



The Relationship between the Severity of Atopic Dermatitis and Sleep Quality in Widya Mandala Surabaya Catholic University Teaching Hospital Patients

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ABSTRACT

Background: Atopic dermatitis is a chronic inflammatory skin disease that commonly begins during childhood. Most atopic dermatitis patients may experience symptoms that continue into adulthood. Itching is the characteristic symptom of atopic dermatitis. Over time, patients' itching can lead to sleep disturbances. In fact, every human being requires sleep to maintain the balance of metabolism, calories, temperature, and immunity. If a person often lacks sleep, the risk of obesity, type 2 diabetes mellitus, hypertension, heart disease, stroke, deterioration of mental health, and premature death will increase. **Purpose:** To analyze the relationship between the severity of atopic dermatitis and sleep quality in Widya Mandala Surabaya Catholic University (WMSCU) teaching hospital patients. **Methods:** This is an analytic study with a cross-sectional research design. This study used the purposive sampling technique as its sampling method. A dermatologist used the Eczema Area and Severity Index (EASI) instrument, to assess the severity of atopic dermatitis in the samples, and Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality. **Result:** The Mann-Whitney test showed a p value of 0.348 ($p > 0.05$). **Conclusion:** There is no significant relationship between the severity of atopic dermatitis and sleep quality in WMSCU teaching hospital patients.

Keywords: Atopic dermatitis, sleep quality, itch, EASI, PSQI

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BACKGROUND

Atopic dermatitis (AD) is a chronic inflammatory skin condition that commonly starts during childhood. Most patients with atopic dermatitis may experience symptoms that continue into adulthood. Since the 1960s, atopic dermatitis has tripled in prevalence. Experts estimated that 15-30% of children and 2-10% of adults in developed countries suffer from atopic dermatitis.¹ Atopic dermatitis is thought to be caused by mutations of the Filaggrin protein. The Filaggrin gene, located on chromosome 1q21, encodes the Filaggrin (FLG) protein. The mutation is responsible for 11-15% of atopic dermatitis cases in Europe.

However, not all cases of atopic dermatitis are caused by FLG mutations. Patients with atopic dermatitis often show an immunologic sign with a T-helper 2 (Th2) phenotype. This means that there are increased immunoglobulin E (IgE), eosinophils in skin biopsies, as well as positive results on skin tests and radioallergosorbent tests (RAST). Furthermore, researchers found high levels of thymic stromal lymphopoietin (TSLP) in the skin lesions of atopic dermatitis patients. TSLP is an interleukin-7-like cytokine that, through its interaction with mast cells and dendritic cells, can promote the secretion and

production of Th2 cytokines and the development of inflammatory T cells (Th2 CD4+).² Itching is the characteristic symptom of atopic dermatitis. In severe cases of atopic dermatitis, the patient will continuously feel this itching, which can eventually cause sleep disturbances.³

Every human being needs sleep to maintain the balance of metabolism, calories, temperature, and immunity.⁴ Every night, people will experience two types of sleep. These types of sleep are divided into rapid-eye movement sleep (REM sleep) and slow-wave sleep (non-REM sleep). REM sleep is a type of sleep that is not very deep, while non-REM sleep is a deep and restful sleep.⁵ Lack of sleep can increase the risk of obesity, type 2 diabetes mellitus, hypertension, heart disease, stroke, deterioration of mental health, and premature death.⁶

In one study, atopic dermatitis patients spent up to 14.3% of their sleep time scratching.⁷ These scratching impulses are often out of the patient's control.² According to a study involving patients with lichen simplex chronicus, scratching episodes occur in all stages of non-REM sleep but are most common in stages 1 and 2. Scratching episodes in stages 1 and 2 can easily wake the patients up and cause disturbances in non-REM sleep stages 3 and 4.⁸ Another study revealed that 224 out of 287 respondents reported experiencing one or more sleep disturbances due to their atopic dermatitis in the past week.⁹

The objective of this research is to determine the relationship between the severity of atopic dermatitis and sleep quality in WMSCU teaching hospital patients. We anticipate this research to yield valuable insights into the relationship between the severity of atopic dermatitis and sleep quality.

METHODS

This is an analytical study with a cross-sectional research design. We conducted this research at the skin clinics of PHC Surabaya Hospital and Gotong Royong Surabaya Hospital from July 13th to October 31st, 2023. The population of this research were patients who sought treatment at the skin clinics of PHC Surabaya Hospital and Gotong Royong Surabaya Hospital. The samples of this research were patients diagnosed with atopic dermatitis at the skin clinics of PHC Surabaya Hospital and Gotong Royong Surabaya Hospital.

The inclusion criteria were patients diagnosed with atopic dermatitis through the Hanifin and Rajka's criteria and those aged 12-60 years. Meanwhile, the exclusion criteria were patients diagnosed with primary insomnia and taking anti-insomnia drugs,

having complications of eczema herpeticum, taking anti-inflammatory drugs and/or immunosuppressants in the last 1 week, and taking anti-histamine drugs in the last 3 days.

The dermatologist used the Eczema Area and Severity Index (EASI) instrument to assess the severity of atopic dermatitis in patients undergoing treatment. Afterwards, the patients completed the Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality. After obtaining the necessary data, the researcher(s?) processed and analyzed the data using the Statistical Program for Social Science (SPSS) version 26 program. The Mann-Whitney test was used in this research.

This research has been reviewed by the Ethics Committee of Widya Mandala University, Surabaya.

RESULT

Table 1. Demographic characteristics of the samples

	Frequency (n)	Percentage (%)
Age		
12-16	2	7
17-25	7	25
26-35	7	25
36-45	4	14,3
46-55	4	14,3
56-60	4	14,3
Sex		
Man	11	39,3
Woman	17	60,7
Severity		
No eczema	0	0
Almost no eczema	0	0
Mild	3	10,7
Moderate	16	57,1
Severe	9	32,1
Very severe	0	0
Sleep Quality		
Good	7	25
Bad	21	75

Table 2. Distribution of Sleep Quality by Sex

Sex	Sleep Quality	
	Good	Bad
Man	4 (36,4%)	7 (63,6%)
Woman	3 (17,6%)	14 (82,4%)

Only 4 out of 7 men (36.4%) and 3 out of 14 women (17.6%) had good sleep quality.

Table 3. Tabulation of the Relationship between Atopic Dermatitis Severity and Sleep Quality

Severity	Sleep Quality		Exact Sig. [2*(1-tailed Sig.)]
	Good	Bad	
No eczema	0 (0%)	0 (0%)	.348
Almost no eczema	0 (0%)	0 (0%)	
Mild	1 (33,3%)	2 (66,7%)	
Moderate	5 (31,25%)	11 (68,75%)	
Severe	1 (11,1%)	8 (88,9%)	
Very severe	0 (0%)	0 (0%)	

In patients with mild atopic dermatitis, 1 out of 2 (33.3%) respondents had good sleep quality. In patients with moderate atopic dermatitis, 5 out of 11 (31.25%) respondents have good sleep quality. In patients with severe atopic dermatitis, 1 out of 8 (11.1%) respondents had good sleep quality. The Mann-Whitney test in Table 3 yielded a significant value.

DISCUSSION

Most of the respondents in this study were patients aged 17-35 years. Estrogen levels in the body can influence this condition. Estrogen hormone can increase Th2 cell activity,¹⁰ which is one of the causes of atopic dermatitis. Older women experience a decrease in estrogen levels, especially during menopause, which usually occurs between the ages of 40 and 55 years.¹¹ We also know that estrogen consists of three types: estrone, estradiol, and estriol.¹⁰ In men, estradiol levels will also decrease with age.¹² Therefore, the older a person gets, the lower their risk of developing atopic dermatitis.

Additionally, we found that more respondents were female than male. Hormones in the body may be responsible for this phenomenon. Estrogen and progesterone increase Th2 cell activity, whereas testosterone suppresses Th2 cell activity and is immunosuppressive. As previously discussed, Th2 cells can also influence atopic dermatitis. Thus, higher estrogen and progesterone levels in women make them more at risk for atopic dermatitis. Furthermore, E2 (estradiol) and/or progesterone can induce the secretion of Th2-related cytokines, such as TSLP, which will bind to receptors on type C sensory neurons and cause itching sensations in patients with atopic dermatitis.¹⁰

Table 2 reveals that only 17.6% of female respondents have good sleep quality, compared to 36.4% of male respondents. When compared to men, women tend to experience sleep problems more easily. Women are more susceptible to certain sleep disorders, such as insomnia and restless legs syndrome.¹³ Physiological changes in the body, such as those that occur during menstruation, can also cause sleep disorders in women.¹⁴

The analysis of Table 3 gave non-significant results, with a significance value of 0.348 ($p > 0.05$). According to the researchers' data, there are mild atopic dermatitis patients with poor sleep quality, but there are severe atopic dermatitis patients with good sleep quality. The researcher concluded, referencing Kong et al.'s research, that the two results contradict each other, as they found no severe patients with good sleep quality.⁸

Poor sleep quality in mild atopic dermatitis patients is thought to occur due to stress factors. Stress and the hormone cortisol have a well-established relationship. Stressful conditions, whether physical or psychological, can influence the release of the hormone cortisol.¹⁵ Cortisol levels will peak when the individual is about to wake up from sleep. Thus, cortisol contributes to a person's consciousness and aids in the initiation of wakefulness.¹⁶ So, the more stressed a person is, the lower their sleep quality will be.

Furthermore, researchers believe that changes in ambient temperature can lead to poor sleep quality. Research(ers? Es?) suggest that a decrease in core body temperature at night triggers the release of melatonin. A mismatch in body temperature with the surrounding environment can disrupt the melatonin release process, thereby disrupting sleep initiation and maintenance. In addition, a temperature rise can increase wakefulness and decreased REM and non-REM sleep.¹⁷

Workload is also thought to be one of the factors causing poor sleep quality. A person's high workload can lead to a decrease in sleep quality. A reduction in workload and working hours, according to research, can help improve sleep quality, health, and productivity.¹⁸

The patient's pain threshold can influence good sleep quality in severe atopic dermatitis patients. Itching is a very mild form of pain. It can be said so because pruriceptors are pruriceptive nociceptive neurons, which means that they are part of nociceptors (neurons that are sensitive to pain). Research reveals that most pruriceptors receive stimulation from both pain and itch, despite the existence of many non-pruriceptive

nociceptors (neurons sensitive to pain but not itch). Itch and pain also traverse the same neural pathway, the spinothalamic tract.¹⁹ Research conducted involving 24 respondents showed that the pain threshold in each subject varied greatly.²⁰ Therefore, excellent sleep quality in severe atopic dermatitis patients may occur because these patients have a high pain threshold. There was no significant relationship between the severity of atopic dermatitis and sleep quality in WMSCU teaching hospital patients, with a significance value of 0.348.

Additionally, future researchers should: (1) consider using another sleep quality questionnaire with a formally validated ordinal data scale; (2) assess and collect data on confounding factors that can affect variables such as stress level, education, and occupation; and (3) exclude patients who are menstruating, consume alcohol or caffeine, and use gadgets for a long period of time before going to bed.

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