

A web-based survey on the behavior of moisturizer used in adults with and without atopic dermatitis in Thailand

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Abstract

Background: Moisturizers play an important role in restoring the skin barrier. They should be used to treat and prevent eczema, especially in atopic dermatitis (AD).

Objective: To evaluate the factors that influence selection of moisturizers in adult patients with AD and without it. Usage behavior between the two groups was also determined.

Methods: A cross-sectional web-based survey was performed.

Results: A total of 1,195 participants with mean age of 46.5 ± 14.5 were enrolled. Fifty participants (4.2%) met the William's criteria for AD diagnosis. Most participants reported using moisturizer every day or two times per day. A non-sticky moisturizer, followed by pleasant odor were considered important properties. For choosing a moisturizer, personal satisfaction was the most common answer given by participants. The most common locations that participants applied moisturizer were the extremities (85.1%) and face (84.9%). Physicians' suggestion was also a significant factor that led to moisturizer use by AD patients but it was not significant in the non-AD group (29.2% vs 14.7%, $p = 0.007$, OR 2.4). A pH of 5.5 and the anti-inflammatory property were important factors in choosing a moisturizer in the AD group. Both AD and non-AD participants preferred liquid soap over bar soap in daily life.

Conclusions: Our results showed that most participants have basic knowledge of how to use a moisturizer. Physicians' suggestion influenced the selection of moisturizer in AD patients. Thus, physicians should continue to educate in order to achieve good clinical outcomes.

Key words: Moisturizer, atopic dermatitis, eczematous lesion, behavior, Thailand

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Introduction

Atopic dermatitis (AD) is a chronic inflammatory skin disease characterized by itchy, red, swollen, and cracked skin. AD is commonly found in children but can occur at any age with prevalence ranging from 9%-24% in children^{1,2} and 2%-10% in adults, respectively.³ AD may coincide with allergic rhinitis, allergic conjunctivitis, food allergy or asthma. The disease tends to flare periodically and affects quality of life. Although the pathophysiology of AD is still unclear, the combination of environmental factors and genetic susceptibility may lead to immune dysregulation and epithelial barrier dysfunction.⁴ Treatment of AD patients such as (i) avoiding aggravating factors, (ii) maintaining hydrated skin, and (iii) applying anti-inflammatory drugs in active eczematous lesions is aimed at controlling exacerbated symptoms.⁵ Using a moisturizer regularly can reduce transepidermal water loss, preserve skin integrity and repair the epidermal barrier defect. This method is considered standard treatment for AD.^{3,6}

The benefits of moisturizers can also be seen in other skin diseases such as seborrheic dermatitis, contact dermatitis, psoriasis, and rosacea.⁷

Nowadays, there are many moisturizers containing different ingredients and properties. Several factors such as a moisturizer's properties (cream texture and scent), recommendation by physicians, information on social media, friends, and family have an impact on patients' selection. Shroff et al.⁸ reported that social media is the most influential factor when it comes to selecting a skin product. Xu et al. also reported fragrance-free and non-greasy properties as common factors that influence selection of a moisturizer.⁹ However, few studies have been conducted on the behavior of selecting moisturizers in tropical countries, especially for adult-onset AD.^{8,10-13} Our study aimed to assess the factors that influence selection of moisturizers in adult patients with AD and without it. The usage behavior between the two groups was also determined.

Methods

A cross-sectional, electronic web-based multiple choices questionnaire was conducted in the Thai population between June and July 2021. Our questionnaire contained 17 items including demographic data, symptoms of atopic dermatitis, detail of moisturizer behavior used (frequency, location, timing, properties and factors influencing moisturizer used) and detail of choosing soap (type and properties). If participants had an eczematous lesion, the step applying moisturizer and topical anti-inflammatory drug on eczematous lesions will be asked. All participants were recruited by social media such as Facebook or Line applications and poster advertisement. The diagnosis of AD was made according to criteria by Williams et al.¹⁴ Subjects who met the AD criteria were placed in the AD group. Active eczematous lesion was defined as skin redness, itching, or serum oozing at the flexural area. The inclusion criteria included patients who (i) were Thais aged ≥ 18 , (ii) able to read and understand the Thai language, (iii) able to use a device to answer the web-based questionnaire, and (iv) willing to participate in the study. Informed consent was obtained from all individuals at the beginning of the questionnaire. The study design was approved by the Siriraj Institutional Review Board (SIRB) (COA no. Si 390/2021).

Statistical analysis

Statistical analysis was performed using PASW for Windows, version 18 (SPSS, Inc., Chicago, IL, USA). All statistical tests were two-sided, and statistical significance was declared at a *p*-value less than 0.05. Data is presented as mean \pm standard deviation (SD) for continuous data with normal distribution. Categorical data is presented as a number and percentage. For comparison of continuous data, the Student's *t*-test and Mann-Whitney U test were used for normal distribution data and non-normally distributed data, respectively. A Chi-square test or Fisher's exact test was used to compare categorical data.

Results

Out of a total of 1195 participants, 525 (43.9%) met the major criterion for AD (**Table 1**). Among the minor criteria, the most common was personal history of eczema or hay fever (29.2%), followed by history of general dry skin in the last year (23.3%), and history of skin creases (14.2%). Fifty participants (4.2%) met the criteria for AD diagnosis. **Table 2** shows that 946 (79.2%) participants were female. Almost all participants (90.9%) had the highest education level, either a bachelor's degree or higher. Almost all of them (*n* = 1155, 96.7%) also used a moisturizer. For participants, self-satisfaction (71.3%) was more important than a physician's suggestion in choosing a moisturizer. Non-sticky cream (87.1%), followed by pleasant odor (38.3%) were properties of moisturizers that influenced selection the most.

Table 1. Diagnosis criteria of atopic dermatitis (AD)*

Diagnosis criteria of AD	n (%)
Major criterion	
- An itchy skin condition	525 (43.9)
Minor criteria	
- History of skin creases such as folds of elbows, behind the knees, fronts of ankles or around the neck	170 (14.2)
- A personal history of asthma or hay fever	349 (29.2)
- A history of a general dry skin in the last year	278 (23.3)
- Visible flexural eczema	37 (3.1)
- Onset under the age of 2	34 (2.8)
Patient diagnosed with AD (1 major criterion + at least 3 minor criteria)	50 (4.2)

*Diagnosis AD according to Williams et al.

Table 2. Demographic data and behavior when choosing a moisturizer in the atopic dermatitis (AD) and non-AD group

Demographic data	Total (N = 1195) n (%)	AD (N = 50) n (%)	Non-AD (N = 1145) n (%)	p-value	OR (95% CI)
Sex					
Female	946 (79.2)	37 (74.0)	909 (79.4)	0.358	
Mean age ± SD	46.53 ± 14.46	46.82 ± 13.49	46.52 ± 14.51	0.885	
Using a moisturizer	1155 (96.7)	48 (96.0)	1107 (96.7)	0.682	
Number of patients receiving physician advice for moisturizers	557 (46.6)	42 (84.0)	515 (45.0)	< 0.001*	6.42 (2.99, 13.80)
Factors associated with selection of moisturizers[†]	N = 1155	N = 48	N = 1107		
- Based on self-satisfaction	823 (71.3)	35 (72.9)	788 (71.2)	0.795	
- Suggestions or media [†]	446 (38.6)	19 (39.6)	427 (38.6)	0.888	
Moisturizer properties used[†]	N = 1155	N = 48	N = 1107		
- Non sticky	1006 (87.1)	43 (89.6)	963 (87.0)	0.600	
- Pleasant odor	442 (38.3)	17 (35.4)	425 (38.4)	0.678	
- No fragrance	281 (24.3)	17 (35.4)	264 (23.8)	0.067	
- No preservative	165 (14.3)	10 (20.8)	155 (14.0)	0.185	
- pH 5.5	110 (9.5)	10 (20.8)	100 (9.0)	0.019*	2.65 (1.23, 5.48)
- Anti-inflammatory ingredient	305 (26.4)	26 (54.2)	279 (25.2)	< 0.001*	3.29 (1.90, 5.72)
Step to apply to the eczematous lesions					
Using moisturizer “before” topical anti-inflammatory drugs	216/1152 (18.9)	16/47 (34.0)	200/1105 (18.1)	0.006*	2.34 (1.25, 4.35)
Using moisturizer “after” topical anti-inflammatory drugs	249/1152 (21.6)	14/47 (29.8)	235/1105 (21.3)	0.165	
Did not use moisturizer at eczematous lesion	401/1152 (34.8)	17/47 (4.2)	384/1105 (34.8)	0.841	
Continued to use moisturizer after eczematous lesion resolved	686/865 (79.3)	36/46 (78.3)	650/819 (79.4)	0.857	

*A p-value of less than 0.05 indicates statistical significance

[†]One participant could have more than one answer

Abbreviations: CI, confident interval; OR, odd ratio; SD, standard deviation

Regarding moisturizer use behavior, 730 participants (63.2%) reported using moisturizer every day while 212 (18.4%) rarely used a moisturizer. More than half the participants (54.5%) used moisturizer after bathing. The most common locations that participants applied moisturizer were the extremities (85.1%) and face (84.9%) as shown in **Figure 1**. Most participants also applied different types of moisturizers on the face and body. When participants had eczematous on their skin, 34.8% did not apply moisturizer directly on eczematous lesions. After the eczematous rash healed, almost 80% of participants continued to apply moisturizer as usual.

When comparing the AD and non-AD group, application sites and frequency of moisturizer usage are shown in **Figure 2A and 2B**. A significantly higher number of patients in the AD group were suggested to use moisturizer by physicians ($p < 0.001$, OR 6.4). Accordingly, physicians’ suggestion was a significant factor that influenced AD patients’ moisturizer use while it was not significant in non-AD groups (29.2% vs 14.7%, $p = 0.007$, OR 2.4) as shown in **Figure 2C**. Moreover, a moisturizer pH of 5.5 ($p = 0.019$, OR 2.7) and anti-inflammatory property ($p < 0.001$, OR 3.3 times) were significant factors in the AD group when choosing a moisturizer. Regarding soap properties, almost half the participants using with AD and those without it used liquid soap (44.0% and 50.0%, respectively) (**Table 3**). Patients with AD tended to choose soaps with anti-inflammatory ingredients and without fragrance.

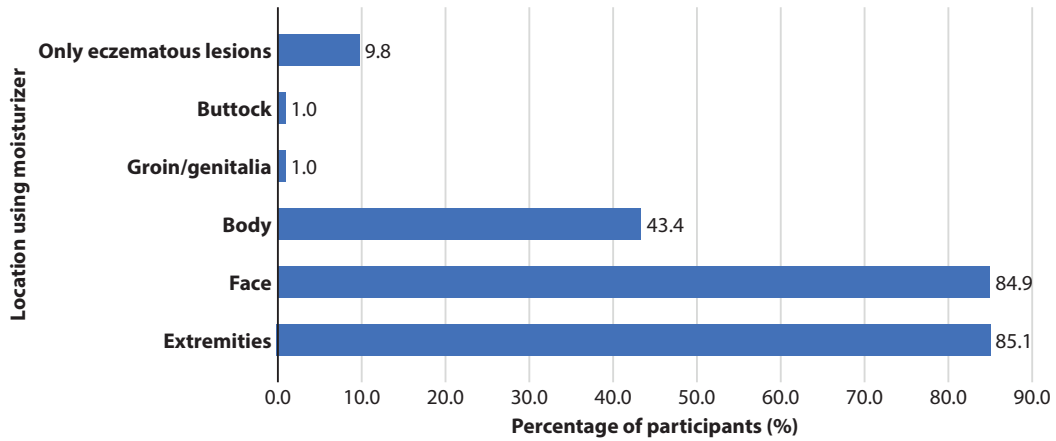


Figure 1. Application sites of moisturizer

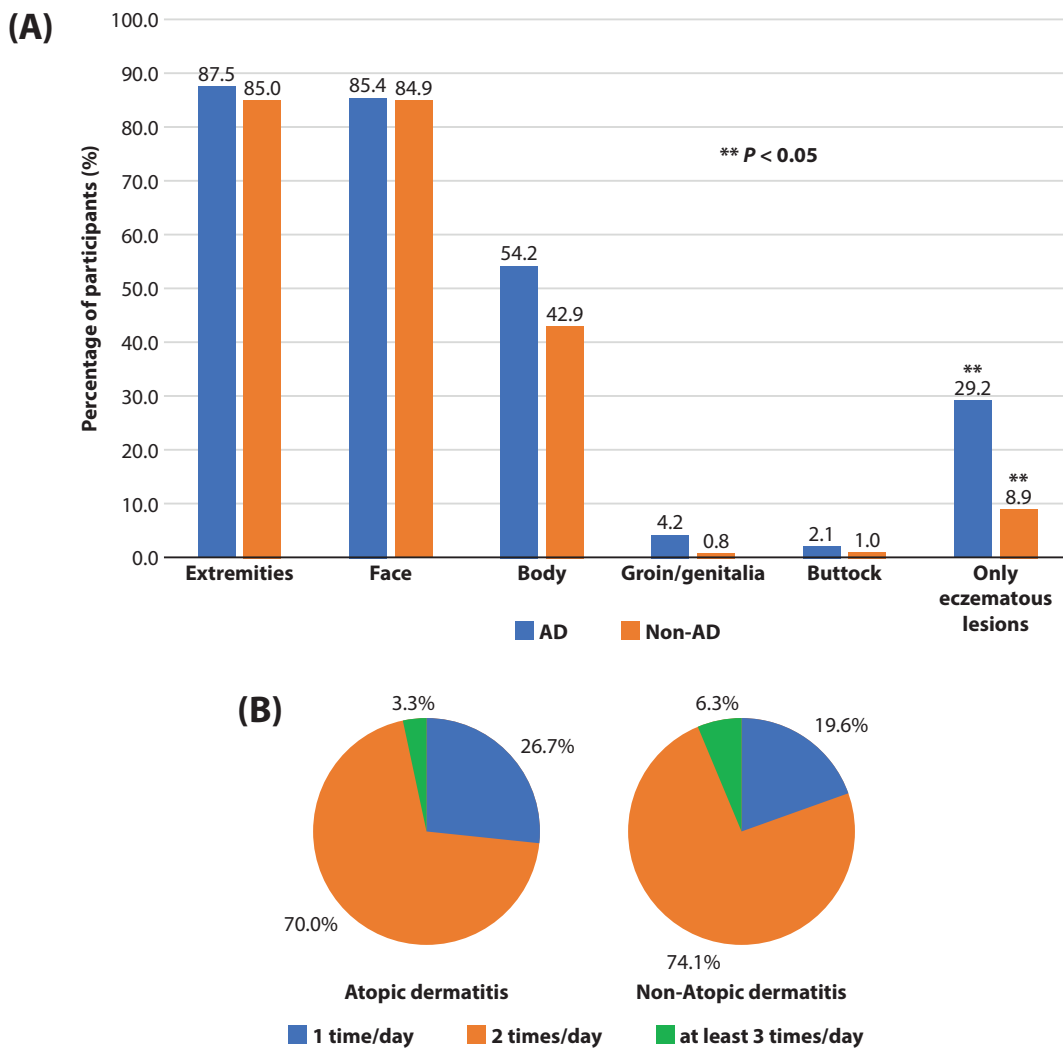


Figure 2.

(A) The comparison of application sites between atopic dermatitis and non-atopic dermatitis groups.

(B) Frequency of moisturizers usage in atopic and non-atopic dermatitis groups.

(C) The comparison of the associated reasons for choosing moisturizers between atopic and non-atopic dermatitis groups.

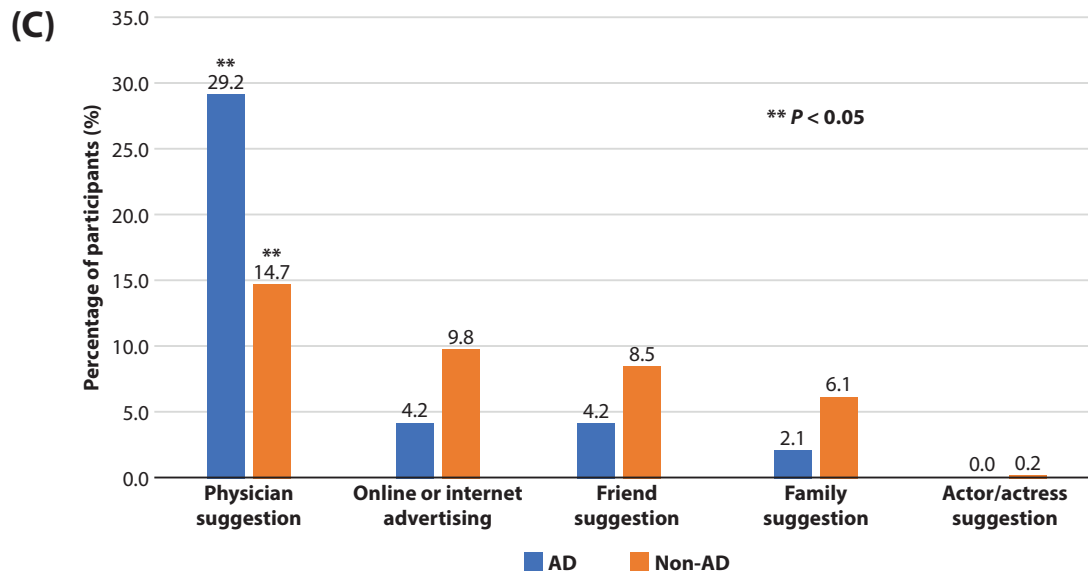


Figure 2. (Continued)

Table 3. Behavior of soap use in patients with atopic dermatitis (AD) and non-AD.

Soap using	Total (%) (N = 1155)	AD (%) (N = 48)	Non-AD (%) (N = 1107)	p-value	OR (95% CI)
Soap type					
- Bar soap	162 (13.6)	8 (16.0)	154 (13.4)	0.606	
- Liquid soap	594 (49.7)	22 (44.0)	572 (50.0)	0.410	
- Both bar and liquid soap	399 (33.4)	18 (36.0)	381 (33.3)	0.689	
Soap properties[†]					
- Pleasant odor	664 (57.5)	21 (43.8)	643 (58.1)	0.049*	0.56 (0.31, 1.00)
- pH 5.5	296 (25.6)	18 (37.5)	278 (25.1)	0.054	
- No fragrance	120 (10.4)	12 (25.0)	108 (9.8)	0.001*	3.08 (1.56, 6.10)
- No preservative	181 (15.7)	9 (18.8)	172 (15.5)	0.549	
- Anti-inflammatory ingredient	82 (7.1)	8 (16.7)	74 (6.7)	0.017*	2.79 (1.26, 6.18)

*A p-value of less than 0.05 indicates statistical significance

[†]One participant could have more than one answer

Abbreviations: CI, confident interval; OR, odd ratio

Discussion

It is a generally accepted fact that moisturizer has several benefits in maintaining skin as part of acute and long-term care. Thus, how to choose and apply moisturizer in skin care routine has gained traction from dermatologists and patients with skin diseases. This study explored the behaviors of the general adult population and patients with AD in selecting and using moisturizers. For choosing a moisturizer, self-satisfaction was the most important factor. Our study showed that a non-sticky moisturizer was the property most desired by participants. This may be due to the fact that Thailand is a tropical country with high levels of humidity. Thus, a non-sticky or quick drying moisturizer has a big effect on users' preference.

The molecular weight of a compound less than 500 Dalton is beneficial for skin penetration.¹⁵ Nano-based technology such as liposomes and solid lipid nanoparticles have also been used to increase skin penetration and efficacy.^{16,17} Thus, small molecular weight and nanotechnology may help overcome this problem.

A previous study reported 2-10% prevalence of adult AD. Our results showed that 4.2% of adult patients met the diagnostic criteria for AD.¹⁸ According to a clinical practice guideline for management of AD, topical corticosteroids are the mainstay and an effective treatment for inflamed skin during acute exacerbation of patients with AD. It should be used twice daily and discontinued during disease remission.

Long-term usage of topical corticosteroids is associated with local skin side effects such as atrophy, telangiectasias and hypopigmentation of the skin. Moisturizers can decrease the use of topical corticosteroids and prevent disease relapse. Plain moisturizers (not containing fragrance and preservatives) are recommended for patients with AD. Moisturizers containing anti-inflammatory ingredients also have several advantages in decreasing the severity of AD and preventing disease relapse.⁵ However, the relatively high cost of moisturizers with anti-inflammatory ingredients compared to plain moisturizers limits their use in clinical practice.

Twice daily application of moisturizers has been suggested in AD patients to reduce inflammation quickly and once daily or intermittent use when the lesion has resolved.^{3,19} However, two to three times daily use or frequently as long as the skin is dry is also suggested, depending on the climate and environment.^{20,21} It should be noted that only 50% of moisturizers are absorbed into the skin after eight hours of application.^{22,23} Thus, twice daily application is generally recommended. Our study showed that most participants only had general knowledge regarding moisturizer use. Most applied moisturizers every day or twice daily, however, they had a tendency to use different types of moisturizers between their face and body. This may be because skin on the face is more sensitive than on the body. Moreover, some participants, especially women may want other properties added in facial moisturizers such as anti-aging, sun protection, and whitening.

Applying moisturizer before or after topical anti-inflammatory drug use depends on skin status, vehicle of moisturizer, patient's convenience and physician's opinion. However, it is generally recommended that moisturizer in the form of cream or lotion should be applied before topical anti-inflammatory drugs while ointment preparations should be applied after topical anti-inflammatory drug use.⁵ The humectant property in creams or lotions hydrates the skin and maintains its water content, which allows for the absorption of topical anti-inflammation through the skin.²⁴ On the other hand, the occlusive property in ointments increases adherence of topical anti-inflammatory drugs if it is applied after use.²¹ According to our results, participants in both AD and non-AD groups usually used moisturizer before topical anti-inflammatory drugs. We postulated that most of our participants used moisturizer in preparation of cream or lotion rather than ointment.

Bathing is also important in the management of patients with AD. It can help remove crusts, irritants and rehydrate the skin. Nevertheless, it can also cause dry skin due to an increase in transepidermal water loss.²⁵ The syndet soap, a synthetic soap with a pH of between 4 to 5 and a mild synthetic surfactant is recommended for AD patients.²⁶ In our results, the soap's pleasant odor, lack of fragrance and anti-inflammatory ingredients was reported in AD which corresponds to the recommendation for using cleanser in AD (neutral to low pH, hypoallergenic and fragrant free).¹⁹ Most AD participants reported using moisturizer after a bath, which is correct according to the recommendation.^{19,27}

The limitation of this study is an internet-based questionnaire survey which may not present general population. The interpretation data from participants should be careful. Participants responding to an internet-based survey are usually ready to access to the internet and well-educated.²⁸ Corresponding to our results, approximately 90% of participants had highest educational level. Additionally, female is more likely to use moisturizer and interested to participate than male. That's probably why female is predominantly reported in our survey.

In conclusion, most participants have basic knowledge of moisturizer use. They use moisturizer every day or twice daily after bathing and continue to use it even after the eczematous rash resolves. For AD patients, suggestions by physicians are an influential factor in choosing a moisturizer. Thus, physicians should educate AD patients in selecting an appropriate moisturizer and help them understand the importance of its use to improve outcomes.

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Conflict of interest declaration

All authors declare no conflicts of interest.

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Author contributions

- PT, LC, CR and KK design the study.
- PT, LC, CR and OP and KK collected data.
- OP performed the analyses and interpretation the data.
- CR and OP involved in drafting the manuscript.
- PT, LC and KK revised the paper critically for important intellectual content.
- All authors reviewed and approved the final manuscript.

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