Setting the Record Straight on Diaper Rash and Disposable Diapers

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Abstract
Skin in the diapered area is continuously threatened by exposure to changes in pH levels, overhydration, mechanical friction, and fecal enzymes, making diaper rash a common occurrence among babies. Up to one third of infants may exhibit clinical symptoms of diaper rash at any time, and more than half of babies between the ages of 4 and 15 months develop diaper rash at least once in a 2-month period. Despite misperceptions that disposable diapers are related to an increase in diaper rash, the incidence of diaper dermatitis is on the decline, largely due to significant improvements in disposable diaper construction and materials. Modern-day disposable diapers are specifically designed to limit exposure to irritants in the diaper area, reduce overhydration, inhibit skin barrier compromise, and help maintain normal skin pH levels and have been thoroughly evaluated for safety and skin compatibility.

Keywords
diaper rash, diaper dermatitis, disposable diapers, skin pH levels, skin irritation, overhydration, skin barrier compromise, diaper chemical burn

Skin in the diapered area is continuously threatened by exposure to changes in pH levels, overhydration due to urine load, and mechanical friction and fecal enzymes, making diaper rash a common occurrence among babies. Up to one third of infants may exhibit clinical symptoms of diaper rash at any time, and more than half of babies between the ages of 4 and 15 months develop diaper rash at least once in a 2-month period (see Figures 1 and 2).¹,²

One of the challenges in effectively treating rash and rash symptoms is that it can be caused by a range of factors (see Figure 3). Defined as an acute, inflammatory reaction, dermatitis may result from a combination of the following factors:

- Extended periods of wetness in the diaper, leading to skin that is more easily damaged and prone to chafing
- The presence of bile salts and other irritants in feces that break down the protective lipids and proteins in the top layer of skin (the stratum corneum)
- Skin pH levels that are elevated by a mixture of urine and feces, which can activate fecal enzymes that may cause redness and skin irritation
- Friction and mechanic abrasion, which may exacerbate irritation, especially if the skin is already compromised

Increase in Disposable Diaper Use Corresponds to Reduction in Diaper Rash
Despite widespread perceptions among parents that disposable diapers are related to an increase in diaper rash, the incidence of diaper dermatitis is actually on the decline, largely due to significant improvements in disposable diaper construction and materials. Modern-day disposable diapers are specifically designed to limit exposure to irritants, reduce overhydration, inhibit skin barrier compromise, and help maintain normal skin pH levels. As such, doctors report a noticeable reduction in the frequency of moderate and severe diaper area skin eruptions.³

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Recent studies reaffirm decreases in rash rates timed with innovations in disposable diaper technology. Trends among infants in the United States and Europe reveal that since the introduction of superabsorbent polymers in diaper layers, the severity of diaper rash has significantly lessened, likely due to pH buffering and management of hydration levels.4

Manufacturers have also conducted rigorous safety evaluations to confirm the favorable safety profile of diapers and their components. Furthermore, trends in diapering habits and practices encourage proactive treatment regimens that help prevent or reduce the severity of rash.

Considering Other Conditions That Present Rash

While diaper dermatitis is the most common cause of irritation in the diaper area, when a rash is severe, unusual, or does not respond quickly to treatment, it is important to consider other conditions that can present in this area. Skin irritation in the diapered area can be caused by a range of conditions and present a variety of symptoms that are unrelated to diaper use. Impetigo, seborrheic dermatitis, yeast infections, atopic dermatitis, psoriasis, and miliaria (prickly heat) are examples of mild skin disorders that mimic diaper rash. These rashes often occur in stages and can vary in severity, beginning with the appearance of erythema, followed by edema, then the formation of superficial erosions, ulcerated nodules that can manifest as faint pinks or very intense reds in color, slight dryness or severe desquamation, or a single papule or confluent papules (see Figures 5 and 6).5
Common tips on caring for diaper rash:

- Change frequently and clean gently:
  - Change wet or soiled diapers frequently to decrease moisture on the skin
  - Gently clean the diaper area with water and a soft washcloth, or use disposable diaper wipes; wipes do not contain alcohol and are available fragrance-free
  - Pat the area dry instead of rubbing and allow it to air dry

- Protect the skin:
  - Apply a thick layer of protective ointment or cream that contains zinc oxide and/or petrolatum
  - Use an extra-absorbent and/or lotion-treated diaper to help maintain skin dryness
  - Avoid tight-fitting diapers to keep wetness away from the skin

- Check with the pediatrician if:
  - Blisters or sores are present
  - The condition persists or worsens after 2 to 3 days
  - The area is profoundly red and/or tender
  - The condition is accompanied by fever, behavioral, or feeding changes

Less commonly, severe erosions or ulcers in the diaper, large nodules, scales, or systemic redness could be a sign of a potential underlying dermatitic tendency, such as psoriasis or rare immune, inflammatory, or other severe disorders. In these cases, referral to a pediatric dermatologist for evaluation is recommended.

In Summary

Two decades of clinical research and consumer use speak to the significant advances in diaper technology. Clearly, the issues of safety and efficacy drive both health care expert recommendations and parental acceptance of disposable diapers. The resultant decrease in severe and even moderately severe diaper dermatitis seen in pediatric health care offices during this time speaks volumes. Super absorbent polymers in disposable diapers reduce babies’ exposure to the fluid content of urine and feces resulting in a documented decrease in hydration and friction, two of the major drivers of diaper dermatitis. Other benefits, such as the normalization of diaper area skin pH and skin conditioning by petrolatum-based formulations in diaper linings, continue to build on efficacy prior to and continually since marketing superabsorbent diapers.
Parents understandably wish to understand any redness and irritation in the diaper area; they want to know if it's an allergy, an infection, or other cause such as a chemical burn; it's important for me to clarify those misconceptions and discuss the role of disposable diapers, specifically the layers of absorbency that have helped to reduce irritation and friction. The vast majority of the time, it's not an allergy or infectious in nature. As I counsel parents of my patients to allay their concerns about rash, I often cite the significant body of knowledge available today about the reduction in both moderate and severe diaper dermatitis since the advent of the absorbent disposable diaper. The strong data include not only efficacy studies, but also the extensive toxicity and ingestion studies, as well as the significant data available confirming the safety of these diapers.

Declaration of Conflicting Interests
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