

The Price of Pruritus

Sleep Disturbance and Cosleeping in Atopic Dermatitis

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Background: Atopic dermatitis is a common skin disorder that most often begins in infancy. Sleep disturbances in children with atopic dermatitis are likely due to itching and scratching and not only impact the afflicted child but may also affect the entire family. Sleep characteristics in young children with atopic dermatitis and their families have not been thoroughly investigated.

Objective: To evaluate sleep disturbance and cosleeping in young children with atopic dermatitis and evaluate the association between sleep characteristics and features of the disease.

Design and Methods: Parents of 300 children ranging in age from birth to 6 years with atopic dermatitis responded to 4 questions about sleep characteristics of their child and family. Analyses determined the prevalence of reported sleep disturbance and cosleeping, and their association with features of the patients and disease severity.

Results: Sleep disturbance attributed to atopic dermatitis was common; most parents (>60%) reported that the dermatitis affected how well they or their child slept. Cosleeping because of the skin condition was reported by 30% of families, and most of these parents (66%) were bothered by the cosleeping. Sleep disturbance and cosleeping were directly associated with severity of atopic dermatitis and with the degree to which parents reported that the atopic dermatitis affected the child and family's happiness.

Conclusions: Sleep disturbances were more common in children with atopic dermatitis than have been reported in children overall. These results demonstrate important sequelae of a very common childhood condition that warrant further investigation and the development of intervention strategies.

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ATOPIC DERMATITIS (AD) IS the most common inflammatory skin disease in children, affecting 17% of children in the United States.¹ It begins in infancy or early childhood, with 90% of cases seen in the first 5 years of life. Atopic dermatitis often appears during the first months of life when sleep patterns are being established. Although approximately 10% to 30% of all children experience difficulties with sleep during the first few years of life,² sleep disturbances are increased in children with AD because of itching and scratching, which interfere with the initiation and maintenance of sleep.³⁻⁶ Comforting behavior, learned associations, and habits influence the development of sleep patterns; in AD, itching and scratching become the association and behavior that disturbs sleep.

In addition, the sleep patterns of the family of an affected child is likely disturbed, as parents awake to comfort or treat the children's symptoms.⁴

Physiologic sleep abnormalities have been studied in older children with AD. Sleep in school-aged children with AD studied with home polysomnography, a recording of overnight sleep physiology, is marked by frequent awakenings associated with scratching episodes and an overall reduced sleep efficiency.⁶ These awakenings persist for many children during disease remission and many are unassociated with scratching.⁵ Thus, the sleep abnormality initially induced by pruritus becomes a learned sleep pattern. Consequences of sleep abnormalities in AD include greater difficulty awakening, daytime tiredness, and irritability. Moreover, difficulty falling asleep and night waking

Table 1. Sleep Patterns and Their Possible Consequences

Sleep Characteristic	Item
Child's sleep disturbance	"This skin condition affects how well my child sleeps"
Parent's sleep disturbance	"This skin condition affects how well my spouse and I sleep"
Cosleeping	"My child sleeps in my bed because of this condition"
Bothered by cosleeping	"I am bothered by my child sleeping in my bed"

in children with AD correlate with daytime behavior and discipline problems.³ Despite concern about the effects of AD on sleep, sleep patterns in young children with AD and their families have not been thoroughly investigated. The purpose of this study was to evaluate sleep disturbance and cosleeping in young children with AD and their families.

METHODS

SAMPLE

This cross-sectional analysis was conducted within a larger study to evaluate the validity and reliability of the Childhood Atopic Dermatitis Impact Scale (CADIS). The CADIS was developed from data obtained during focus sessions with affected families to measure the effects of AD on the quality of life of children aged 0 to 6 years from the parent/caregiver's perspective. An expert group and 20 families of children with atopic dermatitis reviewed and completed the CADIS questions and their content prior to administration in this study. Additional information on the development, methodology, and validation process of the CADIS is in preparation. The sample population consisted of parents or primary caregivers of children from birth to 6 years of age with a diagnosis of AD who could read and understand English. There were 300 participants with regular appointments who were consecutively recruited at 2 pediatric dermatology practices (Children's Memorial Hospital, Chicago, Ill, and University of California, San Francisco). Parents or caregivers responded to the CADIS and other measures prior to leaving the clinic or were sent home with the forms and a stamped, addressed envelope. Parents were contacted by phone up to 3 times if the form was not received within 1 week.

MAIN MEASURES

Four items from the CADIS were used to determine sleep patterns and their possible consequences in children with AD and their families (**Table 1**). All response choices were "never," "rarely," "sometimes," "often," "all the time."

Parents also completed global items about their child's overall health status and the current status of their child's skin condition. They also responded to 2 items inquiring about how often their child's and/or family's happiness was affected by the skin condition ("never, rarely, sometimes, often, all the time").

In addition, the examining physician (S.L.C.) completed the SCORAD index for each participating child during the clinic visit. The SCORAD index is a widely used, well-validated instrument used to measure the severity of AD according to objective (extent and intensity of lesions) and subjective (pruritus and sleep loss) criteria.^{7,8} The SCORAD index results can

be reported as a total score or an objective score. The objective score excludes the subjective ratings of pruritus and sleep loss with low scores representing mild and high scores representing severe AD (0-83 point scale). All parents and primary caregivers provided informed consent and the study protocol was approved by the institutional review boards at both participating centers, Children's Memorial Hospital and the University of California.

ANALYSIS

The primary goals of the analysis were to describe the prevalence of sleep disturbance and cosleeping in children and parents, and to determine the relationship between these sleep characteristics and features of the patient, the disease, and child and parent happiness. Analyses were performed only on participants who returned the completed CADIS and demographic information (ie, individuals who answered at least 90% of the questions). Descriptive statistics were computed for all outcome variables and covariates. Independent *t* tests were used to assess continuous variables and odds ratios with 95% confidence intervals (CI), and Pearson χ^2 statistics were computed to compare proportions. Only α levels less than .05 were considered statistically significant. Logistic regression analysis was performed to identify independent predictors of sleep disturbance while adjusting for covariates. All analyses were completed with SPSS 11.5 statistical software (SPSS Inc, Chicago, Ill). Analyses were performed with the original coding scheme (never, rarely, sometimes, often, all the time) using Pearson χ^2 statistics to compare proportions and with the dichotomous variables (never/rarely vs sometimes/often/all the time or fair/poor vs good/very good/excellent). The recoding as dichotomous variables did not substantively alter the results or interpretation of the analyses.

RESULTS

SAMPLE CHARACTERISTICS

Of the 300 patients enrolled, 270 (90%) completed the CADIS and demographic form. Only 1 family refused to participate, and 30 families (10%) did not return the completed CADIS. Sample characteristics, including demographics, overall health status questions, and SCORAD index scores are listed in **Table 2**.

The children's overall mean (SD) objective SCORAD index score was 24.9 (12.1) and the mean subjective SCORAD index score (includes subjective rating of pruritus and sleep loss) was 34.1 (15.9). When the objective SCORAD index scores were recoded as categorical variables, 23% of the participants were classified as having mild disease (<15), 64% as moderate (15-40) and 13% as severe (41-83). No statistically significant difference was found between either the objective or subjective SCORAD index scores and race or sex. Age was not correlated with the objective or subjective SCORAD index scores.

Most parents (93%) reported their child's general health as good/very good/excellent, and 6% reported general health as fair/poor. There were 187 parents (69%) who reported the condition of their child's skin as Poor/Fair, while 31% reported good/very good/excellent condition. In addition, 156 (72%) parents reported that AD affected their child's happiness and 185 (69%) reported an affect on the family's happiness (sometimes/often/all the time).

Table 2. Characteristics of 270 Children and Parents*

Variable	Frequency, No. (%)
Child's sex	
Male	149 (55)
Female	121 (45)
Mean (SD) child's age, mo	
Male	14.9 (11.9)
Female	17.4 (13.6)
Child's race	
African American	46 (17)
Caucasian	140 (52)
Asian or Pacific Islander	56 (21)
Hispanic	13 (5)
Other	15 (6)
Parent's marital status	
Single	31 (12)
Married/living with partner	233 (86)
Separated/divorced	4 (2)
Insurance	
Private insurance	219 (81)
Medicaid	44 (16)
None/other	7 (3)
Family income, US \$	
<15 000	14 (5)
15 000-30 000	30 (11)
31 000-45 000	15 (6)
46 000-60 000	37 (14)
61 000-75 000	20 (7)
>75 000	150 (56)
Mean parent's age, y	
Mother	32.8
Father	34.9
Mean (SD) SCORAD index scores	
Objective SCORAD	24.9 (12.1)
Subjective SCORAD	34.1 (15.9)
Child's general health	
Poor	0
Fair	17 (6)
Good	66 (24)
Very good	92 (34)
Excellent	95 (35)
Condition of skin now	
Poor	90 (33)
Fair	97 (36)
Good	59 (22)
Very good	21 (8)
Excellent	3 (1)
Condition affects child's happiness	
Never	30 (11)
Rarely	44 (16)
Sometimes	136 (50)
Often	43 (16)
All the time	17 (6)
Condition affects family's happiness (n = 269)	
Never	35 (13)
Rarely	49 (18)
Sometimes	115 (43)
Often	49 (18)
All the time	21 (8)

*Percentages do not always add up to 100 because of rounding.

SLEEP CHARACTERISTICS

The prevalence of sleep characteristics are provided in **Table 3**. Of the 270 participating parents, 183 (68%) reported that their child's sleep was disturbed by the con-

Table 3. Parents' Reports About Sleep Characteristics*

Sleep Characteristic	Frequency, No. (%)
This skin condition affects how well my child sleeps	
Never	43 (16)
Rarely	44 (16)
Sometimes	69 (26)
Often	57 (21)
All the time	57 (21)
My child's skin condition affects how well my spouse and I sleep	
Never	63 (23)
Rarely	41 (15)
Sometimes	62 (23)
Often	57 (21)
All the time	47 (17)
My child sleeps in my bed because of this condition	
Never	150 (56)
Rarely	37 (14)
Sometimes	32 (12)
Often	20 (7)
All the time	30 (11)
I am bothered by my child sleeping in my bed	
Never	175 (65)
Rarely	41 (15)
Sometimes	35 (13)
Often	12 (4)
All the time	7 (3)

*Percentages do not always add up to 100 because of rounding.

dition and 166 (61%) reported that their own sleep was disturbed (sometimes/often/all the time). Cosleeping due to AD was reported by 82 (30%) parents, and 54 of these 82 (66%) reported being bothered by cosleeping.

ASSOCIATION OF SLEEP CHARACTERISTICS AND SEVERITY OF DISEASE

To determine if sleep disturbance was related to SCORAD index scores, mean scores were compared with the measures of sleep characteristics (**Table 4**). Both objective and subjective SCORAD index scores were compared with the sleep questions, but because they reveal very similar results, only the objective SCORAD index scores are presented.

Children with sleep disturbance were more likely to have a higher SCORAD index score than children without sleep disturbance, and similarly, their parents were more likely to report sleep disturbance as well. Therefore, disease severity was associated with sleep disruption (child and parents) and these associations were statistically significant.

ASSOCIATION OF SLEEP DISTURBANCES AND OTHER MEASURES OF HEALTH AND HAPPINESS

Children whose happiness was sometimes/often/always affected by their skin condition were 8.59 times more likely to report a sleep disturbance and this difference was statistically significant (95% CI, 4.89-16.38). A similar result was found between the child's happiness being

Table 4. Association of Sleep Characteristics and Severity of Atopic Dermatitis

Sleep Characteristic	SCORAD Index Scores, Mean (SD)
Child's sleep disturbance*	
Never/rarely	19.6 (8.4)
Sometimes/often/all the time	27.5 (12.8)
Parent's sleep disturbance*	
Never/rarely	20.1 (8.6)
Sometimes/often/all the time	27.9 (13.0)
Cosleeping*	
Never/rarely	22.8 (10.9)
Sometimes/often/all the time	29.9 (13.4)
Bothered by cosleeping†	
Never/rarely	24.0 (11.6)
Sometimes/often/all the time	28.5 (13.4)

* $P < .001$.

† $P < .01$.

affected by the skin condition and the parents' sleep being disturbed. In addition, parents who reported that their happiness was affected by their child's skin condition were 6.40 times more likely to report a sleep disturbance in their children (95% CI, 3.62-11.30) and 6.90 times more likely to report a sleep disturbance for themselves or their spouses (95% CI, 3.92-12.29), and both of these differences were statistically significant (**Table 5**). Overall, the family's happiness was affected if the child's happiness was affected, and sleep disturbances among children and parents were more likely if the child's skin condition was reported as fair/poor.

MULTIVARIATE ANALYSES

In logistic regression analysis, the most important predictor of parent's sleep disturbance was child's sleep disturbance (adjusted odds ratio [OR], 72.5; 95% CI, 25.9-202.2). Disease severity was also related to the parents' sleep disturbance. The adjusted OR comparing children who have severe disease with those who have mild disease was 10.0 (95% CI, 1.3-80.1) (**Table 6**).

The most important predictor of child's sleep disturbance was parent reporting that the child's happiness was affected by the skin condition (adjusted OR, 4.64; 95% CI, 2.9-9.4). Similarly, the child's sleep disturbance was also associated with whether the family's happiness was affected by the skin condition (adjusted OR, 2.65; 95% CI, 1.3-5.2). Finally, disease severity was also associated with child's sleep disturbance; however, this result was only marginally significant. The adjusted OR comparing children who have severe disease with those who have mild disease was 3.9 (95% CI, 0.99-15.4). Although this result is not statistically significant at $\alpha = .05$, this could be attributed to the relatively small number of children identified as having severe disease ($n = 35$, 13%) (**Table 7**).

COSLEEPING

Eighty-two parents (30%) reported that their children sleep with them sometimes/often/all the time because of

the atopic dermatitis. Moreover, of these parents who reported cosleeping, most (66%) were bothered by the cosleeping sometimes/often/all the time. Cosleepers were slightly older (mean, 18.5 months) than children who did not cosleep (mean, 14.96 months), and this difference was statistically significant ($P = .04$). No associations were found between cosleeping or parents bothered by cosleeping and children's sex, parents' education, or insurance status. However, there was a statistically significant increase in cosleeping among Asian Americans ($\chi^2 = 6.83$, $P = .01$).

Parents who reported cosleeping sometimes/often/all the time ($n = 82$, 30%) because of the child's condition also had children with higher mean SCORAD index scores of 29.9 compared with 22.8 for children who reported rarely or never cosleeping owing to their skin condition ($n = 187$, 70%) ($P < .01$). Similarly, parents who reported being bothered by their children's cosleeping sometimes/often/all the time ($n = 54$, 20%) also had children with higher mean SCORAD index scores of 28.5 vs 24.0 for children whose parents were rarely or never bothered by their cosleeping ($n = 216$, 80%) ($P < .01$) (**Table 2**). Therefore, higher SCORAD index scores were associated with cosleeping and being bothered by cosleeping and the differences were statistically significant. In addition, cosleeping and being bothered by cosleeping were significantly associated with happiness of child, happiness of family, and condition of skin.

COMMENT

Our results demonstrate that sleep disturbance is very common in young children with AD and their families. Furthermore, we determined that in 30% of families in our sample, children coslept with their parents owing to their skin disease, a situation that most often bothered the parent. These results demonstrate important sequelae of a common condition of childhood that warrant further attention.

Childhood AD has a profound impact on the physical and psychosocial functioning of affected children and their families. When this impact is quantitatively compared with the family impact of childhood-onset insulin-dependent diabetes mellitus, the impact with AD is significantly greater.⁹ The prevalent sleep disturbance in children with AD and the consequences of sleep deprivation may partially account for this difference. In this investigation, sleep disturbances in child and parents were directly associated with severity of AD, and inversely associated with happiness of the child and family. Sleep disturbance in patients with AD likely correlates with overall decreased quality of life.

Bed sharing between infants, older children, and parents is common in many cultures.¹⁰ The benefits and potential hazards of this practice are controversial. The prevalence of cosleeping or bed sharing is increasing in the United States and was recently reported as 12.8%. Factors associated with increased probability of bed sharing include maternal age less than 18 years, ethnicity reported as African American or Asian, yearly household income of less than \$20 000, and living in the Southern states compared

Table 5. Association of Sleep Disturbances and Child's Skin Condition, and Whether Skin Condition Affects Child or Family Happiness

	Child's Sleep Disturbance			Parent's Sleep Disturbance		
	Present (n = 183)	Absent (n = 87)	OR (95% CI)	Present (n = 166)	Absent (n = 104)	OR (95% CI)
Child's skin condition* now						
Fair/poor	143 (78)	44 (51)	3.49 (2.02-6.04)	132 (80)	55 (53)	3.46 (2.02-5.93)
Good/very good/excellent	40 (22)	43 (49)		34 (20)	49 (47)	
Child's happiness affected by skin condition*						
Sometimes/often/all the time	159 (87)	37 (43)	8.59 (4.89-16.38)	147 (89)	49 (47)	8.68 (4.70-16.04)
Never/rarely	24 (13)	50 (57)		19 (11)	55 (53)	
Family's happiness affected by skin condition*†						
Sometimes/often/always	149 (92)	36 (41)	6.40 (3.62-11.30)	140 (84)	45 (44)	6.90 (3.92-12.29)
Never/rarely	33 (18)	51 (59)		26 (16)	58 (56)	

Abbreviations: CI, confidence interval; OR, odds ratio.

* $P < .001$.

†n = 269.

Table 6. Logistic Regression Analysis of Factors Associated With Parent's Sleep Disturbance

Independent Variable	Odds Ratio (95% CI)
Objective SCORAD comparing moderate with mild	1.05 (0.39-2.8)
Objective SCORAD comparing severe with mild	10.06 (1.3-80.1)
Child's sleep disturbance (present vs absent)	72.4 (25.9-202.2)
Child's happiness affected by skin condition (sometimes/often/always vs never/rarely)	2.06 (0.71-5.9)
Family's happiness affected by skin condition (sometimes/often/always vs never/rarely)	2.19 (0.80-6.0)

Abbreviation: CI, confidence interval.

Table 7. Logistic Regression Analysis of Factors Associated With Child's Sleep Disturbance

Independent Variable	Odds Ratio (95% CI)
Objective SCORAD comparing moderate with mild	1.33 (0.67-2.6)
Objective SCORAD comparing severe with mild	3.90 (0.99-15.4)
Child's happiness affected by skin condition (sometimes/often/always vs never/rarely)	4.64 (2.3-9.4)
Family's happiness affected by skin condition (sometimes/often/always vs never/rarely)	2.65 (1.3-5.2)

Abbreviation: CI, confidence interval.

with living in the Midwest.¹¹ This investigation documents a 30% prevalence of cosleeping in patients with AD with a significant increase in Asian Americans. Although an increased prevalence of AD is reported in Asian children,¹² and cultural influences may partially account for the increase in cosleeping in Asian families in this investigation, parents were asked specifically about cosleeping attributed to AD. Severity of disease was not significantly increased in Asian patients studied.

All items in the CADIS were designed to measure a parent's perception about the impact of AD on their child and themselves. This investigation measures parents' judgment that sleep disturbances are related to AD. The cosleeping questions in this study were designed to identify the parents that would otherwise choose not to share a bed. Parents in this study answered the questions "My child sleeps in my bed because of this condition" and "I am bothered by my child sleeping in my bed." Parents of children with AD report that they bring the child into their bed as a method to prevent the child from awakening. Parents report staying awake to hold the child's hands to prevent scratching. This may improve the child's sleep, but it leads to sleep loss for parents,¹³ and the consequences of sleep loss have a negative effect on quality of life for these families.

This cross-sectional analysis was conducted during the validity and reliability evaluation of the CADIS, a disease-specific measurement of quality of life in children with AD under the age of 6 years. The CADIS demonstrates content validity by comprehensively addressing the domains reported in focus sessions with families and expert clinicians.¹³ Although the 4 sleep items have not been thoroughly validated, internal validity is demonstrated by the reported increases in sleep disturbance, cosleeping, and being bothered by cosleeping with increasing severity of disease. In addition, these results may not be generalizable to all young children with atopic dermatitis seen by pediatricians as this investigation included only children referred for specialty care. Further investigation with a control group of children with other dermatoses and an existing sleep scale is warranted to confirm the marked increase in cosleeping and the family impact of sleep disturbance in children with AD.

This study did not attempt to quantify daytime sleepiness in the affected children. Daytime sleepiness is difficult to evaluate, and children with chronic sleep loss are often mistakenly misdiagnosed with behavioral abnormalities and learning disabilities.¹⁴ Fussiness and irritability, difficulty with concentration, and emotional lability have been reported in children with AD, but attributing these symptoms entirely to sleep disruption is difficult.^{3,15}

Although increasing severity of disease is associated with sleep disturbance, reducing severity of skin disease alone may not correct the sleep disturbance. Nighttime awakenings in children with AD may persist when the skin is in remission⁵ likely because of the learned abnormal sleep pattern and behaviors. In addition to topical therapy for AD, some children with AD may require medications and behavioral modification for their sleep disorder. Historically, sedating antihistamines have been used at night as sedatives in children with AD and other pruritic dermatoses. The use of medications (sedating antihistamines such as diphenhydramine hydrochloride, hydroxyzine, or other sedative hypnotics) to improve sleep onset and continuity are indicated for a limited number of sleep disorders in children, but such pharmacological therapy has not been thoroughly investigated in children with AD. The ideal approach would be to achieve disease control so that such sedating medications or behavioral therapy are unnecessary, but this is not always possible. More studies are needed to examine intervention strategies for minimizing sleep disturbance and its consequences.

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Correction

Numerical Error. In "This Month in *Archives of Pediatrics & Adolescent Medicine*" published in the June issue of ARCHIVES (2005;159:511), an error occurred in the summary written about the article by Paz-Bailey et al. In the last summary on page 511, the second sentence should have read: "In this study from the Centers for Disease Control and Prevention, the effect of condom use on decreasing the prevalence of chlamydia and gonorrhea was examined among more than 500 adolescent girls."