ORIGINAL REPORT

Effect of Paediatric Atopic Dermatitis on Parental Sleep Quality

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Data on the impact of paediatric atopic dermatitis on parental sleep are scarce. The aim of this study was to examine the effects of paediatric atopic dermatitis on the quality of parents' sleep. This cross-sectional study included parents of patients with atopic dermatitis and parents of healthy children who completed validated Pittsburgh Sleep Quality Index questionnaires. The study and control groups were compared, as were results for mild and moderate atopic dermatitis with severe atopic dermatitis, mothers and fathers, and different ethnic groups. A total of 200 parents were enrolled. Sleep latency was significantly longer in the study group compared with the control group. Sleep duration was shorter in the parents of the mild AD group compared with the moderate-severe and control groups. Parents in the control group reported more daytime dysfunction than parents in the AD group. Fathers of children with AD reported more sleep disturbance than mothers.

Key words: atopic dermatitis; eczema; sleep disturbance; children; Pittsburgh Sleep Quality Index questionnaire.

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Atopic dermatitis (AD) is one of the most common skin diseases in childhood, affecting up to 25% of children in the USA (1). Pruritus is the hallmark symptom of AD, often causing uncontrollable excoriation to the point of skin damage and possible bleeding or infection. However, AD can have far-reaching effects on patients beyond itching. One of the effects is sleep disruption, both for the diagnosed children and their parents, ranging from mild to profound insomnia (2). Previous studies have shown that parents of children with AD experience difficulties falling asleep and increased nocturnal awakenings related to the child's condition (3, 4) leading to physical and mental exhaustion, mood swings, loss of concentration, and lower executive performance (5). Insomnia may be a symptom, a sign, or a primary disturbance. It is currently defined as a symptom in the presence of ≥1 of 4 characteristics: difficulty falling asleep, involuntary early awakening, difficulty maintaining continuous sleep, and unrefreshing sleep.

SIGNIFICANCE

This study identified specific sleep characteristics that negatively influenced the quality of sleep among parents of children diagnosed with atopic dermatitis. Among parents of patients with atopic dermatitis, various factors contributed to having worse sleep quality, which should be addressed by physicians as part of routine care of families.

As a syndrome, sleep difficulties must occur with impaired daytime functioning (e.g. diminished vocational functioning) and in the presence of adequate opportunity to sleep, as defined in the International Classification of Sleep Disorders 3 (ICSD-3) general criteria for insomnia (6). Studies of the pathophysiology of this disturbance have described both physiological and psychological effects (7). The most studied clinical implication is the negative effect on essential cognitive functions, such as attention, concentration, alertness, reaction time, risk-taking, short-term memory, decision making and judgment (8). The significance of these findings is their effect on the individual's quality of life and their heavy toll on society. This is expressed as decreased productivity of those experiencing sleep disturbances, due to increased errors and accidents, including many fatal ones (9). In addition, sleep disturbances have direct adverse effects on morbidity and mortality (10, 11).

The primary aim of the current study was to evaluate the effects of paediatric AD on the quality of sleep of parents, both mothers and fathers, in comparison with parents of non-atopic children, according to AD severity.

The secondary aims of this study were to: (*i*) compare the subjective sleep quality of parents of children with mild AD with that of parents of children with moderate-severe AD; (*ii*) compare the subjective sleep quality of fathers with that of the mothers of children with AD; and (*iii*) to compare the subjective sleep quality of 2 different ethnic groups (Jews and Arabs).

MATERIALS AND METHODS

This is a cross-sectional questionnaire study. The study population included parents of patients aged 2–18 years, diagnosed with AD, compared with parents of healthy children of the same age. The patients with AD visited the paediatric dermatology clinic in the Soroka University Medical Center (SUMC), Beer Sheva, Israel, from 2019 to 2020 and were insured by the "Clalit" health maintenance organization. Parents were excluded if their children had diseases other than AD that could cause pruritus and/or sleep

disorders (inflammatory and infectious skin disorders, arousal disorders, obstructive sleep apnoea, central sleep apnoea, restless legs syndrome, insomnia, and parasomnias). In addition, parents of children diagnosed with other major chronic diseases that may interfere with sleep quality were excluded in accordance with the investigator's clinical judgment. The control group included parents of generally healthy children, age-matched, without AD. Since AD outbreaks are affected by seasonality, the time of completing the questionnaires was also matched. To assess AD severity, prescriptions of specific AD pharmaceutical purchases were documented as a proxy estimation for AD severity. Patients with AD were considered to have moderate-to-severe AD if they had 1 of the following 3 criteria: (*i*) at least 1 hospitalization due to AD exacerbation; (*ii*) at least 1 course of systemic AD-related medications (methotrexate, cyclosporine, azathioprine, mycophenolate mofetil, dupilumab) prescribed adjacently to a diagnosis of AD with more than 2 succeeding prescriptions over more than 4 weeks; or (*iii*) phototherapy treatment that was prescribed with the indication of AD. This information was collected via computerized files and the parental questionnaire.

Recruitment took place either by phone or as an interview in the paediatric outpatient waiting room. All subjects provided informed consent to participate in the research before commencing the questionnaire. The current study was approved by the Institutional Review Board (IRB) of SUMC in accordance with the Declaration of Helsinki and all appropriate amendments. The validated Hebrew version of the gold standard Pittsburgh Sleep Quality Index (PSQI) (12) was used in the study. The PSQI is a self-administered questionnaire commonly used in clinical research sleep studies. Using a cut-off value of 5, the questionnaire is validated to define subjective insomnia. The PSQI is more highly associated with psychological symptom ratings and sleep diary measures than the Epworth Sleepiness Scale (ESS) and has a sensitivity of 89.6% and a specificity of 86.5% (13). The PSQI has 19 sections that subjectively evaluate the subject's sleep quality over the past month, containing 7 indices of clinical aspects of sleep quality (Appendix S1). The questionnaire has been translated into 48 languages, including Hebrew. In addition, demographic information was obtained from the study participants (sex, age, number and ages of additional children, years of schooling, number of daily work hours). Questions directed only to parents of patients with AD were the number of prior hospitalizations due to AD exacerbations and previous use of AD-related medications: methotrexate, cyclosporine, azathioprine, mycophenolate mofetil, dupilumab, or phototherapy.

Statistical analysis

Nominal variables were compared using Pearson's χ^2 test, and continuous variables meeting the assumptions of the normal distribution were compared using Student's *t*-test or one-way analysis of variance. Ordinal variables and continuous variables that did not meet parametric criteria were compared using Kruskal–Wallis or Mann–Whitney tests. Continuous variables are presented as mean ± standard deviation (SD) and categorical data as percentages. Statistical significance was defined as a *p*-value ≤0.05. The association between study groups and parents' sleep quality was examined and adjusted for suspected confounders using multivariate logistic regression. Clinically significant factors and characteristics found borderline significant in the univariable analysis were included in the models. A difference of 1.5 units or more in the PSQI questionnaire proved an impact on parents' sleep quality. In addition, identifying which characteristics of a sub-group of parents (e.g. mothers vs fathers, Arabs vs Jews, mild AD vs moderate-severe AD) were most affected allowed for achieving the study's secondary endpoints. In order to do so, all variables were adjusted and corrected statistically.

Analyses were performed using IBM SPSS software version 22 (Armonk, NY: IBM Corp.).

RESULTS

A total of 200 parents were recruited: 100 in the study group and 100 in the control group. When comparing demographic parameters between the study and the control groups (after matching patients with AD with the control group, according to age), most of the parameters were similar, except for parents' age, years of education and the number of additional children younger than 2 years. Parents in the control group were younger (35.43 ± 7.7 vs 39.32 ± 8.7 years, $p<0.001$), more educated (15.05 ± 4.2 vs 14.06 ± 3.5 years of education, $p=0.009$), and had higher rate of additional younger children (41% vs 22%, $p=0.004$) (**Table I**). The demographic details of the patients with AD and patients without AD are shown in Table I, with similar ages (7.51 ± 4.8 vs 7.65 ± 4.4 years, $p=0.7$) and a majority of boys (59% vs 44%, $p=0.034$) in the control group.

The results of the scoring PSQI questionnaires are shown in **Table II**, according to 7 components. Significant differences in sleep latency and daytime dysfunction were found when comparing the parents of the AD group with the control group. Sleep latency (the length of time it takes to transition from full wakefulness to sleep) was significantly longer in the study group vs the control group (0.53 ± 0.7 vs 0.91 ± 1, *p*-value 0.016).

Surprisingly, parents in the control group reported having greater daytime dysfunction than those in the study group (0.74 ± 0.8 vs 0.42 ± 0.8, $p<0.001$). Other components of the PSQI questionnaire (subjective sleep quality and use of sleep medication) were higher in the study group compared with the control group and demonstrated a trend toward statistical significance ($p=0.074$, and 0.068, respectively).

Table I. Parent's and children's demographics, according to atopic dermatitis (AD) and control groups

	Control group N = 100	AD N = 100	*p*-value
Parent's demographics			
Male sex, *n* (%)	40 (40.0)	60 (60.0)	0.321
Age, years, mean ± SD Median, min, max	35.43 ± 7.7 33.0, 18; 64	39.32 ± 8.7 39.0, 22; 64	<0.001
Arabs, *n* (%)	22 (22.0%)	17 (17.0%)	0.372
Number of additional children in the family, mean ± SD Median, min, max	2.45 ± 2.1 2.0, 0; 10	2.24 ± 1.6 2.0, 0; 10	0.957
Parent education years, mean ± SD Median, min, max	15.05 ± 4.2 16.0, 0; 23	14.06 ± 3.5 14.0, 0; 23	0.009
Daily working hours, mean ± SD Median, min, max	7.03 ± 3.9 8.0, 0; 20	7.03 ± 4.0 8.0, 0; 16	0.452
Additional children younger than 2 years of age, *n* (%)	41 (41.0)	22 (22.0)	0.004
Children's demographics			
Child's age, mean ± SD Median, min, max	7.51 ± 4.8 6.0, 2; 18	7.65 ± 4.4 7.0, 2; 16	0.701
Male sex, *n* (%)	59 (59.0)	44 (44.0)	0.034

SD: standard deviation.

Table II. Scoring Pittsburgh Sleep Quality Index (PSQI) questionnaire, according to atopic dermatitis (AD) and control groups and AD severity

Component	Control group Mean±SD Median, min; max	AD Mean±SD Median, min; max	*p*-value	Control group Mean±SD Median, min; max	AD		*p*-value
					Mild AD, *n*=74 Mean±SD Median, min; max	Moderate–severe AD, *n*=26 Mean±SD Median, min; max	
Sleep latency	**0.53**±0.7 **0.0, 0; 3**	**0.91**±1.0 1.0, 0; 3	**0.016**	**0.53**±**0.7** **0.0, 0; 3**	**1.0**±**1.1** **1.0, 0; 3**	**0.69**±**0.8** **0.0, 0; 2**	**0.027**
Sleep duration	1.72±0.9 2.0, 0; 3	1.5±1.0 2.0, 0; 3	0.118	**1.72**±**0.9** **2.0, 0; 3**	**1.38**±**1.0** **1.0, 0; 3**	**1.79**±**0.9** **2.0, 3; 0**	**0.049**
Subjective sleep quality	0.88±0.8 1.0, 0; 3	1.10±0.9 1.0, 0; 3	0.074	0.88±0.8 1.0, 0; 3	1.1±0.9 1.0, 0; 3	1.1±0.9 **1.0, 0; 3**	0.201
Sleep efficiency	0.42±0.8 0.0, 0; 3	0.26±0.65 0.0, 0; 3	0.162	0.42±0.8 0.0, 0; 3	0.25±0.6 0.0, 0; 3	0.3±0.7 0.0, 0; 3	0.355
Sleep disturbance	0.94±0.6 1.0, 0; 2	0.93±0.5 1.0, 0; 2	0.965	0.94±0.6 1.0, 0; 2	0.91±0.52 1.0, 0; 3	0.96±0.32 1.0, 0; 2	0.894
Use of sleep medication	0.04±0.2 0.0, 0; 3	0.20±0.7 0.0, 0; 3	0.068	0.04±0.2 0.0, 0; 2	0.18±0.7 0.0, 0; 3	0.24±0.8 0.0, 0; 3	0.177
Daytime dysfunction	**0.74**±**0.8** **1.0, 0; 3**	**0.42**±**0.8** **0.0, 0; 3**	**<0.001**	**0.74**±0.8 **1.0, 0; 3**	**0.46**±0.7 **0.0, 0; 3**	**0.31**±0.8 0.0, 0; 3	**0.003**
Global PSQI score	5.24±2.9 5.0, 0; 14	5.30±3.3 4.0, 0; 15	0.389	0.52±0.3 5.0, 0; 14	5.3±3.5 5.0, 0; 15	5.3±2.9 4.0, 2; 12	0.914

SD: standard deviation. Bold indicates significant results wih *p*-value <0.05.

Evaluation of sleep quality, according to AD severity (Table II), showed that sleep latency was longer in the control group, compared with the mild and moderate-severe group (0.53, 1, and 0.69, respectively, $p=0.027$). Sleep duration was shorter in the parents of the mild AD group, compared with the moderate-severe and the control groups (1.38±1, 1.79±0.9, 1.72±0.9, respectively, $p=0.049$). Again, daytime dysfunction showed the opposite trend with the control group reporting the worse dysfunction (0.74, 0.46, and 0.31 for control, mild and moderate-severe groups, respectively, $p=0.003$).

Regarding the sleep quality of fathers and mothers of children with AD (**Table III** and **IV**), fathers reported more sleep disturbance than mothers (0.8±0.6 vs 1.02±0.4, $p=0.022$).

Regarding sleep quality in different ethnic groups (Jews vs Arabs), no significant difference was observed (Appendix S2).

Table III. Scoring Pittsburgh Sleep Quality Index (PSQI) questionnaire of parents (fathers and mothers) of children with atopic dermatitis

Component	Fathers Mean±SD Median, min; max	Mothers Mean±SD Median, min; max	*p*-value
Sleep latency	0.82±1.0 0.5, 0; 3	0.97±1.0 1.0, 0; 3	0.422
Sleep duration	1.60±0.9 2.0, 0; 3	1.43±1.0 1.5, 0; 3	0.409
Subjective sleep quality	0.90±0.8 1.0, 0; 3	1.23±0.9 1.0, 0; 3	0.081
Sleep efficiency	0.31±0.8 0.0, 0; 3	0.23±0.6 0.0, 0; 3	0.905
Sleep disturbance	**0.80**±**0.6** **1.0, 0; 2**	**1.02**±**0.4** **1.0, 0; 2**	**0.022**
Use of sleep medication	0.35±0.9 0.0, 0; 3	0.10±0.4 0.0, 0; 3	0.275
Daytime dysfunction	0.35±0.6 0.0, 0; 2	0.47±0.8 0.0, 0; 2	0.685
Global PSQI score	5.05±3.6 4.0, 0; 15	5.45±3.2 4.5, 1; 15	0.405

SD: standard deviation. Bold indicates significant results wih *p*-value <0.05.

Since the study group and control group were different in terms of age, years of education, and the number of additional young children, multivariate logistic regression was used to adjust for controlling suspected confounders, in the parameters that were statistically significant (**Table V**). When testing the statement "can't fall asleep within 30 min", while controlling parent's age, there was a significant difference between the study and the control group, which rated the statement as higher (3 on a scale of 0–3, odds ratio (OR) 3.267, *p*-value 0.022). In addition, in order to test the "can't breathe comfortably", a logistic regression model was used. Controlling for parent age and number of additional children, results show

Table IV. Scoring Pittsburgh Sleep Quality Index (PSQI) questionnaire, according to questions, of parents (fathers and mothers) of children with atopic dermatitis

	Fathers Mean±SD Median, min; max	Mothers Mean±SD Median, min; max	*p*-value
"Can't fall asleep within 30 min"	0.82±1.2 0.0, 0; 3	1.08±1.2 1.0, 0; 3	0.241
"Waking up in the middle of the night/early in the morning"	1.47±1.3 1.5, 0; 3	1.61±1.31.0, 0; 3	0.566
"Need to wake up on order to go to the toilet"	0.77±1.1 0.0, 0; 3	0.88±1.2 0.0, 0; 3	0.598
"Can't breathe conveniently"	0.05±0.3 0.0, 0; 2	0.07±0.3 0.0, 0; 2	0.548
"strong/loud cough/snore"	0.27±0.8 0.0, 0; 3	0.08±0.4 0.0, 0; 2	0.166
"Feels too cold"	0.20±0.6 0.0, 0; 3	0.40±0.8 0.0, 0; 3	0.130
"Feels too hot"	0.40±0.8 0.0, 0; 3	0.43±0.8 0.0, 0; 3	0.771
"Having bad dreams"	0.25±0.7 0.0, 0; 3	0.21±0.6 0.0, 0; 3	0.815
"Feeling pain"	0.10±0.4 0.0, 0; 2	0.33±0.8 0.0, 0; 3	0.057
"Other causes"	**0.70**±**1.1** **0.0, 0; 3**	**1.31**±**1.3** **1.0, 0; 3**	**0.013**
"Having trouble staying awake during driving, eating, social activities"	0.27±0.6 0.0, 0; 3	0.33±0.8 0.0, 0; 3	0.932
"Difficulties to stay enthusiastic in order to get things done"	0.25±0.6 0.0, 0; 3	0.43±0.9 0.0, 0; 3	0.402

SD: standard deviation. Bold indicates significant results wih *p*-value <0.05.

Table V. Results of multivariate logistic regression model: factors associated with "can't fall asleep within 30 min" statement (answers were divided into 3–0 scale)

"Can't fall asleep within 30 min"		OR	95% CI for OR	*p*-value
1	Intercept			0.008
	Atopic dermatitis	0.638	0.278–1.464	0.289
	Parent's age	1.035	0.987–1.086	0.151
2	Intercept			0.049
	Atopic dermatitis	2.463	0.959–6.328	0.061
	Parent's age	0.998	0.945–1.054	0.940
3	Intercept			0.001
	Atopic dermatitis	**3.267**	**1.185–9.008**	**0.022**
	Parent's age	1.030	0.977–1.085	0.278

The reference category is 0.0. Bold indicates significant results wih *p*-value < 0.05. 95% CI: 95% confidence interval; OR: odds ratio.

a significant difference in favour of the study group (OR 0.231 *p*-value 0.019), in opposed to what we expected. Of note is the fact that both parental age and number of children under 2 years of age were essentially co-linear with sleep disturbances in a significant manner. Since these 2 variables are related (as older parents have older children), parental age was addressed as a covariate, and so is the other dependent variable.

DISCUSSION

The current study demonstrated specific negative sleep disturbance among parents of children diagnosed with AD, mainly longer sleep latency and shorter sleep duration in the parents of the mild AD group, compared with the moderate-severe AD group and the control groups. This study further found more sleep disturbance reported by fathers than mothers of children with AD. On the other hand, parents in the control group reported more daytime dysfunction than parents in the AD group.

The association of AD with sleep quality in children had been studied widely in the past, contrary to the scarce data available on parental sleep of patients with AD. AD appeared to be associated with poor sleep quality throughout childhood; thus, it was suggested in previous studies that clinicians should increase their awareness of pruritus (14) and determine whether children with active AD have impaired sleep duration and quality at multiple time-points throughout childhood (15). In other studies, sleep was disturbed even after remission had been established (16).

Indirect information about the sleep quality of parents of patients with AD can be inferred from previous studies. An example of this appears in a Canadian cross-sectional survey conducted by The Eczema Society of Canada, which found sleep disturbances in both the child (70%, 253/361) and the caregiver (55%, 199/361) in a paediatric AD patients' population (17). Moreover, daytime negative consequences have been well demonstrated, for example, by showing that difficulty falling asleep and daytime exhaustion are worse in mothers of patients with AD than in mothers of children without AD (18). Sleep loss due to the child's AD proved to have a negative effect on the parent's emotional state, mood, well-being, cognitive function, ability to concentrate and take the initiative and sensitivity to stress and sound (19). Subjective sleep disturbances have been studied utilizing a single sleep question and relied on parental reporting in previous studies (5, 16).

Some of these findings correlate with the findings of the current study, including a negative influence on subjective sleep quality in parents of patients with AD. This parameter reflects their perception of poor life quality, perhaps generated by their children being diagnosed with AD.

However, other results showed an opposite trend. For example, a significantly greater daytime dysfunction in the control group than in the study group. The demographic differences between the groups may account for these results, as parents in the control group had younger children, a characteristic factor presumed to be the cause for a more significant daytime dysfunction. This confounder has been proven to be significantly relevant to sleep disturbances, as does the parents' age, which was eventually chosen to be the major covariate in the current model.

Additional parameters, such as the risk of the use of sleep medication and longer sleep duration, were not proven to be significantly increased in the study group. Yet, a negative association was indicated by the results and can be studied further.

The negative influence of AD on parental sleep quality was already demonstrated in similar studies showing associations between other paediatric diseases, such as asthma, cystic fibrosis, and epilepsy (20, 21, 22). Therefore, it is reasonable to assume that the pathogenesis of the disturbance is similar to that of other chronic paediatric diseases, with the main common feature between them being the constant, daily care for an ill child, in addition to other similarities (such as strict use of medications, etc.).

The current results also show that the influence of the child's AD on mothers' sleep is not necessarily stronger than that on fathers' sleep (fathers did have longer sleep duration, but experienced greater disturbances in their sleep and had greater use of sleep medications). This finding is different from previous studies that have shown that the mother is the main caregiver in cases of chronically ill children (23). Therefore, impingement on the sleep quality of both parents has severe implications, especially on the effectiveness of care for the patient diagnosed with AD.

Contrary to current perception, this study found only minor correlations between disease severity and consequences on sleep quality. To explain the greater sleep disturbance in parents of mild AD rather than patients with moderate-severe AD, a secondary analysis was made by an additional review of the clinical files. A cross-matching between the use of medications aimed

to treat AD flares and the time of answering the questionnaire was performed. Results indicated that 48% of the children in the study group and 65% of the children diagnosed with moderate-severe AD were treated for the disease flare-up at the time of data collection. Thus, it can be assumed that proper treatment could confound the results and should be considered when explaining disturbances to parents' sleep. The same finding stresses the importance of compliance with medical treatment in AD, as already proven in the relevant literature (24).

Study limitatizons and strengths

One of the limitations of the current study is that not all parameters could be matched between the study and control groups due to the limited sample size and the random nature of population enrollment. We assume that contributing factors, such as parents' age, years of education, number of additional children and their ages, may influence the results and should be considered in future studies. Another limitation of the current study is that measures of children's sleeping disturbances or parents' depression/anxiety were not performed. These medical conditions have a common basis: an uncontrollable worry expressed in several symptoms, among them insomnia. Interviews with the parents left an impression of severe, intractable concern, particularly regarding night-time. Despite the possibility of an underlying parental disorder of that kind, it was decided not to conduct an objective psychiatric evaluation of the parents. It was considered that such an evaluation would decrease the recruitment rate. This type of evaluation, combined with assessing children's sleep, may be appropriate in future studies. Additional confounding factors, such as work schedule, normal sleep habits, caffeine intake throughout the day, television exposure at night etc., may also be included in future research and shed more light on the final results. Objective measures, such as the use of "smart watches" or medical actigraphy, may be used in order to accurately assess the time of falling asleep, which was based on the parents' subjective feeling in the current study. A further limitation of this study is a potential selection bias in the parent who agreed to participate. Indeed, in only a small minority, both parents agreed to participate. It is, therefore, possible that parents with more sleep disturbances tended to agree. Lastly, the fact that some of the children were treated for the disease flare-up at the time of data collection probably influenced the results.

Despite the above-mentioned limitations, we believe that the current study is unique, owing to several factors. Firstly, the database compared only parents of patients who received a formal diagnosis of AD by a board-certified dermatologist with a sub-specialty in paediatric dermatology rather than a primary care physician/paediatrician. Secondly, all parents were interviewed by the same researcher, allowing for the unity of the data collected. Thirdly, it used a multi-question, validated evaluating system that was not present in previous studies (where a single question system was performed (5)). These components allowed for stratification of parental risk factors and children's disease severity, accounting for the poor sleep quality of the parents. It should be noted that specific sleep characteristics were found to negatively influence parents' sleep with AD in a significant matter. In contrast, additional characteristics without statistical significance showed a negative trend. Thus, identifying these characteristics is likely to contribute to the diagnostic and treatment efforts regarding parental well-being and functioning. Finally, expanding the research in this field to more extensive, more diverse, populations may bring greater statistical power and thus more significant clinical implications.

Researchers generally agree that appropriate treatment for sleep disturbance, resulting in better sleep quality, can improve general health and quality of life and decrease morbidity and mortality (25). When treating risk groups, such as older parents of paediatric patients with AD, we consider it should be mandatory to address the question of sleep quality seriously and often. In addition, if the attending physician is not experienced in aspects relevant to sleep medicine, a consultation with a sleep specialist should be strongly considered.

Conclusion

The current study demonstrated an association between paediatric AD and parental sleep disturbances. In light of the current findings, it is recommended that physicians routinely question parents regarding their sleep quality, particularly parents of paediatric patients with AD. Furthermore, if there is any suspicion of the existence of sleep disturbance, a referral to a sleep specialist to clarify diagnosis and possible necessary treatment should be strongly considered.

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The institutional review board (Soroka University Medical Center IRB committee) approved the study in accordance with the ethics standards laid down in the 1964 Declaration of Helsinki and its later amendments (Declaration of Helsinki 1975, revision 2013).

The authors have no conflicts of interest to declare.

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Appendices S1 and S2