Journal of Social Research

P-ISSN: 2827-9832
E-ISSN: 2828-335x
Vol. 4, No. 12, November 2025
http://ijsr.internationaljournallabs.com/index.php/ijsr

Allergic Contact Dermatitis Caused By Daily Soap Products: One Case Report

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ABSTRACT

Allergic contact dermatitis (ACD) is a skin disorder resulting from contact with an allergenic substance. Most cases of ACD are caused by cosmetic ingredients and daily-use products. We report a case of ACD caused by sodium lauryl sulfate (SLS) and fragrance in soap, confirmed by positive patch test results. A 29-year-old woman with chronic persistent itching that did not improve with medication presented to the Dermatovenereology Outpatient Clinic of Dr. Moewardi Hospital. She had a history of using virgin coconut oil (VCO) and various handwashing soaps. Dermatological examination revealed multiple erythematous macules with overlying scales and xerotic skin, suggestive of ACD. The patient underwent a patch test with standard materials as well as personal products she brought to confirm the diagnosis. The patch test showed a positive allergic reaction to Sunlight® liquid soap, Biore® liquid soap, Cerianerss® lychee-flavored VCO, One Scrub Onemed® 4%, and Paquito® liquid soap. Patch testing is an important and useful tool for diagnosing ACD. Although the procedure is simple, it requires several days for evaluation. In this case, we identified the products responsible for ACD in our patient and advised her to avoid them. Several substances with allergenic potential were identified by comparing product compositions with patch test results. However, these findings could not determine which specific compounds were allergenic. Hence, further patch testing of individual compounds is necessary.

Keywords: *allergic contact dermatitis, soup, sodium lauryl sulfate, fragrance, patch test*

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INTRODUCTION

Allergic contact dermatitis (ACD) is a skin disorder that occurs as a result of contact with allergenic substances (Aristizabal et al., 2025; Olusegun & Martincigh, 2021). ACD represents a delayed-type (type IV) hypersensitivity reaction to exogenous antigens that stimulate both innate and adaptive immune responses (Fadaee et al., 2025; Prakoeswa, Awanis, Sari, & Pramuningtyas, 2025). The pathophysiology of ACD consists of two phases: the sensitization phase and the elicitation phase (Molnár, Kovács, Kormos, Aradi, & Jakus, 2025; Sharma, 2025). The sensitization phase occurs upon first exposure to an allergen, whereas the elicitation phase occurs when a sensitized individual is re-exposed and subsequently develops an allergic inflammatory response (Funch, Geisler, & Bonefeld, 2025).

ACD affects approximately 1 in 5 individuals, or about 15–25% of the general population (Yeung et al., 2025). Epidemiological data from Indonesia report that 97% of 389 recorded skin disease cases were contact dermatitis, with 66.3% classified as irritant contact dermatitis (ICD) and 33.7% as ACD (Istiqomah & Utama, 2025). ACD is most frequently observed in young individuals, with a prevalence of approximately 15% among those aged 12–16 years (Alsuwaidi et al., 2025; Andersson & Vasan, 2018). The condition is more common in women, likely due to more frequent exposure to cosmetics, personal-care items, and household cleaning products (Ersanli & Aydin Berktas, 2025; Prifti & El-Osta, 2025).

The most common causative agents of ACD include metals (e.g., nickel, cobalt), latex rubber, adhesives (e.g., medical plasters), plants (e.g., chamomile, arnica), fragrances (in lipsticks, perfumes, and soaps), cleaning agents, solvents, and essential oils. Among these, cosmetics and fragrances are the leading causes, accounting for 30–40% of ACD cases (Faraz, Seely, & Marano, 2024; Nguyen & Chen, 2021). Fragrance-related ACD is primarily associated with exposure to household cleaning products (Faraz et al., 2024; Rana et al., 2025). The principal allergens in these products include preservatives and fragrance components,

particularly methylchloroisothiazolinone/methylisothiazolinone (MCI/MI), limonene, and various surfactants (Adjie & Kariosentono, 2025; Zambello, Fontina, & Caroppo, 2025).

Common symptoms of ACD include itching and, occasionally, soreness. The clinical presentation of ACD may progress through several stages: the erythematous phase, characterized by erythema and edema; and the maddidan (moist) phase, characterized by erosion and exudative lesions. ACD and ICD share similar inflammatory features, often making them difficult to distinguish clinically. The main differentiating features are that ICD typically presents with a more rapid onset, whereas ACD tends to spread beyond the initial site of contact (Ale & Maibach, 2025). Lesions in ACD are initially asymmetrical and confined to contact areas, but often extend subsequently (Krishnan, Gustafson, Plaza, & Dulmage, 2025).

Assessment of ACD begins with a thorough patient history, emphasizing exposure patterns, family history of atopy, and the chronological development of symptoms (Alsararatee, 2025). The diagnosis is confirmed through patch testing, in which standardized allergens and suspected agents are applied to the skin at specific concentrations and monitored for delayed reactions (Tong, Desai, Olsen, & Davis, 2024). Patch testing is indicated for patients with suspected contact dermatitis, chronic dermatitis unresponsive to therapy, or delayed-type hypersensitivity eruptions (de Groot, 2022; Hassoun-Kheir, Bergman, & Weltfriend, 2016).

A positive patch test is characterized by an increasing inflammatory response within 24–72 hours after allergen exposure, peaking at 72–96 hours, even after the allergen has been removed (Xu, Ong, & Wang, 2025). The diagnostic urgency of ACD lies in its significant impact on patients' quality of life, particularly when symptoms become chronic and unresponsive to conventional therapy (Balato et al., 2025). This is compounded by the limited accessibility of patch testing in many clinical settings, making comprehensive case documentation crucial for enhancing clinical awareness and diagnostic accuracy (Alharbi, Rababa, Alsuwayl, Alsubail, & Alenizi, 2025; Tang, Ebriani, Yan, Wongvibulsin, & Farshchian, 2025).

This case report presents a novel documentation of a patient with concurrent sensitivity to multiple scented soap products and virgin coconut oil (VCO), confirmed through systematic patch testing. The complexity of this presentation, involving multiple potential allergens across various daily-use products, underscores the diagnostic challenges in ACD and highlights the importance of thorough allergen investigation in cases of persistent dermatitis. This report describes a case of allergic contact dermatitis caused by sodium lauryl sulfate (SLS) and fragrancescontained in soaps and other daily-use products, confirmed by positive patch test results.

METHOD

A 29-year-old woman who worked as a baby masseuse at a private clinic in Surakarta presented to Dermatovenereology Outpatient Clinic of Dr. Moewardi Hospital with chief complaints of dry skin on both palms that had persisted for approximately one year. The dryness was particularly noticeable after she massaged infants using virgin coconut oil (VCO). The patient routinely washed her hands after each massage session. The symptoms were persistent throughout this period. In addition to dry skin, the patient reported intermittent itching on both palms. No prior treatment had been administered for these complaints.

Approximately one month prior to presentation, the symptoms of dryness and pruritus had worsened. The patient consulted a dermatologist, who prescribed a compounded ointment and a moisturizer (the patient was unable to recall the names of the medications). The symptoms initially improved but recurred after the medications were finished. Upon reevaluation, the dermatologist recommended referral to the Dermatovenereology Outpatient Clinic of Dr. Moewardi Hospital for patch testing.

The patient denied any previous history of similar symptoms. There was no history of hypertension, diabetes mellitus, atopy, or other chronic illnesses. Family history was unremarkable for similar skin disorders, drug allergies, food allergies, atopy, or asthma.

On general physical examination, the patient appeared mildly ill, with vital signs within normal limits. Dermatological examination revealed multiple erythematous macules with overlying scales and xerotic skin on the digits I–V of both hands. Xerosis was also noted on the bilateral palmar regions **(Figure 1).**

Based on the anamnesis and physical examination, the differential diagnoses included ACD secondary to exposure to everyday products such as VCO and soap, irritant contact dermatitis (ICD), pompholyx, and tinea palmaris.

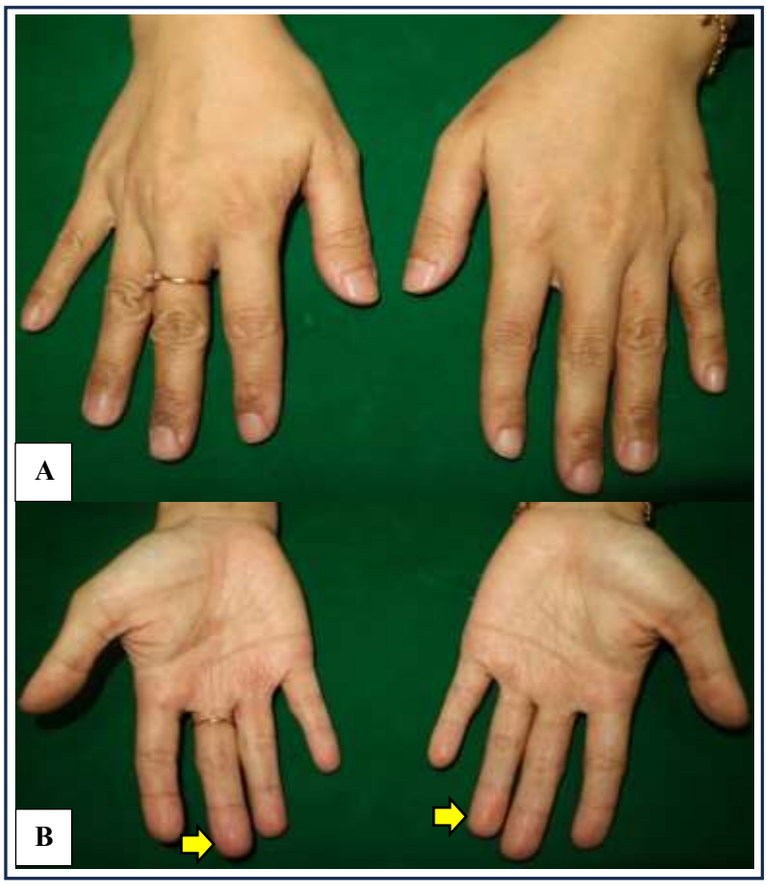

Figure 1. (A-B). Regio digiti I-V manus dextra et sinistra showing multiple maculae erythematosa with overlying squama and xerotic skin (yellow arrow). Xerosis is also noted in the bilateral palmar regions

Source: Author's clinical documentation, 2025

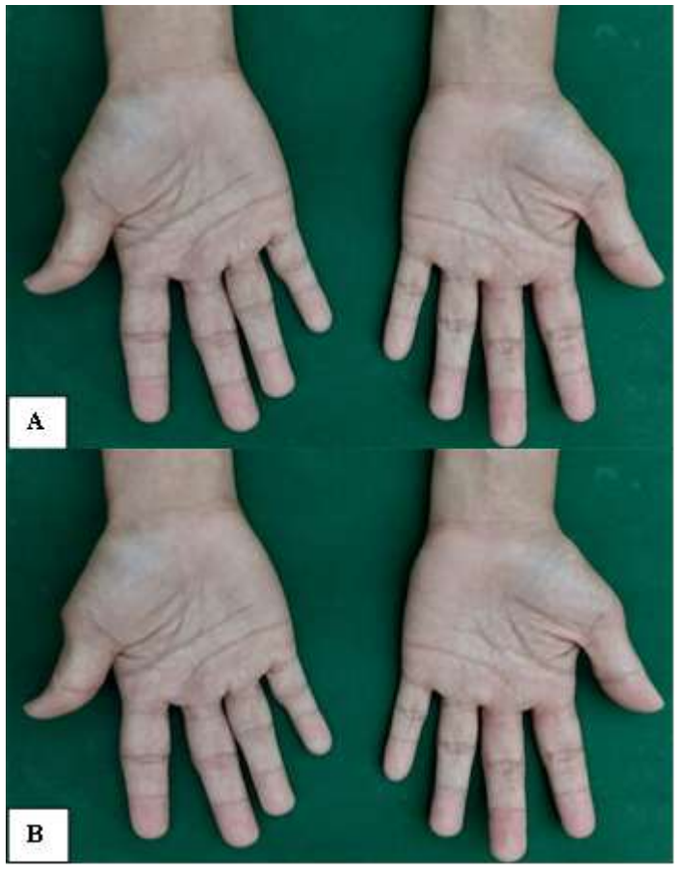

Figure 2. (A-B). Four weeks after treatment, there was improvement
Source: Author's clinical documentation, 2025

The patient underwent a patch test using Finn Chambers (SmartPractice®, Phoenix, AZ, USA) mounted on hypoallergenic adhesive tape. Additional materials used included permanent markers, cotton swabs soaked in 70% alcohol, and standard patch test allergens, as well as all personal products brought by the patient, each diluted to 10% with white petrolatum (vaseline album) **(Table 1).**

Prior to the procedure, it was confirmed that the patient had not taken any immunosuppressive medications or systemic corticosteroids (prednisone <10 mg/day) for at least one week before testing, or within a period corresponding to the drug's biological half-life. The patch test was applied to the upper back under standard conditions.

Table 1. List of Allergens Used for Patch Testing

No	Allergen Names	Reaction		
		48 Hours	72 Hours	96 Hours
	Standard Allergens			
1	Mercaptobenzothiazole 2%	-	-	-
2	Cobalt chloride 1%	-	-	-
3	Para-phenyldiamine 0,1%	-	-	-
4	Balsam Peru 25%	-	-	-
5	Benzocaine 5%	-	-	-
6	Pottasium Dichromate 0,5%	-	-	-
7	Ethylenediamine 1%	-	-	-
8	Benzophenone 3%	-	-	-
9	Colophony 20%	-	-	-
10	S-chloro-7-iodo-8-hydroxy quinoline 5%	-	-	-
11	Lanolin	-	-	-
12	Nikel sulfate 5%	-	-	-
13	Hydroquinon	-	-	-
14	Quarterium	-	-	-
	Personal Products			

No	Allergen Names	Reaction		
		48 Hours	72 Hours	96 Hours
15	Virgin coconut oil (VCO)	-	-	-
16	Smillanerss® coconut oil	-	-	-
17	Lemonerss® coconut oil	-	-	-
18	Lavenerss® coconut oil	-	-	-
19	Greenteanerss ® coconut oil	-	-	-
20	Fruitynerss® coconut oil	-	-	-
21	Sunlight® dishwashing liquid soap	+	++	++
22	Biore® liquid soap	+	++	++
23	Cerianerss® coconut oil	+	++	++
24	One Scrub Onemed® 4% handshop	+	++	++
25	Paquito® liquid bath soap	+	++	++
26	Body lotion Vaseline®	-	-	-
27	Swiss bath® liquid soap	-	-	-
(-)	: negative			
(?+)	: dubious reaction			
(+)	: weak positive (erythema, mild edema, non-vesicular papules)			
(++)	: strong positive (edema accompanied by the formation of vesicles)			
(+++)	: strong positive (bubble formed)			
NT	: not dripped			
AND	: irritation reaction			

Source: Data processed from patient patch test results, 2025

In the patch test results, both standard allergens and personal products were evaluated. The standard allergens included mercaptobenzothiazole 2%, cobalt chloride 1%, para-phenylenediamine 0.1%, Balsam of Peru 25%, benzocaine 5%, potassium dichromate 0.5%, ethylenediamine 1%, benzophenone 3%, colophony 20%, 5-chloro-7-iodo-8-hydroxyquinoline 5%, lanolin, nickel sulfate 5%, hydroquinone, and quaternium compound. The personal products included virgin coconut oil (VCO), Smillanerss® coconut oil, Lemonerss® coconut oil, Lavenderss® coconut oil, Greenteanerss® coconut oil, Fruitynerss® coconut oil, Sunlight® dishwashing liquid, Biore® liquid soap, Cerianerss® lychee-flavored VCO, One Scrub Onemed® 4% handsoap, Paquito® liquid bath soap, Vaseline® body lotion, and Zwitsal® liquid bath soap.

Positive reactions were observed to several of the patient's personal products, namely Sunlight® dishwashing liquid, Biore® liquid soap, Cerianerss® lychee-flavored VCO, One Scrub Onemed® 4% hand soap, and Paquito® liquid bath soap. The first reading was performed by carefully removing the chambers, followed by a 20-minute waiting period to allow the skin to return to baseline contour. The 48-hour (Day 2) reading revealed weak positive (+) reactions to Sunlight® dishwashing liquid, Biore® liquid soap, Cerianerss® lychee-flavored VCO, One Scrub Onemed® 4% handsoap, and Paquito® liquid bath soap **(Figure 3).**

The 72-hour (Day 3) reading demonstrated strong positive (++) reactions to the same products. The 96-hour (Day 4) reading also showed persistent strong positive (++) reactions to Sunlight® dishwashing liquid, Biore® liquid soap, Cerianerss® lychee-flavored VCO, One Scrub Onemed® 4% handsoap, and Paquito® liquid bath soap. The interpretation of the patch test results was based on the International Contact Dermatitis Research Group (ICDRG) grading system. The findings demonstrated a crescendo reaction pattern, confirming the diagnosis of ACD.

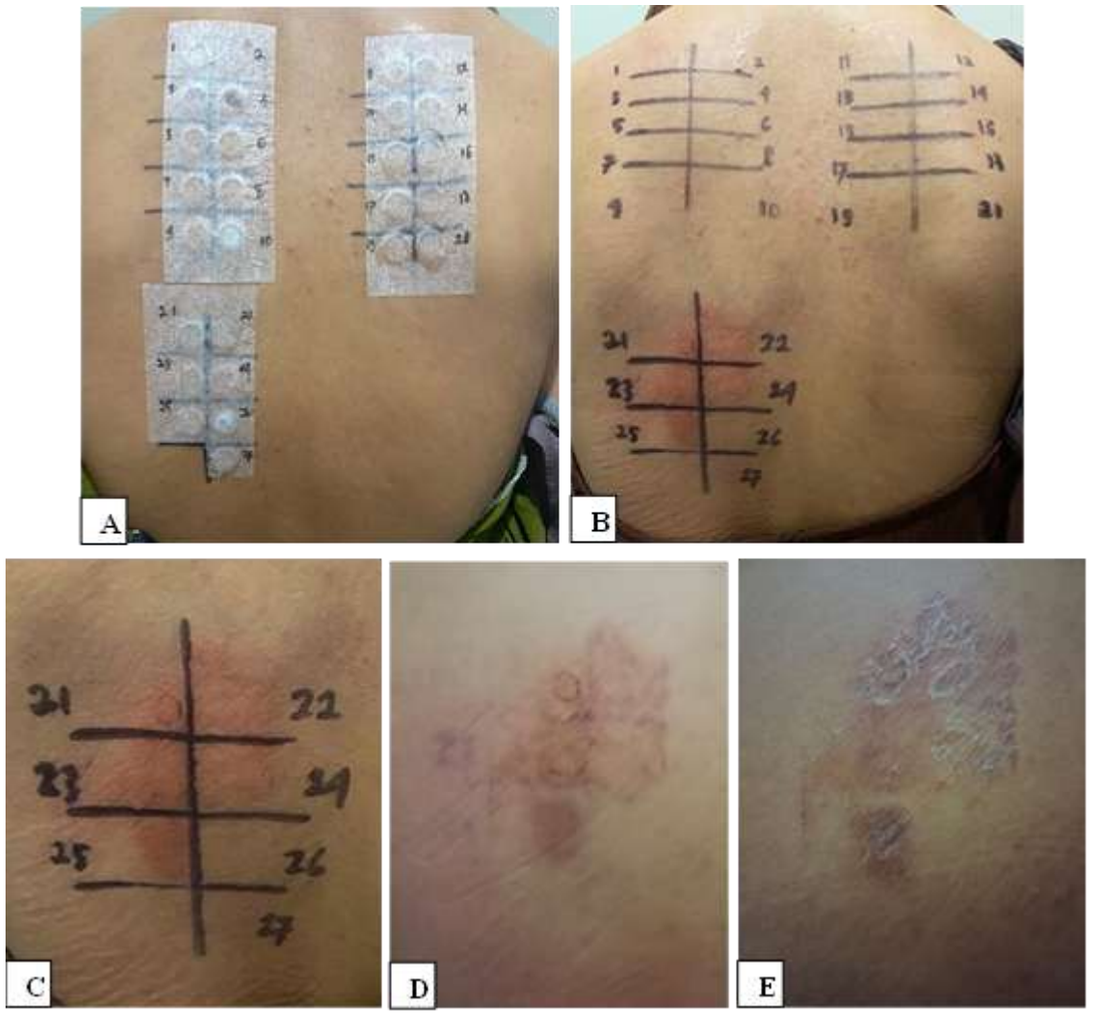

Figure 3. (A-E). Patch test results. A. Documentation after installation of *the* patch test chamber (day 0). **B-C.** Day 2 (48 hours) was positive for weak Sunlight® dish soap, Biore® liquid soap, VCO lychee flavor "*cerianerss*"®, Onemed® One Scrub handsoap 4% and Paquito® liquid bath soap. **D.** Day 3 (72 hours) was strong positive on Sunlight® liquid dish soap, Biore® liquid soap, VCO lychee flavor "*cerianerss*", Onemed® One Scrub handsoap 4% and Paquito® liquid bath soap. **E.** Day 4 (96 hours), the same as day 3.
Source: Author's clinical documentation, 2025

Patients were instructed not to wet the back area and to avoid excessive physical activity that could cause sweating, in order to prevent the patch test from shifting or detaching. They were also advised not to scratch, not to sleep or lean on their back, and to refrain from taking corticosteroids or antihistamines for two weeks prior to and during the testing period. The patch test results were evaluated 48 hours (Day 2), 72 hours (Day 3), and 96 hours (Day 4) after patch application.

Table 2. List of product compositions and potential allergenic ingredients in patients

Product	Composition	Potential allergens/irritants
Virgin coconut oil (VCO)	Coconut oil	Coconut oil
Smillanerss® coconut oil	Coconut oil, fragrance	• Coconut oil • Fragrance
Lemonerss® coconut oil	Coconut oil, fragrance	• Coconut oil • Fragrance
Lavenerss® coconut oil	Coconut oil, fragrance	• Coconut oil • Fragrance

Product	Composition	Potential allergens/irritants
Greenteanerss® coconut oil	Coconut oil, fragrance	• Coconut oil • Fragrance
Fruitynerss® coconut oil	Coconut oil, fragrance	• Coconut oil • Fragrance
Sunlight® dishwashing liquid soap	Surfactant 13%, builder (sodium tripolyphosphate), acetate: nitrile triacetate, ethylene diamine tetra acetate, silicate: zeolite, citrate: citric acid, lime	• Surfactant
Biore® liquid soap	Water, lauric acid, potassium hydroxide, myristic acid, lauryl hydroxysultaine, glycol distearate, fragrance, palmitic acid, laureth-4, carboxylic acid, SLS, hydroxyethylcellulose, etigronic acid	• Lauric acid • Sodium lauryl sulfate (SLS) • Fragrance
Cerianerss® coconut oil	Coconut oil, fragrance	• Coconut oil • Fragrance
One Scrub Onemed® 4% handsoap	Chlorhexidine gluconated 4%, alcohol	• Chlorhexidine gluconated • Alcohol
Paquito® liquid bath soap	Water, lauric acid, myristic acid, potassium hydroxide, cocamidopropyl betaine, ethylene glycol stearate, PEG-7 glycepyl methylcellulose, fragrance, tetrasodium EDTA, methylchloro azoline, methylisothiazolinone	• Lauric Acid • PEG-7 glycepyl methylcellulose • Fragrance • Methylchloro azoline • Methylisothiazolinone
Body lotion Vaseline®	Water, isopropyl myristate, niacinamide, stearic acid, glyseryl stearate, mineral oil, ethylhexyl methoxycinnamate, glycerin, phenoxyethanol, dimethicone, caromer, fragrance, etyl alcohol, methylparaben, glutamic acid, titanium dioxide, sodium PCA, propylparaben, sodium hydroxide, disodium EDTA, hydrated silica, aluminum hydroxide, glycine soja (soybean) sterols, yogurt powder, lecithin, alginic acid.	• Isopropyl myristate • Phenoxyethanol • Fragrance • Alcohol • Methylparaben • Aluminum hydroxide
Swiss bath® liquid soap	Water, SLS, cocamidopropyl betaine, disodium cocoamphodiacetate, olive oil PEG-7 esters, sodium PEG-7 olive oil carboxylate, lactic acid, polyquaternium-7, glycol distearate, cocamide MEA, laureth-10, fragrance, aloe barbadensis extract, chamomilla extract, sodium benzoate, panthenol, sodium chloride	• Fragrance • Olive oil • Sodium laureth sulfate

Source: Analysis based on product composition information from packaging, 2025

The results of the patch test revealed that the compound suspected to be allergenic in Sunlight® dishwashing liquid soap was the surfactant. In Biore® liquid soap, the suspected allergenic compounds included sodium lauryl sulfate (SLS) and fragrance. For Cerianerss® coconut oil, the suspected allergenic compound was fragrance, while in Onemed® One Scrub 4% handsoap, the potential allergens were chlorhexidine gluconate 4% and alcohol. In Paquito® liquid bath soap, the suspected allergenic compounds were methylcellulose and fragrance.

The relevance of the patch test results with the patient's history suggested a probable correlation with SLS and fragrance. Based on the anamnesis, physical examination, and patch test findings, the patient was diagnosed with ACD due to exposure to SLS and fragrance found in daily-use soaps **(Table 2)**.

The patient was treated with a topical corticosteroid, specifically mometasone furoate 0.1% cream, applied twice daily to the affected areas, and a moisturizer in the form of

Atopiclair® lotion, applied four times daily. Non-pharmacological management included patient education to avoid further exposure to identified allergens. Four weeks after treatment, there was improvement **(Figure 2)**.

RESULTS AND DISCUSSION

Allergic contact dermatitis (ACD) is a delayed-type (Type IV) hypersensitivity reaction to exogenous antigens that induce both innate and adaptive immune responses. The reaction in ACD consists of two phases, sensitization and elicitation. In the sensitization phase, the first contact with the allergen (hapten) stimulates keratinocytes to express adhesion molecules, proinflammatory cytokines, and chemokines. These mediators activate epidermal Langerhans cells and dermal vascular endothelial cells, leading to the sensitization of $CD8^+$ lymphocytes (memory cells), mast cells, basophils, and other immune cells. During the elicitation phase, upon re-exposure to the same hapten, antigen-presenting cells (APCs) present the antigen to $CD8^+$ lymphocytes, activating cytotoxic T cells and triggering an inflammatory response. This process results in the gradual development of eczematous lesions characteristic of ACD. In this case, the patient likely experienced the elicitation phase due to repeated exposure to daily-use soaps, as eczematous eruptions appeared after multiple applications.

Allergic contact dermatitis most commonly affects young adults and women, likely due to more frequent exposure to cosmetics and household cleaning products. Household cleaning products, consisting of natural or synthetic chemical agents, are used to facilitate the cleaning process.[8] Common cleaning agents include disinfectants, fragrances, detergents, soaps, polishes, abrasives, and other similar substances. Among these, preservatives and fragrances are the principal allergens, with methylchloroisothiazolinone/ methylisothiazolinone (MCI/MI), limonene, and surfactants being the most frequent sensitizers. In a study of 800 cleaning workers, 31% developed ACD to at least one cleaning agent, including formaldehyde, thiram, zinc diethyldithiocarbamate, and mercaptobenzothiazole.[17] In our case, the patient was a 29-year-old woman working as a baby masseuse, frequently exposed to soaps and oils.

Fragrance is one of the most common causes of ACD, accounting for 30–40% of cases. Essential oils, commonly used as fragrance components in cosmetic and household products, are frequent allergens. In a study involving 471 patients, 34 tested positive for at least one essential oil or fragrance compound, including hydroxyisohexyl 3-cyclohexene carboxaldehyde, Myroxylon pereirae (Balsam of Peru), limonene, and linalool hydroperoxide. Of the approximately 2,500 fragrance ingredients used in perfumes, at least 100 are known contact allergens. Fragrance components are also widely present in cosmetics, shampoos, soaps, moisturizers, and deodorants.

Sodium lauryl sulfate (SLS), also known as sodium dodecyl sulfate (SDS), is an anionic surfactant with strong cleaning and degreasing properties. However, it can damage the skin barrier by disrupting the stratum corneum, leading to irritation and inflammation. SLS exposure induces the release of interleukin-6 (IL-6), which subsequently promotes the release of prostaglandin E2 (PGE_2) and increases tumor necrosis factor (TNF) expression, causing inflammatory reactions such as erythema, edema, and pruritus.

Irritant reactions may occur acutely after a single exposure or develop chronically after repeated cumulative exposure to substances such as soap. Specific irritants such as iodophors, antibacterial soaps (e.g., chlorhexidine gluconate, chloroxylenol, triclosan), and surfactants exacerbate contact dermatitis in patients predisposed to ACD. In this case, patch testing revealed the following suspected allergenic compounds: Sunlight® dishwashing liquid: surfactants Biore® liquid soap: sodium lauryl sulfate (SLS) and fragrance Cerianerss® coconut oil: fragrance Onemed® One Scrub 4% handsoap: chlorhexidine gluconate 4% and alcohol Paquito® liquid bath soap: methylcellulose and fragrance.

Alcohol-containing soaps and hand rubs can induce protein denaturation, lipid disruption in the stratum corneum, and release of proinflammatory cytokines, all of which contribute to skin barrier damage. The patch test results and the patient's history showed a probable correlation with SLS and fragrance exposure. Further testing with individual compounds may be required to confirm the specific allergen.

The most common symptom of ACD is pruritus. Clinically, ACD presents in several phases, erythematous phase: erythema or poorly defined edema of the skin Madidans (exudative) phase: erosions and oozing lesions. Acute ACD develops within 24–48 hours after

exposure. Chronic ACD, as seen in this patient, may arise after prolonged or repeated exposure, manifesting as erythematous macules, fissures, dryness, and pruritus. The patch test remains the gold standard for diagnosing ACD. It is useful in identifying specific allergens and differentiating ACD from ICD. In ICD, inflammation decreases rapidly after removing the irritant (the decreasing phenomenon), while in ACD, inflammation continues to intensify 24–72 hours after allergen exposure and peaks at 72–96 hours, even after removal of the allergen (the crescendo phenomenon).

The differential diagnosis of ACD includes ICD, pompholyx, and tinea palmaris. Bacterial superinfection may complicate ACD, thus bacterial cultures are indicated when exudate or crusted lesions are present.[1] Potassium hydroxide examination is useful in excluding dermatophyte or Candida infections, which can mimic contact dermatitis. Dermoscopy or microscopic examination may help identify parasitic causes, such as mites or fleas.

The mainstay of ACD management is identification and avoidance of allergens. Cold compresses can relieve symptoms in acute cases, and calamine lotion helps dry oozing lesions. Localized ACD lesions can be treated with medium-to high-potency topical corticosteroids, such as mometasone furoate 0.1% or clobetasol propionate 0.05%. For thin or sensitive areas (e.g., eyelids, face, flexures, anogenital region), low-potency corticosteroids like desonide 0.05% are recommended to minimize skin atrophy.

For extensive involvement (>20% of body surface area), systemic corticosteroids such as prednisone 0.5–1 mg/kg/dayfor 5–7 days can be prescribed, followed by a gradual taper over another 5–7 days depending on clinical response and allergen avoidance. Sedating antihistamines such as diphenhydramine or hydroxyzine may provide symptomatic relief of pruritus. Emollients and moisturizers serve as adjunctive therapy to restore the skin barrier by replenishing surface lipids and reducing transepidermal water loss. In this case, the patient was treated with a medium-potency topical corticosteroid, mometasone furoate 0.1% cream, applied twice daily, and a moisturizer (Atopiclair® lotion) applied four times daily. She was also counseled to avoid exposure to allergenic products. The therapy provided was effective in improving symptoms and reducing recurrence.

CONCLUSION

A 29-year-old baby masseuse experienced dry, itchy skin and recurrent lesions on both palms for about one year, worsened by handwashing and massaging infants with virgin coconut oil (VCO). Dermatological examination showed erythematous macules with scales and xerosis on both hands. A patch test confirmed allergic contact dermatitis (ACD), linked to sodium lauryl sulfate (SLS) and fragrance in daily soap products. Treatment with mometasone furoate cream and Atopiclair® lotion, along with allergen avoidance education, effectively relieved symptoms. Future research should explore the specific allergenic compounds in commonly used skin products and evaluate preventive strategies for individuals in professions with frequent skin exposure, like baby massage.

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