Atopic Dermatitis and Sleep Disturbance among Adults: Cross-sectional Study of Patient-Reported Outcomes for Measuring Eczema Severity, Sleep Disturbance and Sleep-Related Impairment

Feras Alhawas, MBBS* Sultan Bin Obaid, MBBS* Seham Alsalamah, MBBS** Shahad Bin Obaid, MBBS** Alya alsuwayhib, MBBS** Maee Mohamad Barakeh, MBBS* Layan Fahad Alsanad, MBBS* Farah Faisal Albakr, MBBS* Abdullah Othman Alangari, MBBS* Sulaiman Obaid Obaid, MBBS*** Eman Almukhadeb, MBBS****

ABSTRACT

This study was carried out to assess the correlation between atopic dermatitis disease severity, Sleep disturbance and Sleep-Related impairment in adult atopic dermatitis patients in King Khaled University Hospital (KKUH); a teaching facility with general and subspecialty medical services in King Saud University Medical City (KSUMC), Riyadh, Saudi Arabia. This study is a cross-sectional study targeting adults diagnosed with atopic dermatitis in KKUH. Patients visiting the dermatology clinic during the study period from May 2023 to September 2023 were asked to fill out a paper-based self-administered questionnaire to assess AD severity, Sleep disturbance and Sleep-related impairment using the Patient-Oriented Eczema Measure (POEM) tool and the Patient-Reported Outcomes Measurement Information System (PROMIS) Sleep Disturbance (SD) and Sleep-related impairment (SRI) instruments respectively. Only patients who fulfilled the inclusion criteria were included in the study. Data was analyzed using SPSS 22.0 version statistical software. A p-value < 0.05 was considered statistically significant. Among 763 participants with atopic dermatitis were included, 74.7 % were females. Allergic rhinitis, asthma, and sinusitis were the highest concomitant associations with atopic dermatitis. Only 17.56% of the participants have eczema without other associations. Almost two-thirds of the participants were within normal limits for sleep disturbance and sleep-related impairments. Eczema severity was proportionate to disease duration and the recent last flare-up. Sleep disturbance and sleep-related impairments were significantly correlated with eczema severity in all categories. As the high prevalence of Sleep disturbance and sleep-related impairment in AD, it is recommended to further study the subject and develop effective interventions to improve sleep and disease outcomes in individuals with AD.

Keywords: Atopic dermatitis; sleep disturbance; Sleep Quality; Sleep Related Impairment; eczema severity; adults

INTRODUCTION

Atopic dermatitis (AD) is a chronic pruritic inflammatory skin disease that affects up to 15% of the Saudi population, most of whom have a moderate severity according to the Patient-Oriented Eczema Measure (POEM) scale[1]. Approximately one-third of AD patients diagnosed during their childhood will have persistent disease in adulthood, and a smaller number will have AD as an adult[2,3]. The pathogenesis of AD stems from T-cell-mediated inflammation and epidermal impairment, often in genetically predisposed persons. AD patients are at higher risk for various atopic conditions, including asthma, allergic rhinitis, and food allergies[4]. AD requires long-term management, including topical medications and frequent healthcare follow-up visits, which might influence the mental health of AD patients and further complicate the association between AD and sleep disturbances, anxiety, and mood disorders[5].

Sleep disturbances are prevalent among AD patients and are considered one of the presenting symptoms and the measures of disease severity. AD patients often have difficulty falling asleep, intense nocturnal pruritus, recurring nocturnal and early morning awakenings, and consequent daytime sleepiness[6]. Furthermore, clinical manifestations of AD have been strongly associated with the severity of sleep disturbances[7,8]. Sandoval et al. found a positive correlation between AD severity and sleep disturbances using actigraphy[8]. Many studies found comorbid sleep disturbances in the majority of AD patients[6,9,10]. Additionally, insomnia was found to be highly associated with AD

* College of Medicine, King Saud University
Riyadh, Saudi Arabia. E-mail: iiFeraS7@gmail.com
** College of Medicine, King Saud bin Abdulaziz University for Health Sciences
Riyadh, Saudi Arabia.
*** Consultant Dermatology At Trust Clinics
Riyadh, Saudi Arabia.
**** Dermatology Department, College of Medicine, King Saud University
Riyadh, Saudi Arabia.

patients compared to adults without AD[11].

Sleep disturbances significantly affect AD patients in several ways. First, depression and anxiety symptoms in AD might originate from or be exaggerated by sleep disorders[10-14]. For instance, a meta-analysis found that insomnia, which is strongly affected by AD, was a significant predictor of depression, anxiety, alcohol abuse, and psychosis[12]. Moreover, Silverberg et al. showed that 40% of adult AD patients had self-reported healthcare-diagnosed anxiety or depression in the past 12 months, significantly higher than adults without AD[14]. Additionally, insomnia has been indicated as a predictor of overall health status in adults with AD[11]. Furthermore, AD patients had a significantly lower quality of life among different chronic skin diseases[15]. Finally, Yu SH et al. showed a significant association between sleep disturbances and impairment of instrumental activity of daily living (IADL) in a large cohort of AD patients in the US[16].

Most of the literature that was published in Saudi Arabia focuses on atopic dermatitis and sleep disturbance in pediatrics. To our knowledge, this correlation is understudied among the adult population in the Middle East and in Saudi Arabia specifically. As it is a growing burden over time, it requires further investigations and studies locally. Thus, this study aims to determine the outcomes of sleep disturbances in adult atopic dermatitis patients in Saudi Arabia and help healthcare workers diagnose and manage it.

MATERIALS AND METHODS

Study design and setting: A descriptive-analytic cross-sectional study was conducted at King Khalid University Hospital (KKUH); a teaching facility with general and subspecialty medical services in King Saud University Medical City (KSUMC), Riyadh, Saudi Arabia between May 2023, and August 2024.

Target population/sampling: The sampling technique is convenient sampling, The inclusion criteria are patients who are above the age of 18 years and are diagnosed with atopic dermatitis. Patients visiting dermatology clinics in KKUH who fulfill the inclusion criteria were asked to fill out a paper-based self-administered questionnaire. Patients who were not diagnosed with atopic dermatitis and patients who were below 18 years old were excluded.

Sample Size: The Good Calculators[17] website was used to estimate the required sample size using the formula: n = z2 * p * (1 - p) / e2, based on previous study findings[18] which indicate that Atopic Dermatitis among Adults in Saudi Arabia ranges between 6% to 13%. We estimated the sample with the following assumption: prevalence of knowledge at 8.5% (a figure chosen because we did not find any prior published studies on knowledge in a similar setting) with a confidence level of 95% and a margin of error of 1.98%; the required sample size was estimated to be 763.

Data collection tool: The questionnaire consisted of three sections. The first section starts by determining whether the participant has been diagnosed with atopic dermatitis, along with the informed consent on the first page.

The second section included the participants' demographics; including age and gender, disease duration and when was the last episode of atopic dermatitis.

The third section assesses the presence of other associations with AD like asthma, allergic rhinitis, sinusitis, conjunctivitis, and alopecia. As AD varies considerably in its clinical course, the severity of AD was measured using the Patient-Oriented Eczema Measure (POEM) instrument. POEM is a self-assessed, repeatable, well-validated measurement tool for monitoring atopic eczema severity. It is composed of 7 questions evaluating itch, skin dryness, skin bleeding, skin oozing, cracked skin, skin desquamation and sleep disturbance in the past week[19]. For each question, there's a five-value response option - no days, 1-2 days, 3-4 days, 5-6 days, and every day, which can be scored from zero to four. Scores range from 0 to 28, the higher the score the higher the level of eczema severity. POEM scoring is categorized into:
0 to 2 = Clear or almost clear,
3 to 7 = Mild eczema,
8 to 16 indicate moderate eczema,
17 to 24 = Severe eczema,
25 to 28 = Very severe eczema

Sleep disturbance was measured using the Patient-Reported Outcomes Measurement Information System (PROMIS) Sleep Disturbance (SD) item bank in which A person's impression of their sleep quality, the restoration that comes from sleep, perceived sleep difficulties and worries about falling and staying asleep, as well as perceptions of adequate and satisfying sleep are all evaluated, Sleep-Related Impairment (SRI) bank is related to a person's sleepiness During waking hours, the patient experiences tiredness, lethargy, and cognitive impairments. Additionally, items related to sleep problems or diminished alertness assess perceptions of functional impairment during the daytime that are related to these issues. Both tools are validated for the assessment of sleep disturbance and sleep-related impairment with excellent measurement properties[20]. Each Sleep Disturbance and Sleep-Related Impairment item is scored on a 5-point Likert scale (1 being Not at all or never, 2 being A little bit or rarely, 3 being Somewhat or Sometimes, 4 being Quite a bit or often, and 5 being Very Much or Always), and each score represents the frequency with which respondents have experienced sleep-related issues over the previous seven days. Then, a raw score out of 40 is calculated using a t-score with a mean of 50 and a standard deviation of 10. The calculated score is divided into four categories,
20-55 = within normal limits,
56-60 = mild
61-70 = moderate
71-80 = severe

Pilot study and Data Collection: All the members of the study project were trained for the data collection process. Primary analyses of the pilot study yielded results that were largely consistent with current tables. For POEM, PROMIS-SD and PROMI-SRI, estimates using the data from the pilot study were slightly attenuated toward the null; however, the results remained qualitatively similar and statistically significant. For POEM, PROMIS-SD and PROMI-SRI, the results were nearly identical.

Statistical analysis: Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Continuous variables were expressed as mean ± standard deviation and median, categorical variables were expressed as percentages. Pearson Correlation Coefficient was used to assess the correlation between Eczema severity Score and Mood Score. A p-value <0.05 was considered statistically significant.

RESULTS

The questionnaire was distributed to 1379 Adult Participants. Only 763 met the inclusion criteria. female participants represented almost three-quarters of the participants (74.71%). The mean age was (28.76±10.40) and the median was 25. More than 60.55% of the participants have been

diagnosed with eczema for more than three years Figure 1 (Eczema chronicity). About 56.49% of the participants had an episode of AD flare-up in the last 6 months Figure 2. The commonest association with AD among our participants were allergic rhinitis, sinusitis, and asthma 31.45%, 28.83% and 17.96% respectively. As shown in table (1).

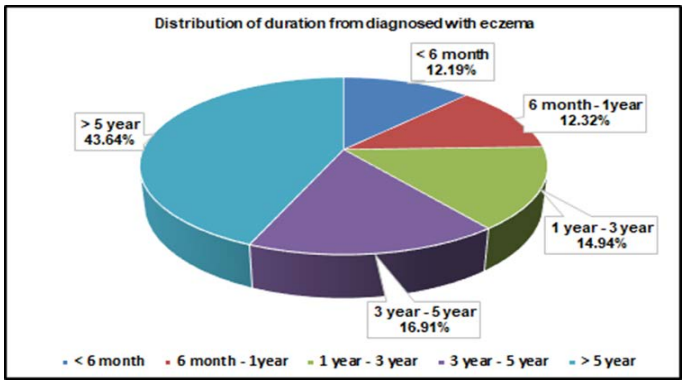

Figure1. Distribution of participants based on disease duration

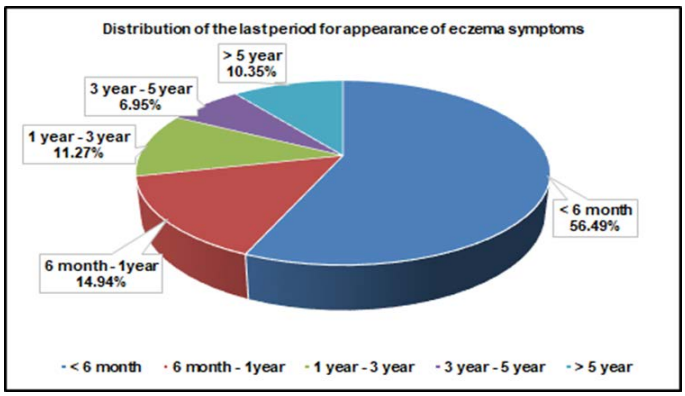

Figure 2. Distribution of participants based on the onset of last episode

Table 1. Characteristics of the participants and concomitant conditions (n=763)

		Number	%
Gender	Male	193	25.29
	Female	570	74.71
Age (Means), Median		28.76±10.40	25.00
How long have you been diagnosed with eczema	< 6 month	93	12.19
	6 month - 1year	94	12.32
	1 year - 3 year	114	14.94
	3 year - 5 year	129	16.91
	> 5 year	333	43.64
When was the last episode of eczema symptoms	< 6 month	431	56.49
	6 month - 1year	114	14.94
	1 year - 3 year	86	11.27
	3 year - 5 year	53	6.95
	> 5 year	79	10.35
Concomitant conditions			
Asthma		137	17.96
Allergic Rhinitis		240	31.45
Sinusitis		220	28.83
Conjunctivitis		49	6.42
Alopecia		57	7.47
No association		317	41.55
Other		19	2.49

Severity of eczema, Sleep Disturbance and Sleep-Related Impairment:

The Patient-Oriented Eczema Measures (POEM) questionnaire demonstrated that 45.48% of the participants have moderate eczema, 30.67% of the participants have severe eczema and only 6.29% have very severe eczema. Clear/almost clear and mild eczema account for 17.56%. As shown in Table (2).

Table 2. Assessment Eczema severity, Sleep Disturbance and Sleep Related Impairment

		Number	%
Eczema severity	Clear or almost clear	20	2.62
	Mild eczema	114	14.94
	Moderate eczema	347	45.48
	Severe eczema	234	30.67
	Very severe eczema	48	6.29
Sleep Disturbance	Within normal limits	526	68.94
	Mild	100	13.11
	Moderate	130	17.04
	Severe	7	0.92
Sleep Related Impairment	Within normal limits	503	65.92
	Mild	144	18.87
	Moderate	113	14.81
	Severe	3	0.39

Sleep disturbance showed that 68.94% of the participants were within normal limits, 13.11% had mild sleep disturbance, 17.04% had moderate sleep disturbance and only 0.92% had severe sleep disturbance. as shown in Table (2)

Sleep Related Impairment tool showed similar results to sleep disturbance, 65.92% were within normal limits, 18.87% were mild, 14.81% were moderate and 0.39 were severely disturbed. Table (2)

Correlation between Eczema severity with characteristics of the participants, concomitant conditions, Sleep Disturbance and Sleep related impairments.

Eczema severity was significant among patients who were 30 years of age or younger and females. The proportion of adults with atopic dermatitis severity and age is shown in Table 3 and Figure 3.

Eczema severity was proportionate to disease chronicity, most of the participants who reported eczema severity as moderate (n=128) and severe (n=133) were diagnosed with AD for at least 5 years (p= <0.001*) and those who reported very severe eczema (72.92%) were diagnosed with AD for more than 5 years. (p= <0.001*). Patients who developed an episode of disease relapse in the last six months were more likely to have severe disease (p= <0.001*) as shown in table 4.

Participants with concomitant allergic rhinitis had more severe disease (p=0.036*). However, sinusitis was following the same trend as allergic rhinitis, but we didn't find any statistical significance with eczema severity Cont. table 4.

Table 3. Correlation between Eczema severity and characteristics of the participants and concomitant conditions

		Eczema severity										P value
		Clear or almost clear (n=20)		Mild eczema (n=114)		Moderate eczema (n=347)		Severe eczema (n=234)		Very severe eczema (n=48)		
		Number	%	Number	%	Number	%	Number	%	Number	%	
Age	<30y	13	65.00	71	62.28	230	66.28	159	67.95	27	56.25	0.076
	30-39y	0	0.00	22	19.30	57	16.43	42	17.95	13	27.08	
	40-49y	5	25.00	11	9.65	34	9.80	20	8.55	8	16.67	
	>=50	2	10.00	10	8.77	26	7.49	13	5.56	0	0.00	
Gender	Male	10	50.00	44	38.60	81	23.34	50	21.37	8	16.67	<0.001*
	Female	10	50.00	70	61.40	266	76.66	184	78.63	40	83.33	
How long have you been diagnosed with eczema	< 6 month	6	30.00	18	15.79	43	12.39	24	10.26	2	4.17	<0.001*
	6 month - 1 year	2	10.00	21	18.42	44	12.68	25	10.68	2	4.17	
	1 year - 3 year	2	10.00	31	27.19	59	17.00	18	7.69	4	8.33	
	3 year - 5 year	4	20.00	13	11.40	73	21.04	34	14.53	5	10.42	
	> 5 year	6	30.00	31	27.19	128	36.89	133	56.84	35	72.92	
When was the last episode of eczema symptoms	< 6 month	11	55.00	57	50.00	168	48.41	160	68.38	35	72.92	<0.001*
	6 month - 1 year	3	15.00	25	21.93	66	19.02	18	7.69	2	4.17	
	1 year - 3 year	4	20.00	16	14.04	50	14.41	11	4.70	5	10.42	
	3 year - 5 year	0	0.00	5	4.39	27	7.78	18	7.69	3	6.25	
	> 5 year	2	10.00	11	9.65	36	10.37	27	11.54	3	6.25	
Concomitant conditions	Asthma	4	20.00	14	12.28	70	20.17	42	17.95	7	14.58	0.396
	Allergic Rhinitis	9	45.00	28	24.56	99	28.53	89	38.03	15	31.25	0.036*
	sinusitis	7	35.00	28	24.56	100	28.82	68	29.06	17	35.42	0.662
	Conjunctivitis	1	5.00	3	2.63	21	6.05	21	8.97	3	6.25	0.248
	alopecia	1	5.00	7	6.14	22	6.34	23	9.83	4	8.33	0.550
	No association	6	30.00	60	52.63	147	42.36	83	35.47	21	43.75	0.031*
	Other	0	0.00	0	0.00	7	2.02	9	3.85	3	6.25	0.081

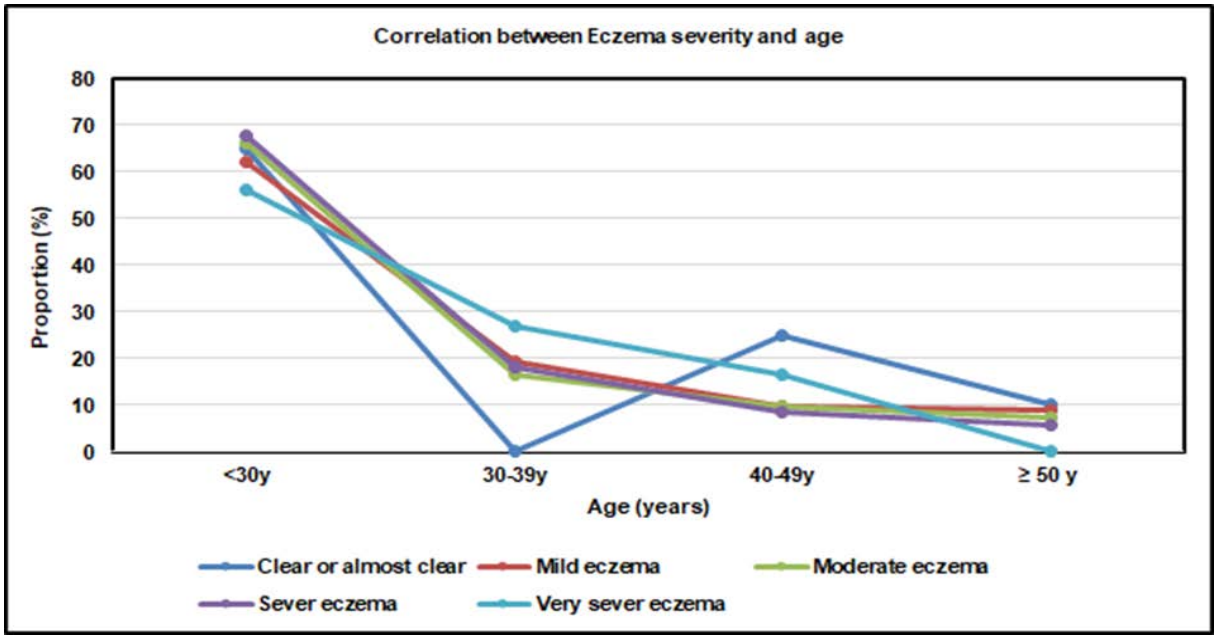

Figure 3. The proportion of Adults with atopic dermatitis severity and age.

Table 4. Correlation between Sleep Disturbance and characteristics of the participants and concomitant conditions

		Within normal limits (n=526)		Mild (n=100)		Moderate (n=130)		Severe (n=7)		P value
		Number	%	Number	%	Number	%	Number	%	
Age	<30y	338	64.26	73	73.00	85	65.38	4	57.14	0.453
	30-39y	89	16.92	17	17.00	26	20.00	2	28.57	
	40-49y	61	11.60	6	6.00	11	8.46	0	0.00	
	>=50	38	7.22	4	4.00	8	6.15	1	14.29	
Gender	Male	138	26.24	23	23.00	30	23.08	2	28.57	0.825
	Female	388	73.76	77	77.00	100	76.92	5	71.43	
How long have you been diagnosed with eczema	< 6 month	69	13.12	11	11.00	13	10.00	0	0.00	0.510
	6 month - 1year	63	11.98	16	16.00	15	11.54	0	0.00	
	1 year - 3 year	78	14.83	18	18.00	18	13.85	0	0.00	
	3 year - 5 year	86	16.35	19	19.00	21	16.15	3	42.86	
	> 5 year	230	43.73	36	36.00	63	48.46	4	57.14	
When was the last period of eczema symptoms	< 6 month	288	54.75	50	50.00	88	67.69	5	71.43	0.036*
	6 month - 1year	78	14.83	20	20.00	16	12.31	0	0.00	
	1 year - 3 year	67	12.74	12	12.00	5	3.85	2	28.57	
	3 year - 5 year	34	6.46	11	11.00	8	6.15	0	0.00	
	> 5 year	59	11.22	7	7.00	13	10.00	0	0.00	
Concomitant conditions	Asthma	88	16.73	24	24.00	23	17.69	2	28.57	0.313
	Allergic Rhinitis	144	27.38	34	34.00	56	43.08	6	85.71	<0.001*
	Sinusitis	130	24.71	32	32.00	54	41.54	4	57.14	<0.001*
	Conjunctivitis	32	6.08	4	4.00	11	8.46	2	28.57	0.053
	alopecia	35	6.65	11	11.00	10	7.69	1	14.29	0.425
	No complication	242	46.01	36	36.00	39	30.00	0	0.00	0.001*
	Other	13	2.47	4	4.00	2	1.54	0	0.00	0.659
Eczema severity	Clear or almost clear	15	2.85	3	3.00	2	1.54	0	0.00	<0.001*
	Mild eczema	88	16.73	15	15.00	11	8.46	0	0.00	
	Moderate eczema	262	49.81	43	43.00	40	30.77	2	28.57	
	Severe eczema	143	27.19	29	29.00	59	45.38	3	42.86	
	Very severe eczema	18	3.42	10	10.00	18	13.85	2	28.57	
Sleep Related Impairment	within normal limits	435	82.70	35	35.00	33	25.38	0	0.00	<0.001*
	mild	67	12.74	40	40.00	36	27.69	1	14.29	
	moderate	23	4.37	25	25.00	60	46.15	5	71.43	
	severe	1	0.19			1	0.77	1	14.29	

* Significant p value

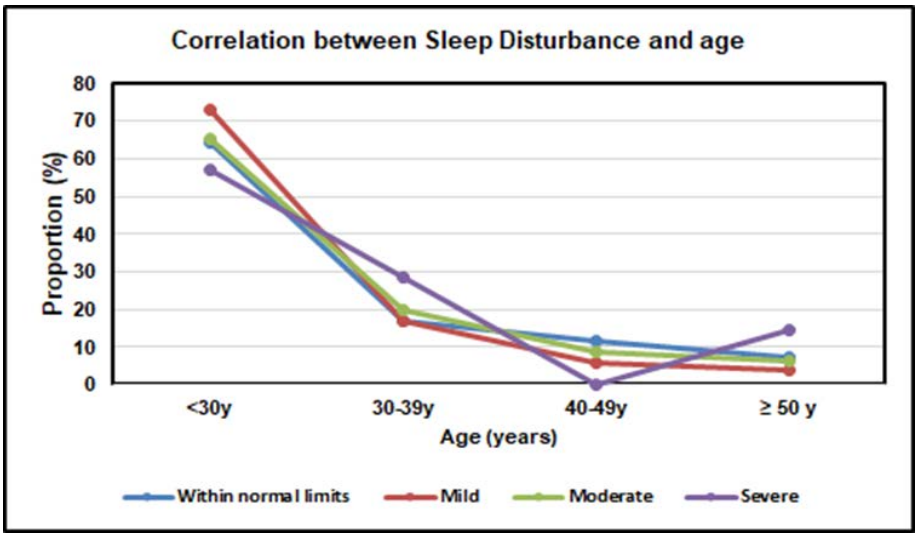

Figure 4. The proportion of sleep disturbance and age is shown.

Table5. Correlation between Sleep Related Impairment and characteristics of the participants with concomitant conditions

		Within normal limits (503)		Mild 144)		Moderate (113)		Severe (3)		P value
		Number	%	Number	%	Number	%	Number	%	
Age	<30y	323	64.21	93	64.58	81	71.68	3	100.00	0.239
	30-39y	82	16.30	33	22.92	19	16.81	0	0.00	
	40-49y	61	12.13	9	6.25	8	7.08	0	0.00	
	>=50	37	7.36	9	6.25	5	4.42	0	0.00	
Gender	Male	133	26.44	38	26.39	21	18.58	1	33.33	0.357
	Female	370	73.56	106	73.61	92	81.42	2	66.67	
How long have you been diagnosed with eczema	< 6 month	55	10.93	19	13.19	18	15.93	1	33.33	0.451
	6 month - 1year	60	11.93	21	14.58	13	11.50	0	0.00	
	1 year - 3 year	76	15.11	28	19.44	10	8.85	0	0.00	
	3 year - 5 year	88	17.50	21	14.58	19	16.81	1	33.33	
	> 5 year	224	44.53	55	38.19	53	46.90	1	33.33	
When was the last period of eczema symptoms	< 6 month	286	56.86	63	43.75	80	70.80	2	66.67	0.004*
	6 month - 1year	66	13.12	37	25.69	10	8.85	1	33.33	
	1 year - 3 year	60	11.93	17	11.81	9	7.96	0	0.00	
	3 year - 5 year	35	6.96	13	9.03	5	4.42	0	0.00	
	> 5 year	56	11.13	14	9.72	9	7.96	0	0.00	
Concomitant Conditions	Asthma	85	16.90	25	17.36	25	22.12	2	66.67	0.870
	Allergic Rhinitis	139	27.63	52	36.11	48	42.48	1	33.33	0.011*
	Sinusitis	122	24.25	44	30.56	51	45.13	3	100.00	<0.001*
	Conjunctivitis	30	5.96	9	6.25	10	8.85	0	0.00	0.683
	Alopecia	33	6.56	13	9.03	11	9.73	0	0.00	0.534
	No complication	232	46.12	55	38.19	30	26.55	0	0.00	0.001*
	Other	12	2.39	4	2.78	3	2.65	0	0.00	0.984

		Within normal limits (503)		Mild 144)		Moderate (113)		Severe (3)		P value
		Number	%	Number	%	Number	%	Number	%	
Eczema severity	Clear or almost clear	15	2.98	3	2.08	2	1.77	0	0.00	<0.001*
	Mild eczema	85	16.90	18	12.50	10	8.85	1	33.33	
	Moderate eczema	243	48.31	71	49.31	31	27.43	2	66.67	
	Severe eczema	138	27.44	41	28.47	55	48.67	0	0.00	
	Very severe eczema	22	4.37	11	7.64	15	13.27	0	0.00	
Sleep Disturbance	within normal limits	435	86.48	67	46.53	23	20.35	1	33.33	<0.001*
	mild	35	6.96	40	27.78	25	22.12	0	0.00	
	moderate	33	6.56	36	25.00	60	53.10	1	33.33	
	severe	0	0.00	1	0.69	5	4.42	1	33.33	

* Significant p value

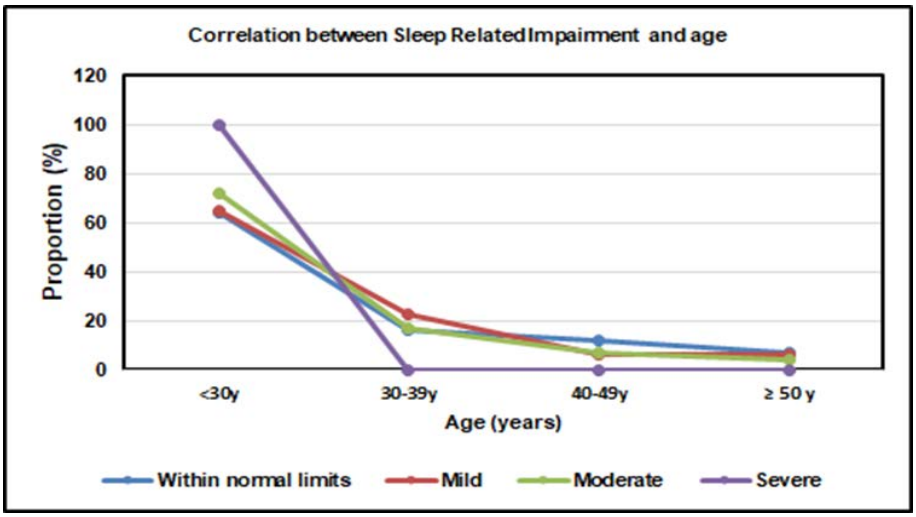

Figure 5. The proportion of Sleep Related Impairment and age is shown.

Correlation between Sleep Disturbance with characteristics of the participants, concomitant conditions, Eczema Severity and Sleep Related Impairment.

Table 5 shows that most of the participants had a normal sleep range (n=526). Participants who are younger than 30 years of age are more likely to have a normal sleep range as shown in Figure 4. Among participants who had eczema symptoms within the last six months, fifty percent of mild sleep disturbance, 67.69% of moderate sleep disturbance and 71.43% of severe disturbance were statistically significant.

Having allergic rhinitis and sinusitis as a concomitant condition significantly correlates with sleep disturbance across all categories of sleep disturbance. (p=0.001*).

Lastly, sleep disturbance significantly correlates with eczema severity as moderate and severe. (p=0.001*) Cont. table 5.

Correlation between Sleep Related Impairment with characteristics of the participants, concomitant conditions, Eczema severity and Sleep disturbance

The majority of the individuals (n=526) out of 763, as shown in Table 5, were within the normal range Figure 5. The majority of patients who are 30 years or younger had mild sleep-related impairment. The percentages of mild sleep-related impairment (43.75%), moderate sleep-related impairment (70.8%), and severe sleep-related impairment (66.67%) among participants who experienced eczema symptoms within the previous six months were statistically significant. (p=0.004*)

All forms of sleep disturbance are significantly associated with having allergic rhinitis and sinusitis as coexisting conditions. (p=0.011*) (p=0.001*).

Finally, there is a strong correlation between sleep disturbance and moderate and severe eczema severity. (p=0.001*) Cont. table 5.

DISCUSSION

This cross-sectional study found a high prevalence of sleep disturbance and sleep-related impairment in AD patients and a strong correlation between sleep disturbance and eczema severity. Sleep disturbances in adults with AD can range from difficulty falling asleep to interrupted sleep due to itching, thus leading to reduced sleep quality. One-third of AD patients had a degree of sleep-related impairment, and one-third of adults with AD reported sleep disturbances. Similarly, Li et al. found that 32% of US adults with AD reported poor or very poor sleep in the past week[21]. Moreover, 41% of individuals in the United States who meet the criteria for AD indicated experiencing sleep disturbances on one or more nights within the previous week, with 80% reporting at least some difficulty sleeping in the past three days[22].

Several studies align with our study in demonstrating a positive correlation between the severity of AD and the magnitude of sleep disturbance. For instance, Silverberg et al. utilized data from 34,613 adults from the 2012 National Health Interview Survey. They found that adults with AD reported significantly more sleep disturbances, daytime sleepiness, and insomnia than those without AD. These associations remained significant even after accounting for factors such as sleep duration, history of allergic disease, sociodemographic factors, and body mass index. Moreover, participants with both eczema and any of the sleep symptoms exhibited higher odds of experiencing poorer outcomes than those with either eczema or sleep symptoms alone[11].

Many theories have emerged to explain the pathophysiology behind this association between AD and sleep disturbance. In a study by Chang et al., 72 pediatric AD patients and 32 controls had their sleep parameters measured by actigraphy and polysomnography. Aligning with our results, AD patients were found to have significantly decreased sleep efficiency, prolonged sleep onset latency, more sleep fragmentation, and less nonrapid eye movement sleep. Interestingly, AD patients with lower nighttime melatonin secretion or higher total serum IgE levels had significantly more sleep disturbance. Additional factors that were associated with poor sleep in AD patients were pruritus and scratching movements[23]. Moreover, Hon et al. found a significant correlation between serum levels of brain-derived neurotrophic factor (BDNF) and substance P and quality of life in children with AD[24]. Disruptions in circadian rhythms or the rhythmic release of biological substances (such as cortisol) could be responsible for the daily pattern of itching and flare-ups, particularly considering the nighttime occurrence of eczema flare-ups[25,26]. Additionally, the itch-scratch cycle is when pruritus, a hallmark symptom of AD, leads to a vicious cycle of scratching and extensive skin damage. Scratching can exacerbate inflammation, disrupt sleep, and impair sleep quality[27]. The exaggerated immune response in AD with a predominance of Th2 cells and pro-inflammatory cytokines can directly affect neural pathways involved in sleep regulation, leading to disrupted sleep patterns[22]. Furthermore, the chronic nature of AD, along with the impact on quality of life, can contribute to psychological distress, including anxiety and depression, which might further disrupt sleep and exacerbate the perception of itchiness[28].

In summary, the relationship between sleep disturbance and the severity of AD is multifaceted, involving both physiological and psychological aspects. Given the implications of our findings, future studies must delve deeper into the understanding of sleep disturbances in individuals with eczema and develop effective interventions to improve sleep and disease outcomes in individuals with AD.

Limitations: There are several limitations of this study. First is recall bias as the assessment of AD severity, Sleep disturbance and sleep-related impairment was based on self-report, patients may not recall the accurate responses to the assessment measures. Second, assessment of Sleep disturbance and sleep-related impairment might be prone to confounding bias, as many factors, including mood, health, and social stressors, can play a role in sleep disturbance and sleep-related impairment. Finally, this cross-sectional study was able to show the association between atopic dermatitis severity and sleep disturbance; however, it was unable to show the causality. This issue can be addressed by conducting further cohort or controlled studies where the assessment of sleep disturbance and sleep-related impairment would be conducted in relation to AD severity control.

With that being said, this study has several implications for future research, precisely, trials that assess the effectiveness of atopic dermatitis interventions in reducing sleep disturbance and sleep-related impairment. As this study shows a significant association between AD severity and sleep disturbance and sleep-related impairment, guidelines for assessment and management of sleep disturbance and sleep-related impairment should be implemented and added to the clinical approach of AD.

CONCLUSION

In summary, Sleep disturbance and Sleep related Impairments are prevalent among adults with AD in Saudi Arabia. It is important for healthcare providers to delve deeper into the understanding of sleep disturbances in individuals with eczema and develop effective interventions to improve sleep and disease outcomes in individuals with AD.

Authorship Contribution: EA is the Primary investigator, Revised

Final draft of manuscript, FA and SBO(Sultan) are the one who conceived and designed the study, conducted Research and who wrote the manuscript, SBO(Shahad) and AA did Methodology Development, SA Did the data collection and manuscript writing. MMB, LA, FA, RZA and AOA Provided research materials, data collection and provided logistical support. SOO did the analysis and revision of the data. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Potential Conflicts of Interest: None

Competing Interest: None

Acceptance Date: 23 April 2025

REFERENCE

1. Maspero J, Rubini NDPM, Zhang J, et al. Epidemiology of adult patients with atopic dermatitis in AWARE 1: a second international survey. World Allergy Organ J. 2023;16(3):100724.
2. Abuabara K, Yu AM, Okhovat JP, et al. The prevalence of atopic dermatitis beyond childhood: a systematic review and meta-analysis of longitudinal studies. Allergy. 2018;73(3):696–704.
3. Napolitano M, Megna M, Patruno C, et al. Adult atopic dermatitis: a review. G Ital Dermatol Venereol. 2016;151(4):403–11.
4. Langan SM, Irvine AD, Weidinger S. Atopic dermatitis. Lancet. 2020;396(10247):345–60.
5. Kiebert G, Sorensen SV, Revicki D, et al. Atopic dermatitis is associated with a decrement in health-related quality of life. Int J Dermatol. 2002;41(3):151–8.
6. Chang YS, Chiang BL. Sleep disorders and atopic dermatitis: a 2-way street? J Allergy Clin Immunol. 2018;142(4):1033–40.
7. Yano C, Saeki H, Ishiji T, et al. Impact of disease severity on sleep quality in Japanese patients with atopic dermatitis. J Dermatol Sci. 2013;72(2):195–7.
8. Sandoval LF, Huang K, O'Neill JL, et al. Measure of atopic dermatitis disease severity using actigraphy. J Cutan Med Surg. 2014;18(1):49–55.
9. Jeon C, Yan D, Nakamura M, et al. Frequency and management of sleep disturbance in adults with atopic dermatitis: a systematic review. Dermatol Ther (Heidelb). 2017;7(3):349–64.
10. Silverberg JI. Selected comorbidities of atopic dermatitis: atopy, neuropsychiatric, and musculoskeletal disorders. Clin Dermatol. 2017;35(4):360–6.
11. Silverberg JI, Garg NK, Paller AS, et al. Sleep disturbances in adults with eczema are associated with impaired overall health: a US population-based study. J Invest Dermatol. 2015;135(1):56–66.
12. Hertenstein E, Feige B, Gmeiner T, et al. Insomnia as a predictor of mental disorders: a systematic review and meta-analysis. Sleep Med Rev. 2019;43:96–105.
13. Neckelmann D, Mykletun A, Dahl AA. Chronic insomnia as a risk factor for developing anxiety and depression. Sleep. 2007;30(7):873–80.
14. Silverberg JI, Gelfand JM, Margolis DJ, et al. Symptoms and diagnosis of anxiety and depression in atopic dermatitis in U.S. adults. Br J Dermatol. 2019;181(3):554–65.
15. Beikert FC, Langenbruch AK, Radtke MA, et al. Willingness to pay and quality of life in patients with atopic dermatitis. Arch Dermatol Res. 2014;306(3):279–86.
16. Yu SH, Attarian H, Zee P, et al. Burden of sleep and fatigue in US adults with atopic dermatitis. Dermatitis. 2016;27(2):50–8.
17. Good Calculators [Internet]. Sample size calculator. Available from: https://goodcalculators.com/sample-size-calculator/
18. Alqahtani JM. Atopy and allergic diseases among Saudi young adults: a cross-sectional study. J Int Med Res. 2020;48(1):0300060519899760.
19. Kido-Nakahara M, Nakahara T, Yasukochi Y, et al. Patient-oriented eczema measure score: a useful tool for web-based surveys in patients with atopic dermatitis. Acta Derm Venereol. 2020;100(10):1–4.
20. Buysse DJ, Yu L, Moul DE, et al. Development and validation of patient-reported outcome measures for sleep disturbance and sleep-related impairments. Sleep. 2010;33(6):781–92.
21. Li JC, Fishbein A, Singam V, et al. Sleep disturbance and sleep-related impairment in adults with atopic dermatitis: a cross-sectional study. Dermatitis. 2018;29(5):270–7.
22. Silverberg JI, Chiesa-Fuxench Z, Margolis D, et al. Epidemiology and burden of sleep disturbances in atopic dermatitis in US adults. Dermatitis. 2021;33(6S).
23. Chang YS, Chou YT, Lee JH, et al. Atopic dermatitis, melatonin, and sleep disturbance. Pediatrics. 2014;134(2):e367–74.
24. Hon KLE, Lam MCA, Wong KY, et al. Pathophysiology of nocturnal scratching in childhood atopic dermatitis: the role of brain-derived neurotrophic factor and substance P. Br J Dermatol. 2007;157(5):922–5.
25. Gupta MA, Gupta AK. Sleep-wake disorders and dermatology. Clin Dermatol. 2013;31(1):118–26.
26. Schwarz W, Bock G, Hornstein OP. Plasma levels of cyclic nucleotides are elevated in atopic eczema. Arch Dermatol Res. 1987;279(S1).
27. Mack MR, Kim BS. The itch–scratch cycle: a neuroimmune perspective. Trends Immunol. 2018;39(12):980–91.
28. Kage P, Simon J, Treudler R. Atopic dermatitis and psychosocial comorbidities. J Dtsch Dermatol Ges. 2020;18(2):93–102.