N (%)
No effect	0-1	2 (2.9%)
Small effect	2-6	8 (11.8%)
Moderate effect	7-12	20 (29.4%)
Large effect	13-18	13 (19.1%)

## Discussion

This study found that children diagnosed with scabies experience disrupted sleep and lower QoL compared to the control group. However, there was no significant difference observed between the children diagnosed with scabies and the control group in terms of the frequency of depression and anxiety disorders. This case-control study found a significant difference in socioeconomic status between the two groups ( $P<0.05$ ), with 66.2% of children diagnosed with scabies classified as C2 level and 22.1% as C1 level. None of the families of children with scabies belonged to the A level. Reviewing the literature, scabies is recognized as a significant public health problem in low and middle-income countries. The disease is endemic in many economically poor communities, with prevalence rates exceeding 20%. The contagiousness of the disease is influenced by social behaviors, migration, access to health services, crowded environments, housing, and hygiene conditions [11]. The lower socioeconomic status of scabies patients we found in this study supports the literature. The most important symptom of scabies is intense pruritus,

especially at night [12]. This itching is believed to result from a delayed hypersensitivity reaction to products from the *S.scabiei* [13]. In a study, itching at night was found to be a concurrent symptom in approximately 90% of infants and about half of adolescents diagnosed with scabies. Itching can lead to sleep disturbances and secondary bacterial infections due to scratching [1]. In this study, we observed that sleep disturbances were more prevalent in children diagnosed with scabies ( $P<0.05$ ), based on the data we evaluated. Additionally, we found that dermatological QoL was lower in scabies-diagnosed children ( $P<0.05$ ). Similarly, Worth et al. found that scabies significantly impacts the QoL of adults and children living in urban slums and impoverished conditions. Furthermore, the nocturnal itching characteristic of the parasite, exacerbated by movement and warmth of the skin, can disrupt sleep patterns [14]. Disturbances in sleep patterns during the disease period may negatively affect children's QoL. While the existing literature acknowledges the impact of itching on sleep quality, this study contributes significantly to the literature by assessing and demonstrating this relationship using scales and exploring its impact on QoL. Although it is known that scabies negatively impacts children's QoL and sleep, there is limited information regarding its effects on mental health during childhood. Studies in adults diagnosed with scabies have shown that the negative impact on QoL is associated with higher scores of depression and anxiety [15]. In these adult studies, the median duration of disease was nine weeks, whereas in this study, it was five weeks. The shorter duration of disease in the study might suggest that patients had not yet developed anxiety and depression disorders. Possibly, as the duration of the disease becomes longer and more chronic, the intense stress it would create could further contribute to

the development of psychiatric disorders. Similarly, another adult study found higher levels of anxiety, depression, and impaired QoL in scabies patients compared to the control group, with scabies patients tending to have more moderate-to-severe depression [16]. Additionally, another study conducted by Karadoğan et al. in adult scabies patients showed that the more QoL deteriorates, the higher the levels of depression, anxiety and stress [17]. However, what is known regarding anxiety and depression levels in pediatric scabies patients is limited. In this study, despite comparing anxiety and depression levels between scabies-diagnosed children and the control group, we did not find significant differences. This may be because scabies diagnosis and treatment may not persist long enough in children to develop diagnoses of anxiety disorders or depressive disorders. Another reason for this difference could be that studies conducted with adult scabies cases are descriptive in nature, with no comparison with a control group.

### Limitations

This study has several limitations. One of these is that participants were assessed using scales rather than undergoing structured psychiatric interviews. Additionally, the SES index we used to calculate socioeconomic status in this study may be more suitable for community surveys and studies with larger sample sizes, which posed a limitation.

### Conclusions

This study is important because it evaluated sleep disorders, anxiety, depression, and QoL in pediatric scabies cases; it found that sleep disorders are common among children diagnosed with scabies, negatively impacting their QoL compared to healthy controls, but an impact on depression and anxiety levels was not observed. The obtained data can be interpreted as suggestive that behaviors such as irritability and restlessness arising from sleep disturbances related to pediatric scabies cases do not persist long enough or with sufficient severity to predispose to depression and anxiety disorders. We believe that obtaining information about both night and day sleep patterns during dermatological follow-up of children diagnosed with scabies and providing recommendations on sleep hygiene as part of the treatment process may have positive effects on children's QoL.

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