

Infant Skin Care: Thai Caregivers' Attitudes, Knowledge, and Practices

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Background: Skin problems are common among infants in Thailand due to the sensitivity of infant skin, high humidity, and hot weather in tropical climates, along with improper skin care. However, caregivers can mitigate these issues by providing appropriate skin care.

Objective: To investigate the attitudes, knowledge, and practices of infant skin care among Thai caregivers.

Materials and Methods: Questionnaire-based, cross-sectional descriptive survey conducted among caregivers who brought children under one year old to a well-baby clinic in Chonburi Province, Thailand, between December 2022 and July 2023.

Results: Three hundred seventy Thai caregivers participated in the present study. Attitude, knowledge, and practice scores were calculated from the questionnaire. The mean infant skin care attitude score was 88.67%, the mean knowledge score was 57.00%, and the mean practice score was 76.14%. Statistically significant correlations were found between skin care knowledge and attitude ($p < 0.001$), and between skin care knowledge and practice ($p < 0.05$). According to caregiver's perceptions, the top five skin conditions they encountered were miliaria rubra, dry itchy rash, intertrigo, insect bite rash, and diaper rash. Notably, only 27.84% of caregivers had accurate knowledge about miliaria rubra care, with many mistakenly using moisturizers to treat prickly heat rash. About one-third of carers use botanical products, with the most common being from butterfly pea, followed by turmeric, coconut oil, olive oil, aloe vera, and cucumber.

Conclusion: Thai caregivers should be encouraged to improve their knowledge and practices regarding the management of common skin conditions, particularly miliaria rubra, and the safe use of baby products, including botanical items.

Keywords: Skin care; Infant; Caregivers; Botanical products

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Infant skin is delicate, prone to irritation, infections, and percutaneous toxicity due to its thin stratum corneum, high trans-epidermal water loss, and high surface area-to-body mass ratio⁽¹⁾. Given its sensitivity, most infants experience skin problems eventually. According to the 2019 Global Burden of Disease study, skin and subcutaneous diseases were more common in young patients, with the majority of new cases occurring in the 0 to 4 years age group⁽²⁾. An analysis of skin diseases in a pediatric dermatology referral clinic in Thailand revealed that

21.3% of patients were under one year old, which is 502 out of 2,361 patients⁽³⁾. Similarly, a study in Turkey found that infants aged 0 to 2 years made up 9.24% of patients in a dermatology outpatient clinic with 935 out of 10,115 patients⁽⁴⁾. Infant skin conditions are prevalent. According to the study in a well-baby clinic in Thailand, Mongolian spot, nevus simplex, seborrheic dermatitis, café-au-lait spot, and miliaria rubra were the common skin findings in infants under one year old⁽⁵⁾. While the study in an outpatient clinic in Turkey found contact dermatitis, atopic dermatitis and impetigo were common diseases in the 0-to-2-year age group⁽⁴⁾. Infant skin problems can be prevented or managed early through appropriate skin care practices⁽⁶⁾.

Updated recommendations from Europe, USA, and India offer guidelines to promote healthy infant skin care⁽⁷⁻¹¹⁾. Key aspects include bathing practices, emollient use, diaper care, and selecting appropriate skin care products for babies. However, skin care practices vary by region, depending on climate and culture. Thailand, a tropical Southeast Asian country

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with high humidity, commonly noticed children’s skin problems such as insect bite reactions and heat rash, or miliaria rubra^(5,12). In addition, a wide variety of skin care products are available in Thailand, including organic and botanical options⁽¹³⁾.

Currently, there has not been specific clinical guidelines for maintaining healthy infant skin in Thailand. Existing guidelines apply primarily to skin diseases such as atopic dermatitis. Routine infant skin care recommendations include bathing infants for five to ten minutes in tap or lukewarm water, limiting baths to no more than twice daily, and using a small amount of gentle liquid baby cleansers⁽¹⁴⁾. The limited time for counseling in well-baby clinics often means that caregivers do not receive comprehensive guidance on infant skin care. The present study served as a preliminary survey of infant skin care practices in Thailand. It explored infant skin problems caregivers faced, their attitudes, knowledge, and practices concerning infant skin care, and the products they used. The findings provided insight into how infant skin care in Thailand differed from other regions.

Objective

The present study aimed to investigate attitudes, knowledge, and practices regarding infant skin care, as well as the use of botanical skin care products, among Thai children’s caregivers.

Materials and Methods

The present study protocol was approved by the Institutional Review Board, Research Ethics Committee of Burapha University (IRB1-091/2565). This was a cross-sectional study using a questionnaire about infant skin care among Thai child caregivers, performed between December 2022 and July 2023. The questionnaire was developed by the study team based on the existing infant skin care guidelines⁽⁷⁻⁹⁾, incorporating commonly encountered topics. The questionnaires included a combination of multiple-choice questions and open-ended questions. Caregivers were asked 43 questions about demographic data of participants, including gender, age, education, age of children in care, sources of knowledge about skin care, infant skin problems, and questions assessing attitudes, knowledge, and practices in infant skin care. The validity of the content of the infant skin care questionnaire was assessed by two other pediatric dermatologists and three pediatricians. They used the content validity index (CVI) to evaluate the questions. Each expert rated the questions on four levels of relevance as

Table 1. Attitudes toward infant skin care

Questions on attitudes (n=370)	Agree n (%)	Disagree n (%)
1. Proper bathing contributes to an infant’s healthy skin.	356 (96.22)	14 (3.78)
2. Using a skin moisturizer is necessary.	304 (82.16)	66 (17.84)
3. Diaper rash can be prevented.	346 (93.51)	24 (6.49)
4. Choosing skin care products specifically for babies is necessary.	363 (98.11)	7 (1.89)
5. Protection against mosquitoes and insects is necessary.	361 (97.57)	9 (2.43)
6. Avoiding strong sunlight is necessary.	328 (88.65)	42 (11.35)

1) not relevant, 2) needs revision, 3) relevant but minor changes needed, 4) highly relevant. The researchers counted only the ratings of 3 and 4 to calculate the item content validity index (I-CVI) using the formula: $I-CVI = N_c/N$, where N_c is the number of experts who rated the item as relevant, and N is the total number of experts. The questionnaire was found to have high content validity, with an I-CVI value of 1 for all questions, indicating they were all highly relevant to infant skin care. Thus, the researchers examined the scores for all questions. There was no validation from non-medical personnel.

The infant skin care attitude’s assessment used Likert scale questions in Table 1. Responses range from “strongly agree” to “strongly disagree,” with a maximum score of 3. Scores decreased to 2, 1, and 0. The assessment of knowledge and practices consisted of multiple-choice questions with correct responses indicated by asterisks (*) in Table 2 and 3. Results were presented as percentages, with caregiver performance categorized as high for 80% or higher, moderate for 60% to 79.99%, and low for below 60% in Table 4.

Participants

Caregivers of children under one year old who attended the well-baby clinic and consented to complete the questionnaire were enrolled.

Data collection

Demographic data of participants, the age of children in care, sources of skin care knowledge, infant skin problems encountered, and questions assessing attitudes, knowledge, and practices in infant skin care, were collected. All survey questionnaires were completed by all participants.

Data analysis

Data were analyzed using R Statistical Software

Table 2. Knowledge on infant skin care

Caregiver's knowledge (n=370)	n (%)
1. Which could cause dry skin related to bathing?	
Warm bath*	316 (85.41)
Bathing everyday	28 (7.57)
<5 minutes bath	26 (7.02)
2. What time should you apply moisturizer to maximize the hydration of your baby's skin?	
Immediately after bath*	330 (89.19)
Within 1 hour after the bath	30 (8.11)
Before bedtime	10 (2.70)
3. What are proper methods for managing nappy rashes?	
Apply protective cream*	291 (78.65)
Stop using soap	56 (15.14)
Apply calamine lotion	23 (6.21)
4. What are proper methods for managing miliaria rubra?	
Frequent bathing*	103 (27.84)
Applying moisturizer	230 (62.16)
Applying topical antibiotic	37 (10.00)
5. Which substances in baby skin care products may cause skin irritation? (can answer >1 choice)	
Fragrance*	325 (87.84)
Preservatives*	255 (68.92)
Alcohol*	245 (66.22)
Natural extracts*	28 (7.57)
6. What problems could arise from using baby powder? (can answer >1 choice)	
Friction, skin irritation*	108 (29.19)
Irritating the respiratory system*	321 (86.76)
Does not cause problems	28 (7.57)
7. What is the minimum age for safely using sunscreen?	
6-month*	73 (19.73)
1-year	139 (37.57)
6-year	158 (42.70)

* This is a scored answer.

(v4.3.2; R Core Team, Vienna, Austria), and a second researcher cross-checked the results. Quantitative variables were calculated and presented as percentages, ranges, means, and standard deviations. Associations between attitudes, knowledge, and practices were analyzed using chi-square test.

Results

The present study included 370 caregivers with an age range of 16 to 65 years, the mean age was 32.46 years (Table 5). The age range of the infants in care was 28 days to one year old. The average age of infants in care was 4.83 months. Most caregivers obtained infant skin care information from social media for 76.49%, followed by consultations with healthcare professionals for 40.54%, relatives for

Table 3. Practices in infant skin care

Practices in infant skin care	n (%)
Cleansers used for babies	
Special for sensitive skin or baby cleansers*	348 (94.06)
General cleansers	11 (2.97)
Water alone	11 (2.97)
Bath duration	
<5 minutes*	196 (52.97)
5 to 10 minutes*	169 (45.68)
>10 minutes	5 (1.35)
Frequency of bathing per day	
<1 time	11 (2.97)
Once	86 (23.24)
Twice	251 (67.84)
≥3 times	22 (5.95)
Water temperature for bathing	
Room air temperature water*	159 (42.97)
Warm water	211 (57.03)
Frequency of diaper changing	
≥3 times in daytime*	303 (81.89)
≥3 times in night-time*	113 (30.54)
Character of the skin care product that caregivers choose for infant	
Moisture effect*	172 (46.49)
Fragrance-free*	196 (52.97)
Irritant-free*	221 (59.73)
Dermatologically tested*	249 (67.30)
Specialized for baby*	316 (85.41)
Organic product	294 (79.46)
Natural extract	245 (66.22)
Good smell	49 (13.24)

* This is a scored answer.

Table 4. Classification of child caregivers score in infant skin care

Infant skin care aspect	Child caregiver score (n=370); n (%)		
	High level (score ≥80%)	Moderate level (score 60% to 79.99%)	Low level (score <60%)
Attitude	286 (77.30)	76 (20.54)	8 (2.16)
Knowledge	27 (7.30)	139 (37.57)	204 (55.13)
Practice	88 (23.78)	240 (64.87)	42 (11.35)

27.30%, pharmacists from drug stores for 24.86%, and friends for 16.76%. The top five skin problems encountered were miliaria rubra in 79.73%, dry scaly itchy rash in 72.70%, intertrigo in 68.38%, insect bite rash in 66.22%, and diaper rash in 59.73%. Other conditions included birthmark in 50.00%, food allergy in 22.43%, suntan in 21.89%, fungal infection in 18.92%, bacterial infection in

Table 5. Demographic data of participants

Data	n=370; n (%)
Sex	
Female	276 (74.59)
Male	94 (25.41)
Age of caregivers (years)	
16 to 19	5 (1.35)
20 to 29	123 (33.24)
30 to 39	194 (52.43)
40 to 49	35 (9.46)
50 to 59	10 (2.70)
60 to 65	3 (0.82)
Education	
Below bachelor's degree	165 (44.59)
Bachelor's degree or higher	205 (55.41)

17.30%, and sunburn in 15.73%. It was important to note that while caregivers reported skin problems, these reports reflected their perceptions of skin conditions rather than being confirmed by a doctor's diagnosis.

Attitudes, knowledge, and practices about infant skin care among caregivers

Their mean attitude score was 88.67%, mean knowledge score was 57.00%, and mean practice score was 76.14%. Table 1-3 presents the infant skin care attitudes, knowledge, and practices among caregivers. Most caregivers exhibited a positive attitude, aligning with appropriate skin care recommendations, with over 80% demonstrating positive attitudes toward all aspects of infant skin care. Caregivers showed proper knowledge⁽⁶⁻⁹⁾ on key aspects such as bathing, moisturizing, diaper changing, and selecting baby skin care products. However, gaps were identified in their knowledge regarding the proper management of miliaria rubra, age limited for sunscreen use, and the potential for natural extracts to cause skin irritation. Most caregivers demonstrated appropriate practices in preventing dry, irritated skin.

Table 6. Association between attitudes, knowledge, and practices

	Attitude level; n (%)		χ^2	p-value	Practice level; n (%)		χ^2	p-value
	Moderate to low level (score <80%)	High level (score ≥80%)			Moderate to low level (score <80%)	High level (score ≥80%)		
Knowledge level			15.321	<0.001*			6.046	0.014*
Low level (score <60%)	62 (30.39)	142 (69.61)			135 (66.18)	69 (33.82)		
Moderate to high level (score ≥60%)	22 (13.25)	144 (86.75)			89 (53.61)	77 (46.39)		

* p<0.05, statistical significance

Association between attitudes, knowledge, and practices

There were statistically significant correlations between the level of skin care knowledge and attitude (p<0.001), and between knowledge and practice (p<0.05). Caregivers with moderate to high knowledge scores also exhibited a high level of positive attitudes toward skin care for 86.75% (chi-square 15.321, p<0.001). Those with lower knowledge scores showed moderate to low levels of skin care practices for 66.18% (chi-square 6.046, p<0.05). However, no statistically significant correlation was found between attitude and practice levels for infant skin care (Table 6).

Baby skin care products

Baby skin care products used by caregivers are shown in Figure 1. The most frequently used products were baby wipes, followed by baby cleansers, disposable diapers, and moisturizers, followed by diaper cream, which was used at the same rate as baby powder. Insect repellent body products, including sprays, stickers, and sunscreen, were also commonly used on infants.

Most caregivers, actually 90.54% of them, used disposable diapers, with 84.59% using them regularly and 15.41% using them infrequently, primarily outside the home. Only 30.54% of caregivers changed diapers at least three times overnight. The percentage of caregivers who changed diapers frequently for infants aged 0 to 2 months was 64.18%, decreasing to 12.50% among infants aged six months or older. Baby powders were commonly used, with caregivers applying them to treat rubra in 45.14%, diaper rash in 35.41%, and intertriginous rash in 44.32%.

From the question "When caregivers are choosing baby skin care products, what specific aspects will they seek in the product?", multiple messages can be responded by them. The chosen messages, arranged from highest to lowest in order of the number of replies, were products specifically for infants for 85.41%, organic options for 79.46%,

Baby skin care products used by child caregivers

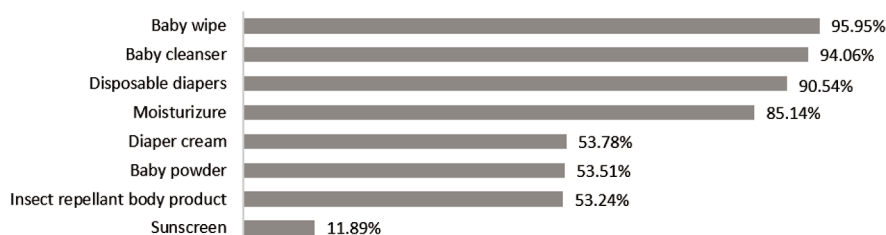


Figure 1. Baby skin care products used by caregivers.

dermatologist tested products for 67.30%, natural extracts for 66.22%, irritant-free products for 59.73%, perfume-free products for 52.97%, contain skin moisturizing substances for 46.49%, and had pleasant aroma for 13.24%.

Discussion

The present study included 370 caregivers, aged 16 to 65 years, with a mean age of 32.46 years. Most caregivers were female, at 75%, and over half held a bachelor's degree, at 55.41%. Notably, 25% of the respondents were male, a higher percentage than in previous studies, which were predominantly female^(15,16). This finding highlights an increasing trend of paternal involvement in childcare at the well-baby clinic, which healthcare providers should encourage by offering infant care skills to fathers⁽¹⁷⁾. Social media platforms such as Facebook and websites were the primary sources of skin care information for 76.49% of caregivers, surpassing personal consultations with healthcare professionals. This aligns with previous research on sources of skin care knowledge for child caregivers^(16,18).

The top five skin issues reported by caregivers were miliaria rubra for 79.7%, dry scaly rash for 72.7%, intertrigo for 68.4%, insect bite rash for 66.2%, and diaper rash for 59.7%, consistent with other studies on common skin problems in Thai children under one year old, such as dermatitis, diaper rash, and insect allergies^(3,5). While birthmark lesions like Mongolian spots and nevus simplex are prevalent, caregivers are not primarily responsible for managing these conditions. Insect bite reactions were frequently observed in Thai infants and also among school-age children⁽¹²⁾, similar to findings in other tropical countries^(4,19-22). Dermatitis and nappy rash are prevalent issues in a variety of countries, including those with temperate and tropical climates^(6,23).

The present study discussed the knowledge and practices of infant skin care among child caregivers, categorized by the following topics:

Bathing and emollients

Thai caregivers followed good bathing and moisturizing practices, consistent with global children's skincare guidelines^(7-10,24). Nearly all caregivers used lukewarm water for bathing, selecting baby-specific bath products, limited bath time to under ten minutes, and applied moisturizers afterward. Bathing frequency up to twice daily differed from colder climates, where bathing occurs two to three times per week, reinforcing the relationship between bathing practices and climate⁽²⁵⁾.

Although Thailand's climate is hot and humid, 85.14% of caregivers regularly used emollients. However, caution is advised when applying moisturizers to skin to avoid exacerbating conditions like miliaria rubra or impetigo. Emollients, while necessary in colder climates, may not be required as frequently in tropical regions. In a prior study on emollients used on infant skin for atopic dermatitis prevention in Thailand, none of the participants used moisturizer every day, and the majority had low, which is one to three days per week to moderate, which is four to six days per week adherence to moisturizer use⁽²⁶⁾. The studies on emollient use for atopic dermatitis prevention in Thai newborns suggest a benefit in tropical climates, though daily application remains debated^(14,27).

Specific infant skin problems care

1) Miliaria rubra: This is the most common skin issue, with 79.7% of caregivers reporting it. It results from immature sweat ducts and is prevalent in tropical areas, particularly during the summer^(19,21,28). Care includes creating a cooler environment, avoiding tight clothing, moisturizing, or occlusive ointments. Surprisingly, only 27.84% of caregivers knew how to manage prickly heat, often mistakenly applying moisturizers, which can worsen the condition. Even among medical professionals, misdiagnosis of miliaria rubra remains an issue⁽²⁹⁾. Therefore, it is possible that caregivers may fail to identify

the cause of the infant's rash, which could lead to mismanagement. This knowledge gap should be addressed by healthcare providers, including the condition and management.

2) Diaper rash: Diaper dermatitis is common worldwide, can be managed by frequently changing diapers, using superabsorbent diapers, and applying barrier creams⁽²³⁾. While 90.54% of caregivers used disposable diapers, only 30.54% changed diapers at least three times overnight. In addition, 35.41% of carers used baby powder despite its potential health risks due to the associated risk of inhalation, induced diaper dermatitis, and intertrigo^(30,31). Proper diaper skin care requires changing diapers more frequently at night. Instead, it is safer to recommend barrier creams like petrolatum, zinc oxide, or newer, more advanced treatments like dexpanthenol or powder in cream formulations⁽³²⁾. The present study revealed that approximately half of the respondents (53.78%) used nappy cream. The rate of nappy cream use has increased compared with the previous report in Thailand, which was only 13.61%⁽³¹⁾. This is probably because most caregivers get more information about diaper care from social media, which is easily accessible these days. In addition, there are many available nappy cream choices in the market.

3) Insect bite rash: In tropical regions, insect bite reactions and post-inflammatory hyperpigmentation are frequent concerns⁽¹²⁾. According to the present study, about 50% reported using insect repellent products, which come in a variety of forms, including solutions, pump sprays, and stickers. Physicians or pediatricians should provide knowledge of appropriate insect repellents to caregivers. The American Academy of Pediatrics recommended 10% to 30% DEET in children older than two months of age⁽³³⁾. However, the Canadian Paediatric Society advised infants from two months of age should not use more than 10% DEET and should be limited to once a day. Plant extracts such as eucalyptus and lemongrass can be substituted⁽³⁴⁾. Applying the product to the skin outside of clothing omitting the mouth, eyes, hands, or open wounds is recommended. Furthermore, it is important to implement other insect-protective measures, such as wearing clothing and avoiding perfumes that might attract insects.

4) Dry, scaly, itchy rash: Often linked to atopy or non-specific causes, this condition can be prevented with good skin care practices. Caregivers in the present study demonstrated positive attitudes, knowledge, and practices in bathing and moisturizing, essential for maintaining healthy skin. In Thailand,

which is a tropical country, there is a study showing that moisturizer can prevent atopic dermatitis among high-risk infant groups, although they use it only for one to three days per week⁽²⁶⁾.

5) Intertriginous rash: This condition develops in warm, humid climates due to sweat and friction. Prevention involves regular washing to remove dirt or sweat stains, using irritant-free products, and avoiding baby powder in intertriginous areas. The present study revealed a significant knowledge gap among caregivers, with only one-third understanding the risks of skin friction from baby powder.

Infant skin care product usage

According to the present research, caregivers used a variety of skin care products with wet wipes, cleansers, and disposable nappies being the most common. Diaper cream, baby powder, and insect repellents were also frequently used. These findings align with a prior study conducted in the United States, although the observation that insect repellent products are more ubiquitous in this tropical location⁽³⁵⁾. Insect repellents are also among the suggested preparations for preventing mosquito bites while travelling in Asia⁽³⁶⁾. Studies on baby skin care products available on the market found that products contain at least one irritant, such as fragrance, lanolin, neomycin, betaines, propylene glycol, formaldehyde, and methylchloroisothiazolinone. Recent research on baby moisturizers reveals that even products labeled as "physician-recommended" and "hypoallergenic" still contain known contact allergens⁽³⁷⁾. Most Thai carers prefer products especially for babies, dermatologist-tested, free of irritating components, and free of perfume, similar to those in India, Europe, and the USA^(35,38-40). However, some Thai caregivers also selected products with potentially irritating properties, like pleasant smells and natural, organic extracts. The present study showed that only 7.57% of caregivers have the right knowledge that substances from natural extract products may cause skin irritation (Table 2).

In Thailand, organic and botanical alternatives to skin care products are gaining popularity⁽¹³⁾. Based on this data, about one third of carers use herbal products. The extract of butterfly pea flower baby skin care products (*Clitoria ternatea*) is the most popular choice, at 32.43%, followed by cumin, coconut oil, olive oil, aloe vera, and cucumber (Figure 2). Long ago, Thai people have used the *Clitoria ternatea* flower for the purpose of enhancing hair and eyebrow growth in infants and reducing

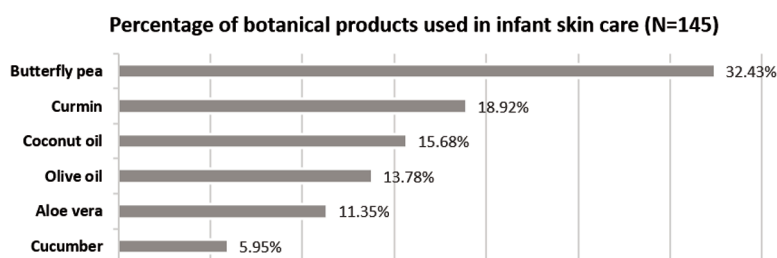


Figure 2. Percentage of botanical products used in infant skin care.

hair loss. The most important substance in *Clitoria ternatea* flowers is anthocyanin⁽⁴¹⁾. These natural products are harmless. However, some of the herbs known to cause allergic reactions are aloe, arnica, calendula, chamomile, goldenseal, and yarrow⁽⁴²⁾. These botanical products are accepted, but it is crucial to choose those approved for safety by the Thai Food and Drug Administration. Safety data on organic and natural extracts for infants is limited. Due to the lack of guidelines for herbal products in young children, further research is essential to ensure their well-being. Prioritizing safety is key for infants.

Strength and limitation

The present study was conducted in Chonburi, Thailand, limiting the generalizability of its findings to other regions. Additionally, the data were based on self-reported questionnaires, which may not fully reflect actual knowledge and practices. Nonetheless, this is one of the few studies in a tropical country, reflecting the range of skin care challenges in such climates. Further studies should include larger populations from multiple areas.

Conclusion

Caregivers in the present study had a positive attitude toward infant skin care but needed to improve their knowledge and practice. Ongoing education on proper skin care in common skin conditions such as miliaria rubra and the safe use of skin care products, including herbal remedies, is recommended.

What is already known about this topic?

In tropical areas, miliaria rubra, intertrigo, and insect bites are common, so caregiver education must be customized. Thailand offers a wide range of skin care products, including botanical types. Data regarding infant skin care issues, their knowledge, practices, and use of baby products are still lacking.

What does this study add?

The knowledge gaps in infant skin care were particularly related to the use of moisturizers for miliaria rubra and the risks associated with baby powder. For baby skin care, almost one-third of caregivers use herbal products. Even though few caregivers are aware that ingredients in natural extract products can irritate skin, some choose products with potentially irritating features, such as pleasant smells and natural extracts. Healthcare providers should focus on improving caregiver knowledge and abilities.

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Conflicts of interest

The authors declared no conflicts of interest.

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