

PREVALENCE AND RISK FACTORS OF DIAPER DERMATITIS AMONG NEWBORN BABIES TO TWO YEARS OF AGE IN A TERTIARY DAY CARE HOSPITAL

Shobhana Jha¹, Anupama Singh²

¹Senior Resident, Department of Skin and VD, PMCH, Patna, Bihar, India.

²Assistant Professor, Department of Skin and VD, PMCH, Patna, Bihar, India

Received : 22/02/2024
Received in revised form : 11/04/2024
Accepted : 26/04/2024

Keywords:
Diaper Dermatitis, Risk Factors.

Corresponding Author:
Dr. Shobhana Jha,
Email: drshobhanajha@gmail.com

DOI: 10.47009/jamp.2024.6.4.221

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (4); 1113-1116



Abstract

Background: This study, thus, attempted to determine the prevalence of diaper dermatitis and its associated factors among children aged 2 to 4 years attending tertiary care centers. The results will assist in the future development of preventive plans for diaper dermatitis in children in this kind of setting. **Materials and Methods:** Responses to self-administered structured questionnaires were collected from the participants' caregivers. Eligibility was defined as age 2 to 4 years and attendance at Pediatric ward of Patna Medical College and Hospital, Patna, Bihar. Written informed consent was obtained from the participants' parents or guardians before data collection. Diaper dermatitis was defined to caregivers as a rash in the diaper region thought to be caused by the infant wearing a diaper. Statistical analysis was performed using STATA software version 10. Cross-sectional analysis and descriptive statistical methods (mean, standard deviation, median, and frequency) were applied to analyze the demographic data. Chi-square, logistic regression, and Fisher's exact tests were used to test correlation and differences between factors. Statistical significance was defined as a P value <.05. The study was approved by the Institutional Review Board committee. **Result:** The prevalence of diaper dermatitis among children aged 2 to 4 years in Pediatric ward in Patna Medical College, a tertiary care centers was 18.3%. This number is apparently low compared with that found in a previous study in children <2 years old. This can be explained by the fact that most children achieve diaper independence by the age of 2 years. **Conclusion:** Implementing early toilet training (before 2 years of age) and decreasing the use of unnecessary oral antibiotics can help prevent diaper dermatitis in children in daycare centers.

INTRODUCTION

Diaper dermatitis is an inflammation of the skin due to prolonged contact with various irritants, such as stool, urine, and moisture, as a result of diaper use. The condition is Occasionally enhanced by bacterial overgrowth.^[1-3] the highest incidence is in children younger than 2 years^{1, [4,5]} because a high percentage of children use diapers in this age group. Thus, the incidence of diaper dermatitis decreases substantially after children are able to use the toilet by themselves, usually by the age of 2 years.^[6] Daycare centers tend to be focused on promoting children's development, including self-feeding and toilet training. However, they are also settings where there is a high risk of children contacting contagious diseases, especially respiratory and gastrointestinal tract infections. This may be one of the factors that influence the risk of diaper dermatitis among daycare populations. This

study, thus, attempted to determine the prevalence of diaper dermatitis and its associated factors among children aged 2 to 4 years attending tertiary care centers. The results will assist in the future development of preventive plans for diaper dermatitis in children in this kind of setting.

MATERIALS AND METHODS

Responses to self-administered structured questionnaires were collected from the participants' caregivers. Eligibility was defined as age 2 to 4 years and attendance at Pediatric ward of Patna Medical College and Hospital, Patna, Bihar. Written informed consent was obtained from the participants' parents or guardians before data collection. Diaper dermatitis was defined to caregivers as a rash in the diaper region thought to be caused by the infant wearing a diaper. Statistical analysis was performed using STATA software version 10. Cross-sectional

analysis and descriptive statistical methods (mean, standard deviation, median, and frequency) were applied to analyze the demographic data. Chi-square, logistic regression, and Fisher's exact tests were used to test correlation and differences between factors. Statistical significance was defined as a P value <.05. The study was approved by the Institutional Review Board committee.

RESULTS

Demographic Data

A total of 150 questionnaires were sent out to Pediatric ward of Patna Medical College and

Hospital, Patna, Bihar a Tertiary care centre of which 111 (74%) were returned. Fifty four respondents were male (49%) and 57 were female (52%), making the male to female ratio 0.94. The children's ages ranged from 24 to 48 months, with an average age of 35.6 months (SD = 4.2). The majority of the children were the only child in the family (71/111, 64%), and the primary caregivers were the children's parents in most cases 83/111, 83.02%). The ages of the primary caregivers were recorded as ranges, with most being between 30 and 40 years old (63/111, 57.1%). The majority of caregivers (96/111, 69.3%) worked in health care-related fields, that is, doctors, dentists, nurses, and faculty staff.

Table 1: Factors Associated With Diaper Dermatitis in the Study Population by Using Logistic Regression.

| Associated Factors | % of Diaper Dermatitis | Odds Ratio | 95%CI of Odds Ratio | P |
|--|------------------------|------------|---------------------|-------|
| Early toilet trained ≥2 years <2 years | 27.93 12.50 | 3.85 1 | 1.18-787 | 0.010 |
| Diarrhea Yes No | 9.76 8.33 | 191 1 | 23.48-1607.86 | <.001 |
| Diaper dependent Yes No | 26.00 16.33 | 1.85 1 | 0.80-5.92 | .265 |
| Use of oral antibiotics Yes No | 32.89 3.86 | 16.93 1 | 14.58-71.95 | <.001 |
| Allergic background No Yes | 19.20 16.80 | 1.120 1 | 0.50-3.90 | .822 |

Prevalence of Diaper Dermatitis among the Daycare Population

Half of the study population (62/111, 56.4%) had experienced at least 1 previous episode of diaper dermatitis; however, only 18.2% (20/111) of the children had documented occurrences of diaper dermatitis within the previous 6 weeks (at the time filling out the questionnaires). Children with previous episodes of diaper dermatitis were more likely to have diaper dermatitis at the time of data collection (odds ratio

Analysis of Associated Factors

There are many variables that have been proposed as being associated with the occurrence of diaper dermatitis among children in this age group, all of which were included in the structured questionnaires. Table 1 show factors associated with diaper dermatitis in the study population. The 2 factors found to be significantly correlated with diaper dermatitis were diarrhea and the use of oral antibiotics. One factor that demonstrated significant preventive correlation was beginning toilet training before 2 years of age. Although atopic background and diaper-dependent status have been proposed as factors that may contribute to the occurrence of diaper dermatitis, no statistically significant correlation with diaper dermatitis was found in this study. The major factors proposed as being associated with diaper dermatitis factors are described next Onset of Toilet Training Before 2

Years of Age. Seventy 63.6%) of the children in this study started the toilet training before the age of 2 years, and 42 children (38.4%) started later. There were 12 cases of diaper dermatitis reported in the former group and 16 cases in the latter.

Initiating toilet training before 2 years of age decreased the occurrence of diaper dermatitis, exhibiting a significant preventive correlation

There were 17 documented cases of diarrhea in the study population. In 16 of these cases, the children had diaper rashes concurrent with the diarrhea. There was only 2 case in which the child did not have a diaper rash at the time the diarrhea occurred. There was a statistically significant correlation between diarrhea and diaper dermatitis

The overall antibiotics use in the study population was 56/111 cases (50.56%), and that among the children with diaper dermatitis was 16/25 cases (63.6%). There was a statistically significant correlation between the use of oral antibiotics and the occurrence of diaper dermatitis

Diaper dependency was defined as the need for diapering at any time during the 6 weeks prior to data collection. A total of 29 of 111 cases (21.2%) were reported as being diaper dependent, of which 8 were noted to have diaper dermatitis. A chi-square test revealed some correlation between diaper dependency and diaper dermatitis, but this was not statistically There were 58 of 111 cases in which the child was documented as having a history of at least

one atopic condition (atopic dermatitis/allergic rhinitis and asthma/cow's milk protein allergy). The children in only 10 of these cases had diaper dermatitis at the time of data collection. A chi-square test revealed a nonsignificant correlation between atopic conditions and the occurrence of diaper dermatitis the sample size was too small to conduct subgroup analysis to test for correlations between each individual atopic condition and diaper dermatitis. Diaper cream, petroleum jelly, baby lotion, and baby powder were recorded as being applied on the diaper area. There was no correlation found between the presence of diaper dermatitis and topical treatment.

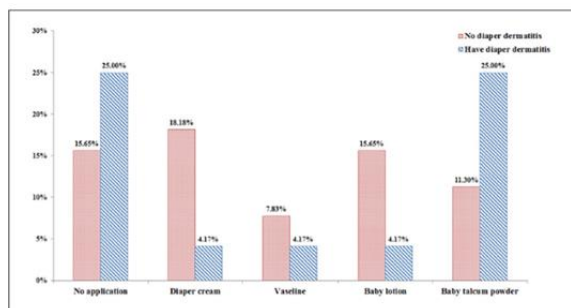


Figure 1: The distribution of participants who had and did not have diaper dermatitis by topical treatment. No statistical correlation was found between topical treatment and the occurrence of diaper dermatitis.

DISCUSSION

The prevalence of diaper dermatitis among children aged 2 to 4 years in Pediatric ward in Patna Medical College, a tertiary care centers was 18.3%. This number is apparently low compared with that found in a previous study in children <2 years old. This can be explained by the fact that most children achieve diaper independence by the age of 2 years,^[7-9] making diaper dermatitis less common in that group. Although diaper dependency has been reported as the main factor leading to diaper dermatitis in this age group, no statistically significant correlation was found in our study. Diaper dependency was defined as the need for diapering at any time during the 6 weeks prior to data collection but the duration of diapering, which varied among children in this study was not considered. Some children wore diapers only at night, while some were documented as only wearing diaper when going outside of the house. Not accounting for this variation may have influenced the study results. A future study that considers the exact duration of diapering may useful in discovering the correlation between the duration of diaper contact and occurrence of diaper dermatitis.

Another factor proposed to be associated with the occurrence of diaper dermatitis is the timing of toilet training. Children in this study were older than 2 years and had already undergone toilet training, which means they spent less time in diapers.^[7,10-12] Thus, the occurrence of diaper dermatitis should be

substantially lower in this group. The authors explored the onset when the study population started their toilet training by the cutoff age of 2 years.^[13] We found that toilet training before 2 years of age showed a preventive correlation with the occurrence of diaper dermatitis. This finding should encourage caregivers to attempt early toilet training in order to prevent the occurrence of diaper dermatitis in the future. The other 2 main factors that had a statistically significant correlation with diaper dermatitis were diarrhea ($P < .001$) and the use of oral antibiotics ($P < .001$). Diarrhea is a significant factor in the occurrence of diaper dermatitis¹⁴ in that it increases contact with stool.^[15,16] Stool is a major irritant and contains many gastrointestinal enzymes, including protease, lipase, and urease.^[1,2,4,5] Having diarrhea increases the frequency of defecation, which can subsequently cause significant irritation to the skin on the diaper area. The authors explored a possible correlation between diarrhea and oral antibiotics use in the study population; however, no statistically significant correlation was found ($P = .082$). This may be due to oral antibiotics being used to treat other conditions, such as respiratory tract infection. In addition, the use of oral antibiotics may have been unnecessary in some cases. Previous studies have shown that the use of oral antibiotics in daycare populations is significantly higher than in children who stay at home.^[17,18] This can be explained by the greater amount of contact among children in the daycare setting, which allows for various contagious infections to break out and spread more easily than in the home setting, thus increasing the necessity of oral antibiotics. However, most of these infections are viral and do not necessitate the use of antibiotics. Previous studies have shown the overuse of antibiotics to be harmful to children in daycare centers.^[18] The overuse of antibiotics has been shown to lead to community-acquired antimicrobial resistance, even among outpatients in primary care centers.^[19] The present study showed a statistically significant correlation between the use of oral antibiotics and diaper dermatitis. This correlation can be explained by antibiotic-associated diarrhea, which a previous study conducted in a pediatric ambulatory care setting found in up to 6.2%.^[20] Thus, it is important to promote to limit antibiotic use among children in daycares to only cases in which they are necessary, which will help prevent diaper dermatitis in this population. There were several potential limitations to the present study. The questionnaire was only structured to examine possible risk factors for diaper dermatitis. However, there may be other unknown factors that have an impact on diaper dermatitis and were not included in the analyses. In addition, there were some parents/caregivers who did not return the questionnaires, making response bias a possible attributing factor.

CONCLUSION

Implementing early toilet training (before 2 years of age) and decreasing the use of unnecessary oral antibiotics can help prevent diaper dermatitis in children in daycare centers. In addition to lowering the potential occurrence of diaper dermatitis, early toilet training has been shown to help children develop healthy habits, increase their learning opportunities, and give them confidence in the developmental milestone.

REFERENCES

1. Berg RW. Etiology and pathophysiology of diaper dermatitis. *Adv Dermatol.* 1988;3:75-98.
2. Atherton DJ. A review of the pathophysiology, prevention and treatment of irritant diaper dermatitis. *Curr Med Res Opin.* 2004;20:645-649.
3. Scheinfeld DN. Diaper dermatitis. *Am J Clin Dermatol.* 2012;6:273-281.
4. Prasad HRY, Srivastava P, Verma KK. Diaper dermatitis—an overview. *Indian J Pediatr.* 2003;70:635-637.
5. Ravanfar P, Wallace JS, Pace NC. Diaper dermatitis: a review and update. *Curr Opin Pediatr.* 2012;24:472-479.
6. Sukhneewat C, Chaiyarit J, Techasatian L. Diaper dermatitis: a survey of risk factors in Thai children aged under 24 months. *BMC Dermatol.* 2019;19:7.
7. Kaerts N, Vermandel A, Van Hal G, Wyndaele JJ. Toilet training in healthy children: results of a questionnaire study involving parents who make use of day-care at least once a week. *Neurourol Urodyn.* 2014;33:316-323.
8. Hooman N, Safaai A, Valavi E, Amini-Alavijeh Z. Toilet training in Iranian children: a cross-sectional study. *Iran J Pediatr.* 2013;23:154-158.
9. Vermandel A, Weyler J, De Wachter S, Wyndaele JJ. Toilet training of healthy young toddlers: a randomized trial between a daytime wetting alarm and timed potty training. *J Dev Behav Pediatr.* 2008;29:191-196.
10. Thaman LA, Eichenfield LF. Diapering habits: a global perspective. *Pediatr Dermatol.* 2014;31(suppl 1):15-18.
11. van Nunen K, Kaerts N, Wyndaele JJ, Vermandel A, Hal GV. Parents' views on toilet training (TT): a quantitative study to identify the beliefs and attitudes of parents concerning TT. *J Child Health Care.* 2015;19:265-274.
12. Naughton L. Starting school clean and dry. *Community Pract.* 2014;87:14-16.
13. Benjasuwantep B, Ruangdaraganon N. Infant toilet training in Thailand: starting and completion age and factors determining them. *J Med Assoc Thai.* 2011;94:1441-1446.
14. Lemp GF, Woodward WE, Pickering LK, Sullivan PS, DuPont HL. The relationship of staff to the incidence of diarrhea in day-care centers. *Am J Epidemiol.* 1984;120:750-758.
15. Singalavanija S, Frieden IJ. Diaper dermatitis. *Pediatr Rev.* 1995;16:142-147.
16. Nordlie AL, Andersen BM. Children in day care centers— infections and use of antibiotics [in Norwegian]. *Tidsskr Nor Laegeforen.* 2002;122:2707-2710.
17. Friedman JF, Lee GM, Kleinman KP, Finkelstein JA. Acute care and antibiotic seeking for upper respiratory tract infections for children in day care: parental knowledge and day care center policies. *Arch Pediatr Adolesc Med.* 2003;157:369-374.
18. Friedman JF, Lee GM, Kleinman KP, Finkelstein JA. Child care center policies and practices for management of ill children. *Ambul Pediatr.* 2004;4:455-460.
19. Shapiro A, Raman S, Johnson M, Piehl M. Community-acquired MRSA infections in North Carolina children: prevalence, antibiotic sensitivities, and risk factors. *N C Med J.* 2009;70:102-107.
20. Damrongmanee A, Ukarapol N. Incidence of antibiotic-associated diarrhea in a pediatric ambulatory care setting. *J Med Assoc Thai.* 2022;90:513-517.