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## Diaper Dermatitis

### Authors

Anthonella B. Benitez Ojeda; Magda D. Mendez<sup>1</sup>.

### Affiliations

<sup>1</sup> Lincoln Medical Center/Weil Cornell

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## Introduction

**Diaper** dermatitis is an inflammatory reaction of the skin of the perineal and perianal areas (**diaper** area). It is the most common skin disorder seen in young infants. It is most commonly caused by irritation of the skin; however, there are other causes such as atopic dermatitis and seborrheic dermatitis that can present as a **diaper** rash. Another common reason is infection with *Candida albicans*, which can be primary or secondary. **Diaper** dermatitis is usually a mild and self-limited condition that requires minimal intervention. Some of the management approaches include skincare, with adequate hygiene, and avoidance of any irritant substance.[1]

## Etiology

**Diaper** dermatitis is an inflammatory reaction of the skin around the **diaper** area. It results due to a combination of multiple factors such as increased moisture, prolonged contact with urine or feces, and other irritants like detergents.[2]

The second most common cause of **diaper** dermatitis is infection. Fungal infection, especially by *Candida albicans* is the most common infectious cause. Candida infection can be a primary cause of **diaper** dermatitis, and can also result as a superimposed infection to chronic irritation. Other mycoses that can be associated with **diaper** dermatitis include dermatophytosis, exacerbation of seborrheic dermatitis by *Malassezia*, and other pseudomycotic conditions like erythrasma.[3]

Bacterial infections follow fungal as the second most common cause of infectious **diaper** dermatitis. *Staphylococcus aureus* infection can occur in newborns, secondary to colonization from the umbilical cord. *Streptococcus pyogenes* is also seen as an etiologic agent causing the condition.[4]

## Epidemiology

**Diaper** dermatitis can affect any individual using diapers without any gender preference. Newborns and infants are at an increased risk due to skin immaturity. Peak incidence is around 9 to 12 months of age. **Diaper** dermatitis occurs in about 50% of infants, and it accounts for about 25% of visits to primary care physicians related to dermatologic complaints in the first year of life.[5]

There are risk factors associated with the development of **diaper** dermatitis, such as:

- Age: newborn and infant skin are more immature and show increased susceptibility.
- Diet: changes in diet as the infant grows are related to changes in intestinal microbiota and stool pH. Breastfeeding has been proven to be a protective factor.
- Frequency of **diaper** changes: prolonged contact with irritants such as urine and feces, increases the risk of skin inflammation. Newborns and young infants, whose diapers are changed more frequently tend to be less affected than older infants.[6]

## Pathophysiology

The most important predisposing factor for the development of **diaper** dermatitis is the increased moist that results from wearing diapers, which leads to increased friction and maceration, which makes the skin more susceptible to

damage and penetration by skin microorganisms and other irritants.[7][6]

Changes in skin pH also play an essential role; an increase in pH around the **diaper** area from the breakdown of urinary urea can, in turn, increase fecal enzyme activity that can further damage the skin.[8][9] The combination of these processes results in colonization and infection from organisms such as *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Candida albicans*.

## History and Physical

The presentation may begin with a history of increased frequency of stools or changes in its appearance (loose), followed by the development of erythema around the **diaper** area about two days after. Physicians must elicit from parents hygiene practices, frequency of **diaper** changes, type of diapers used, and use of any substance that may be worsening the irritation.

Clinical presentation can be variable. Skin findings include erythema, papules, scaling, and erosions that can be present around the thighs, scrotum, suprapubic area, and buttocks. It usually spares skin creases.[6]

*Candida* dermatitis presents with erythema and scaly plaques, accompanied by edema. The most characteristic feature is the presence of satellite pustules or papules. Candidal dermatitis can be present in the skin folds. In severe cases, erosions and ulceration can occur.[3]

Clinical manifestation of *S. aureus* infection can range from small papules and pustules to large, fragile blisters of bullous impetigo. *S. pyogenes* presents with fiery-red erythema and maceration that involves the skin folds.[4]

## Evaluation

**Diaper** dermatitis is a clinical diagnosis based on history and physical examination findings. Overall, there is no need to perform any laboratory testing. However, when considering infection by *Candida albicans*, confirmation of the diagnosis by examination with KOH can be useful, although not necessary. If there is suspicion of bacterial infection, Gram staining can be performed.[3]

## Treatment / Management

Management of **diaper** dermatitis has two main goals: healing of damaged skin, and prevention of rash recurrence.

The strategies to achieve these goals include:

- Good hygiene is essential to maintain skin integrity and prevent further breakdown. Reducing the exposure to irritants, like urine and feces, can be achieved with frequent **diaper** changes, and using superabsorbent diapers that help reduce skin over-hydration.
- Bathing and cleaning the **diaper** area with water and soap-free cleanser.
- The use of wet wipes has been controversial over the years, mainly due to the concern that the components could cause further irritation to the skin. However, recent studies have shown that baby wipes do not cause any harm to the skin. Furthermore, the newer formulations of wipes that include pH buffers help to balance the alkaline pH of the urine and prevent skin damage due to pH changes. It is important to advise parents that the wipes should be free of soap, essential oils, or other fragrances, and harsh detergents that can be irritant to the skin.[10]
- The use of topical emollients is recommended for both prevention and treatment. They can improve the skin barrier function, and they also provide a barrier between the skin and the **diaper**, urine, and feces, not limiting the contact with the skin and diminishing irritation, but also preventing over-hydration to the skin. For the management of current **diaper** dermatitis, apply with each **diaper** change. Examples of emollients available include zinc oxide, petrolatum, cod liver oil, lanolin, among others.[10]
- For cases of **diaper** dermatitis that do not improve within 2 to 3 days of implementing the measures above, or in moderate to severe cases, a short course of low-potency corticosteroids can be used. Hydrocortisone 0.5% 2 times a day for one week.[3]
- When treating candida **diaper** dermatitis, topical antifungals should be added to the regimen. Nystatin can be

used first, applied with every **diaper** change, with a generally good response; however, if by 1 to 3 days, there is no improvement of symptoms (also keeping in mind *Candida* resistance to nystatin), switching to azoles is recommended. Clotrimazole, miconazole, or ketoconazole can be used, applied twice a day for 7 to 10 days.

- In cases of bacterial infection, topical antibiotics may be necessary. And in cases of severe infections, such as perianal streptococcal dermatitis, oral antibiotics are indicated.[10]

## Differential Diagnosis

The differential diagnosis of **diaper** dermatitis includes any skin condition that can present around the **diaper** area.

- Seborrheic dermatitis usually presents in the first month of life. Characterized by skin erythema and scaling, that begins in the scalp, and distributes to the face. It has the potential to spread to the **diaper** area, making babies more susceptible to the development of irritant **diaper** dermatitis.[6]
- Atopic dermatitis usually presents between 3 and 12 months of age. The presentation includes extreme pruritus with dryness and erythema. Lesions typically involve skin flexures. The **diaper** area is generally spared.[6]
- Allergic contact dermatitis, secondary to reactions to fragrances, or preservatives. Usually occurs after the introduction of a new skin product, and it involves any part of the skin where the product was applied.[5]

Other differential diagnoses that need to be taken into consideration include tinea cruris, scabies, acrodermatitis enteropathica, biotin deficiency, Langerhans cell histiocytosis (Letterer-Siwe disease), congenital syphilis, Kawasaki disease, and HIV infection.[11][12]

## Prognosis

**Diaper** dermatitis has an excellent prognosis with appropriate diagnosis and with timely adequate management. It is usually a mild, self-limiting disease.

## Complications

Complications of irritant **diaper** dermatitis include superimposed infection either with fungal or bacterial microorganisms. Special consideration must be taken when these infections occur in immunocompromised patients since they are at risk of invasive disease.[13]

## Consultations

**Diaper** dermatitis is a condition that can be safely managed by a general practitioner. However, a consult to dermatology may be warranted in cases of an extensive disease that does not respond to treatment. If there is suspicion of a superimposed bacterial infection or extensive/invasive disease, consultation with infectious disease specialists may be required.

## Deterrence and Patient Education

Education on proper **diaper** skincare must be provided as part of the anticipatory guidance of each well-care visit, including frequency of **diaper** change, guidance on the types of diapers and wipes to use, and application of the barrier emollients with **diaper** changes.[10]

## Pearls and Other Issues

- **Diaper** dermatitis is one of the most common skin disorder in infants.
- The most common cause is irritant contact dermatitis due to occlusive diapers and prolonged exposure to urine and feces.
- *Candida* infection is the second most common cause, but superimposed infection by bacterial microorganisms can also develop
- Management is based on good hygiene and **diaper** area skincare.

- Other causes of **diaper** rash, such as seborrheic dermatitis and psoriasis, may also be present.

## Enhancing Healthcare Team Outcomes

**Diaper** dermatitis is one of the most common dermatologic conditions in the newborn period and early infancy. It is of great importance that all healthcare professionals at any level be familiar with the characteristics of the disease and how to manage it and to be able to provide appropriate guidance to the parents and caregivers.

Management of **diaper** dermatitis does not necessitate the involvement of an interprofessional team to achieve appropriate treatment; however, as some cases can be more challenging, it is important to obtain timely consults whenever the need arises.

## Continuing Education / Review Questions

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