St Luke's Dermatology

Bacterial Contamination of Skincare Products: A Pilot Study to Determine a Possible Source of Clinical Infection in Children with Atopic Dermatitis

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Hypothesis

"Contaminated topical skincare products may serve as a reservoir for potential infection by known pathogens such as *Staphylococcus aureus* within the pediatric eczema/atopic dermatitis (AD) population."

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Methods

- Pilot study:
  - Compare prevalence and quality of positive bacterial cultures
  - Direct swabs of: clinically-infected lesional AD skin, nares, most used personal skincare products
- Population:
  - Pediatric subjects 3 months to 17 years of age from the outpatient pediatric dermatology population
  - Recruited, consented and enrolled prospectively and in series June 2021 to March 2023

MAIN INCLUSION CRITERIA

- Clinical diagnosis of eczema/atopic dermatitis (AD) per Hanifin and Rajika criteria
- At least one **POSITIVE** *Staphylococcus aureus* bacterial swab culture taken from clinically-infected lesional AD skin with subsequent treatment with an appropriate oral antibiotic (based on patient profile and bacterial susceptibilities) for at least 7 days
  - Subjects were instructed to throw out personal skincare products used in the treatment of their AD after positive *S. aureus* skin culture result
- Re-exam with diagnosis of "clear" using the Validated Investigator Global Assessment scale for AD at **2-week** post-antibiotic follow-up appointment

MAIN EXCLUSION CRITERIA

- Any serious medical condition that would prevent study participation or place the subject at significant risk
- Any known genetic dermatological conditions that overlap with AD (e.g., Netherton syndrome)
- Any known or suspected immunodeficiency
- Any known exposure to oral, intravenous, or topical administration of antibiotic, antifungal, or antiviral agents within the last 14 days
- Use of a "bleach bath" (i.e., sodium hypochlorite solution used to decolonize the skin) within the last 14 days

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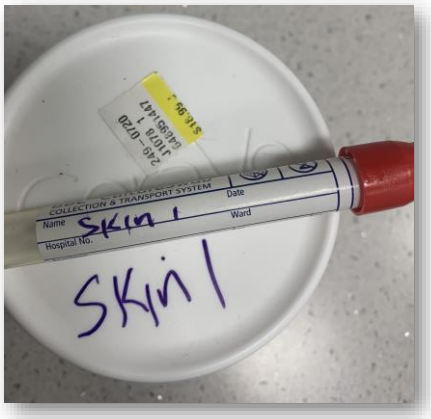
Methods: Follow-Up

- **≥6 months** following treatment with oral antibiotics, subjects underwent reassessment including:
  - Validated Investigator Global Assessment scale (Atopic Dermatitis severity)
  - Total body surface area (%) of involvement
- Subjects/families brought personal skincare products used most frequently in management of their AD
- **3 separate bacterial culture swabs were performed for all subjects**
  1. **Most clinically active area of lesional AD skin**
  2. **Their nares**
  3. **Their personal skincare products**
- Cultures processed by St. Luke's Microbiology Laboratory
- Microbiology results and, where applicable, specific bacterial susceptibility/resistance profiles were compared



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Results

Total of 20 eligible subjects were enrolled

Table 2: Demographics and Atopic Dermatitis Characteristics of Study Population

Patient Demographics	
Age	**n=20 (%)**
6-24 months	11 (55%)
2-7 years	5 (25%)
8-12 years	2 (10%)
13-17 years	2 (10%)
Gender	**n=20 (%)**
Male	11 (55%)
Female	9 (45%)
Race/ethnicity	**n=20 (%)**
White	10 (50%)
Hispanic or Latino	4 (20%)
2 or more	2 (10%)
Black or African American	1 (5%)
Prefer not to answer	3 (20%)

Table 3: Characteristics of Atopic Dermatitis in Study Population

Atopic Dermatitis Characteristics	Screening Encounter	Follow-up Encounter
Disease Severity by vIGA-AD*	**n=20 (%)**	**n=17** (%)**
Clear or Almost Clear	0 (0%)	2 (12%)
Mild	1 (5%)	13 (76%)
Moderate	17 (85%)	2 (12%)
Severe	2 (10%)	0 (0%)
AD Total Body Surface Area		
Mean	23%	6%
Standard Deviation	18 %	4%
Anatomic Location of Skin Swabs	**n (%)**	**n (%)**
Head, Face, or Scalp	7 (35%)	4 (24%)
Chest, Abdomen, or Back	3 (15%)	1 (6%)
Arms or Hands	3 (15%)	6 (35 %)
Legs or Feet	7 (35%)	5 (29 %)
Groin or Buttocks	0 (0%)	1 (6%)

*Validated Investigator Global Assessment for Atopic Dermatitis (vIGA-AD).
**Three subjects were lost to follow up.

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Discussion

- Microbial growth in 74% of the personal skincare products cultured, 37% of which was *S. aureus*
  - Personal skincare products used in a pediatric population with AD **could** serve as a reservoir for *S. aureus* infection
- The majority of **POSITIVE** *S. aureus* cultures resulted from **"tub-style" containers** and **ointment-based products**

Limitations:

- Small sample size
- 3 subjects unable to complete study
- "Batching" of multiple product swabs per culture
- Lack of funding for microbial genotyping

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Results

Table 4: Summary Statistics of Sample Tested

Metric (Collected at Follow-up Encounter)	n	Value (%)
Patients with SKIN and PRODUCT Culture	17	85%
Patients with SKIN Culture POSITIVE for *S. aureus*	11	65%
PRODUCT Cultures POSITIVE for ANY Microbial Growth	20	74%
PRODUCT Cultures POSITIVE for *S. aureus* (MRSA)	10 (3)	37% (11%)
Patients with SKIN Culture and PRODUCT Culture POSITIVE for *S. aureus* (MRSA)	6 (1)	35% (4%)
Patients with NARES Culture and PRODUCT Culture Positive for *S. aureus* (MRSA)	6* (2)	43%* (14%)
Patients with SKIN Culture and PRODUCT Culture POSITIVE for *S. aureus* (MRSA) but NARES Culture NEGATIVE for *S. aureus*	2	14%
Patients with Common *S. aureus* Resistance Between Screening Skin Swab and Product(s) Swab	6	35%

*14 out of 17 follow-up subjects permitted nasal swab collection

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Conclusion

- Personal care products used in a pediatric population with AD **could** be a source of S. aureus infection.
- **A survey of commonly used skincare products** should be included in the clinical exam of patients with atopic dermatitis.
- Education on hygienic topical application practices may be beneficial interventional strategies for reducing clinical AD infection.
  - washing hands prior to application
  - avoidance of "double-dipping" contaminated fingers into products
  - aliquoting specified amount of product for application
- This study was small and prospective in nature. Larger, well-controlled investigations are required to extrapolate these results to a larger population.

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