



Risk Factors Analysis of Diaper Dermatitis in Children Aged 0-36 Months at Puskesmas Working Area, Tembalang District

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ABSTRACT

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Diaper dermatitis is an inflammation of the skin in the diaper area caused by contact with urine and feces and the friction of the diaper against the skin. The incidence of diaper dermatitis in Indonesia is 7-35% in male and female infants with the highest number at the age of 6-12 months. The purpose of this study was to determine the factors associated with diaper dermatitis in children aged 0-36 months at the Tembalang District Puskesmas, such as age, gender, mother's education level, mother's occupation, economic status, frequency of diaper changes, and personal hygiene. This study used an observational analytic method of Case-Control approach with a sample of 30 people, 15 case groups and 15 control groups with purposive sampling technique. Data were obtained through a questionnaire instrument which was then tested with the Chi-Square test with the help of software. Statistical test results showed no significant relationship between age, gender, mother's education level, mother's occupation, and economic status with the occurrence of diaper dermatitis and there was a significant relationship between the frequency of diaper changes 0.013 ($p < 0.05$) and personal hygiene 0.008 ($p < 0.05$). There is a significant relationship between the frequency of diaper changes and personal hygiene with the occurrence of diaper dermatitis, and there is no significant relationship with other risk factors.

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INTRODUCTION

Diaper dermatitis or diaper rash is an inflammatory skin condition of the buttocks, groin, and perineum. It is caused by contact with urine and feces combined with the friction of diapers rubbing against the skin, and is one of the most common skin complaints in infants.¹ The World Health Organization (WHO) reported diaper dermatitis in infants as of 2012 was quite high, where out of 6,840,507,000 newborns 25% of them developed diaper dermatitis, the majority of infants experienced skin irritation due to diaper use.² The incidence of diaper dermatitis in Indonesia

ranges from 7% to 35% in infant boys and girls less than three years old, with the highest number found in children aged 6 to 12 months.³

Diapers are an option that is often sought by parents because of their ease and practicality, but these disposable diapers also contain chemicals that can trigger redness in the diaper area due to humid conditions and the presence of factors that support the life cycle of fungi that can cause health problems for children, and are caused by non-sterile diapers or errors in their use.⁴ Disposable diapers with high water absorption can reduce the incidence of diaper dermatitis. Diaper dermatitis has many causes, including excessive skin hydration, friction, frequent and prolonged contact with urine and feces, increased skin pH and changes in the skin microbiome.⁵

In infants (0-11 months) the skin is more sensitive and susceptible to skin diseases, so that the use of diapers on an ongoing and prolonged basis can spur an increase in the sensitivity of the baby's skin and cause skin irritation.⁶ Boys are more at risk of diaper dermatitis than girls.⁷ In fact, girls have higher discipline in implementing toilet training than boys, boys generally have a slow mastery of bladder control than girls. The use of diapers continuously and for a long duration can lead to increased sensitivity of the baby's skin, potentially resulting in skin irritation. This causes infants' skin to be more sensitive and prone to skin disorders.⁶ Personal hygiene is referred to from the Greek "personal" which means individual and "hygiene" which means healthy. An individual's hygiene is an action to maintain personal hygiene and health in order to improve physical and psychological well-being. The better the personal hygiene that mothers do to their toddlers, the lower the chances of toddlers contracting diaper dermatitis, whereas if personal hygiene is poor, the chances of toddlers experiencing diaper dermatitis will be higher.⁸ The mindset and outlook on life will be formed due to education including in the way of using diapers on children, because the higher the mother's education, the broader the insight she has, the mother will also be easier to adjust to changes that occur compared to mothers with low educational backgrounds.⁶ Working mothers tend to use diapers on children on a practical pretext to facilitate the duties of caregivers because the majority of working mothers decide to delegate the responsibility of caring for children to the grandmother. Employment also affects economic status in supporting the availability of capital in providing the facilities needed by the family, especially regarding the use of diapers for children.⁴

The results of Ayuk Naimah's research (2019) on the Relationship between the Use of Disposable Diapers in Toddlers (Age 0-3 Years) with the Occurrence of Diaper Allergic Dermatitis in Purwoharjo Banyuwangi suggest that the majority of respondents have a frequency of using disposable diapers in the long category, namely 16 (55.2%) respondents, and the majority of others experience diaper dermatitis in the severe category, namely 20 (69.0%) respondents.⁹ Diaper dermatitis often occurs due to a response to parental actions in caring for babies so that

some babies may be at risk of diaper dermatitis according to the statement of Putri & Riski (2017). That of the 82 respondents, most of the 33 (40.2%) respondents had good action, and 49 (59.8%) respondents had less action.¹⁰ From Lita's research (2017) states that the description of the use of disposable diapers there are several factors including the age of the mother and child, the sex of the child, the economic status and occupation of the mother, the mother's education, and the impact of the use of diapers in the form of diaper rash.⁴ According to Iis Lestari (2017) regarding a number of factors that influence the occurrence of diaper dermatitis in infants including knowledge, age, environment, personal hygiene, not changing diapers frequently, dampness, diarrhea, contact reactions to plastic and rubber, wounds or friction, fungal infections and bacterial infections.³

Risk factors for diaper dermatitis include age, mother's education, child's gender, mother's economic and occupational status, frequency of diaper changes, and child's personal hygiene, so referring to this, the researcher is interested in conducting research on the analysis of risk factors for diaper dermatitis in children aged 0 to 36 months at Puskesmas Working Area, Tembalang District.

METHODS

This study used an observational analytic technique with a case-control approach. The study was conducted in June 2022 at Puskesmas in the working area of Tembalang District. The subjects of this study were children aged 0 to 36 months by the criteria of inclusion and exclusion of a total of 30 people calculated by the Lemeshow formula including 15 case groups and 15 control groups. In this study using a questionnaire sheet and stationery as a data collection tool which was then carried out by interviewing and there was also medical record data which would then be analyzed using software. Data analysis in this study used the chi square statistical test. This study has been approved by the Health Research Ethics Commission (KEPK) of the Faculty of Medicine, Muhammadiyah University of Semarang with No. 039/ EC/ KEPK-FK/ UNIMUS/ 2022.

RESULTS

The study was conducted in June 2022. The subjects were 30 people with 15 case groups and 15 control groups. Data collected included child age, child gender, mother's education, mother's occupation, economic status, frequency of diaper changes, child personal hygiene, and incidence of diaper dermatitis. The data obtained were then processed as intended by the researcher and presented in tabular form.

Table 1. Characteristics of respondents.

Respondent Characteristics	Frequency (%)
Child Age	
Infant (0-11 months)	25 (83,3)
Toddler (12-36 months)	5 (16,7)
Gender	
Male	14 (46,7)
Female	16 (53,3)
Mother's Education	
Low (< SMA)	2 (6,7)
High (\geq SMA)	28 (93,3)
Mother's Occupation	
Employed	9 (30,0)
Self-employed	2 (6,7)
Civil Servant	1 (3,3)
Housewife	18 (60,0)
Economic Status	
Low	2 (6,7)
Medium	22 (73,3)
High	5 (16,7)
Very High	1 (3,3)
Frequency of Diaper Change	
< 6 times/day	22 (73,3)
\geq 6 times/day	8 (26,7)
Personal Hygiene	
Poor	11 (36,7)
Good	19 (63,3)
Diaper Dermatitis	
Dermatitis	15 (50,0)
No Dermatitis	15 (50,0)

Table 1 shows that the characteristics of respondents at Puskesmas working area, Tembalang District based on the age group of children were mostly infants (0-11 months) as many as 25 people (83.3%). The majority of the gender of girls is 16 people (53.3%). The majority of mother's education level is high with 28 people (93.3%). The majority of mothers' occupations were housewives, totaling 18 people (60.0%). The majority of economic status was middle class with 22 people (73.3%). The majority of diaper changing frequency group is less than 6 times/day, totaling 22 people (73.3%). The majority of children's personal hygiene group is good, totaling 19 people (63.3%). Based on the group that experienced diaper dermatitis, there were 15 people (50.0%).

Table 2. Relationship between Child Age and occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Child Age	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
Infant (0-11 months)	13	86,7	12	80,0	1,625 (0,230-11,464)	0,624
Toddler (12-36 months)	2	13,3	3	20,0		
Total	15	100,0	15	100,0		

Table 2 shows that respondents who were infants were more in the diaper dermatitis group (86.7%) than those without diaper dermatitis (80%). With statistical tests, the relationship pattern was analyzed using the Chi-Square analysis test which gave the results of a significance value of 0.624 ($p > 0.05$) which proves that there is no significant relationship between the age of the child and diaper dermatitis. Then the odds ratio was declared insignificant.

Table 3. The association between Gender and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Gender	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
Male	8	53,3	6	40,0	1,714 (0,403-7,292)	0,464
Female	7	46,7	9	60,0		
Total	15	100,0	15	100,0		

Table 3 shows that male children were more in the diaper dermatitis group (53.3%) than those without diaper dermatitis (40%). With statistical tests, the relationship pattern was analyzed through the Chi-Square analysis test and gave results in the form of a significance value of 0.464 ($p > 0.05$) which indicates that there is no significant relationship between gender and diaper dermatitis. Then the odds ratio was declared insignificant.

Table 4. The association between mother's level of education and the occurrence of diaper dermatitis in children aged 0 to 36 months.

Mother's Education	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
Low (< SMA)	1	6,7	1	6,7	1,000 (0,057-17,621)	1,000
High (\geq SMA)	14	93,3	14	93,3		
Total	15	100,0	15	100,0		

Table 4 shows that the last education of mothers in the diaper dermatitis and non-diaper dermatitis groups were 14 people (93.3%). With statistical tests, this relationship pattern was

analyzed using the Chi-Square test which gave results in the form of a significance value of 1.000 ($p > 0.05$), indicating that there was no significant relationship between the mother's last education and diaper dermatitis. Then the odds ratio was declared insignificant.

Table 5. Associations between Maternal Occupation and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Mother's Occupation	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
Employed	6	40,0	3	20,0	-	0,528
Self-employed	1	6,7	1	6,7		
Civil Servant	0	0	1	6,7		
Housewife	8	53,3	10	66,7		
Total	15	100,0	15	100,0		

Table 5 shows that the maternal occupation of private employees was more in the diaper dermatitis group (40%) than those without diaper dermatitis (20%). With statistical tests, the relationship pattern was tested using Chi-Square which gave results in the form of a significance value of 0.528 ($p > 0.05$) which indicated that there was no significant relationship between maternal employment and diaper dermatitis.

Table 6. Relationship between Economic Status and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Economic Status	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
Low	1	6,7	1	6,7	-	0,317
Medium	13	86,7	9	40,9		
High	1	20,0	4	80,0		
Very High	0	0	1	100		
Total	15	100,0	15	100,0		

Table 6 shows that respondents with middle economic status were more in the diaper dermatitis group (86.7%) than those without diaper dermatitis (40.9%). With statistical tests, the relationship pattern was analyzed through the Chi-Square analysis test which gave the results of a significance value of 0.317 ($p > 0.05$) which proved that there was no significant relationship between maternal occupation and diaper dermatitis.

Table 7. Relationship between Frequency of Diaper Change and occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Frequency of Diaper Change	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
< 6 times/day	14	93,3	8	53,3	12,250	0,013
≥ 6 times/day	1	6,7	7	46,7	(1,268-118,362)	
Total	15	100,0	15	100,0		

Table 7 shows that the frequency of changing diapers less than 6 times/day was more in the diaper dermatitis group (93.3%) than those without diaper dermatitis (53.3%). With statistical tests, this relationship pattern was tested through Chi-Square analysis, with a significance value of 0.013 ($p < 0.05$), proving a significant relationship between the frequency of diaper changes and diaper dermatitis. Referring to the odds ratio, the frequency of diaper changing for less than 6 times per day is more influential with diaper dermatitis by 12.250 times higher than the frequency of diaper changing for more than equal to 6 times per day, which means that children with a frequency of changing diapers less than 6 times per day have a risk of 12.250 times experiencing diaper dermatitis than children with a frequency of changing diapers more than equal to 6 times per day. Furthermore, a lower value of (1.268) and an upper value of (118.362) were obtained, which means that at least children with a diaper change frequency of less than 6 times per day are at least more at risk, namely 1.268 times more likely to experience diaper dermatitis and at most more at risk up to 118.362 times more likely to experience diaper dermatitis.

Table 8. Association between Personal Hygiene and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Personal Hygiene	Diaper Dermatitis				OR 95% CI	P-Value
	Dermatitis		No Dermatitis			
	n	%	n	%		
Poor	9	60,0	2	13,3	9,750 (1,592-	0,008
Good	6	40,0	13	86,7	59,695)	
Total	15	100,0	15	100,0		

Table 8 shows that respondents with poor personal hygiene were more in the diaper dermatitis group (60.0%) than those without diaper dermatitis (13.3%). The statistical test of this relationship pattern was analyzed using Chi-Square and showed a significance value of 0.008 ($p < 0.05$) which proved a significant relationship between personal hygiene and diaper dermatitis. Based on the odds ratio, it was found that poor personal hygiene with a T value $<$ T mean was more influential with diaper dermatitis by 9.750 times greater than good personal hygiene with a T

value $\geq T$ mean, which means that children with poor personal hygiene have a risk of 9.750 times experiencing diaper dermatitis than children with good personal hygiene. Furthermore, a lower value of (1.592) and an upper value of (59.695) were obtained, which means that at least children with poor personal hygiene are at least 1.592 times more likely to get diaper dermatitis and the highest risk is 59.695 times more likely to get diaper dermatitis.

DISCUSSION

Relationship between Child Age and occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Based on the results of the study, it was found that respondents aged infants (0-11 months) experienced more diaper dermatitis than toddlers (12-36 months). However, the results of this study indicate that there is no significant relationship between the age of the child and the occurrence of diaper dermatitis in children aged 0 to 36 months at the Tembalang District Puskesmas. In the research of Li, Zhu, & Dai (2012) produced the same findings that there was no significant relationship between the age of the child and diaper dermatitis.⁷

According to the World Health Organization (WHO), the prevalence of diaper dermatitis experienced by infants is quite high, with the largest number found in children aged 6 to 12 months. In the research of Ullya, et al. (2018) said that the skin in infants is more sensitive and susceptible to skin diseases, so that the use of diapers on an ongoing and prolonged basis can spur an increase in the sensitivity of the baby's skin and cause skin irritation.⁶ However, the results obtained indicate that there is no relationship between the age of the child and the occurrence of diaper dermatitis in children which affects the occurrence of this.

The association between Gender and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Referring to the results of the study, it was found that children who were male with diaper dermatitis were 8 people (53.3%) and 7 people (40.0%) were female. The results of this analysis indicate that there is no significant relationship between the sex of the child and the occurrence of diaper dermatitis in children aged 0 to 36 months at Puskesmas in the working area of Tembalang District. In the research of Li, Zhu, & Dai (2012) obtained the same results that there was no significant relationship between the sex of the child and diaper dermatitis.⁷

In fact, girls are more disciplined about toilet training than boys, and boys are relatively slower in mastering control over their bladder than girls. In mastering the urge to defecate in girls starting from the age of 18 months, while boys only master at the age of 22 months.⁴ So it can be concluded from the results of the review if there is no relationship between gender and the occurrence of

diaper dermatitis in children regardless of the factors that can also affect toilet training readiness in children, namely the gender of the child.

The association between mother's level of education and the occurrence of diaper dermatitis in children aged 0 to 36 months.

Based on the results of the study, it was found that the majority of mothers' education was high (\geq SMA) with a group that experienced diaper dermatitis totaling 14 people (93.3%) and a group that did not experience diaper dermatitis totaling 14 people (93.3%). However, the results of this study explain that there is no significant relationship between the mother's education level and the occurrence of diaper dermatitis in children aged 0 to 36 months at the Tembalang District Puskesmas. In the research of Li, Zhu, & Dai (2012) proved the same result that there was no significant relationship between the mother's education level and diaper dermatitis.⁷

Education is closely related to knowledge, while research by Ully, et al. (2018) showed that there was a significant relationship between maternal knowledge in the use of disposable diapers and the incidence of diaper dermatitis in children.⁶ So that the results of this analysis prove that there is no relationship between maternal education and the occurrence of diaper dermatitis in children regardless of the mother's knowledge itself.

Associations between Maternal Occupation and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Based on the results of the analysis, it was found that the majority of mothers' occupations were housewives (60%) with a diaper dermatitis group of 8 people (53.3%) and a non-diaper dermatitis group of 10 people (66.7%). Meanwhile, private employees with diaper dermatitis group were 6 people (40.0%) and the non-diaper dermatitis group was 3 people (20.0%). However, the results of this study prove that there is no significant relationship between the mother's occupation and the occurrence of diaper dermatitis in children aged 0 to 36 months at Puskesmas in the working area of Tembalang District.

In Ayuk Naimah's research (2019) that in previous studies, it was found that the majority of respondents were in the very rare category regarding the replacement of disposable diapers. This was triggered by the majority of respondents being housewives.⁹ The continued and prolonged use of diapers will cause irritation to the child's skin.⁶ So it can be stated that the study proves that there is no relationship between the mother's occupation and the occurrence of diaper dermatitis in children due to the use of diapers that are rarely changed.

Relationship between Economic Status and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Based on the results of the study, it was found that the majority of economic status was middle class as many as 22 people (73.3%) with a diaper dermatitis group of 13 people (86.7%) and a non-diaper dermatitis group of 9 people (40.9%). However, the results of this review explain that there is no significant relationship between economic status and the occurrence of diaper dermatitis in children aged 0 to 36 months at the Tembalang District Puskesmas.

In this analysis, most respondents work as housewives whose income only depends on their husbands and for the majority of economic status is middle class. In the research of Ayuk Naimah (2019) that in previous studies the results of the majority of respondents were included in the category very rarely regarding the replacement of disposable diapers, this indirectly affected the low purchasing power of disposable diapers. However, if they are able to buy it, the use of diapers will be carried out for a long duration in order to reduce costs or save expenses.⁹ While the use of diapers continuously and for a long time will cause irritation to the skin.⁶ So from this study it is suggested that there is no relationship between economic status and the occurrence of diaper dermatitis experienced by children.

Relationship between Frequency of Diaper Change and occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Based on the results of the study, it was found that the frequency of changing diapers less than 6 times/day was more in the diaper dermatitis group (93.3%) than those without diaper dermatitis (53.3%). The results of this study explain if there is a significant relationship between the frequency of diaper changes and the occurrence of diaper dermatitis in children aged 0 to 36 months at Puskesmas in the working area of Tembalang District.

Research by Anik Rustiyaningsih, Yeni Rustina, and Tuti Nuraini (2018) gave different results, namely the absence of a significant relationship between the frequency of diaper changes carried out on average 4 times/day, or every 6 hours with the incidence of diaper dermatitis.¹¹ Whereas in the research of Li, Zhu, & Dai (2012) explained that there is a significant relationship with diaper changes more than equal to 6 times per day which is tested to reduce the incidence of diaper dermatitis compared to those replaced less than 6 times/day.⁷ So that from this study it can be understood if there is a relationship between the frequency of diaper changes with the occurrence of diaper dermatitis in children which is very influential on its occurrence.

Association between Personal Hygiene and the occurrence of Diaper Dermatitis in children aged 0 to 36 months.

Based on the results of the study, it was found that poor personal hygiene was more in the diaper dermatitis group (60.0%) than those without diaper dermatitis (13.3%). The findings of this study explain that there is a significant relationship between personal hygiene and the occurrence of diaper dermatitis in children aged 0 to 36 months at Puskesmas in the working area of Tembalang District.

In the research of Hermin Susanti and Puji Hastuti (2016), they explained the same results, namely that there was a relationship between personal hygiene and the occurrence of diaper dermatitis.⁸ In another review conducted by Dini Royda (2017), the same findings were obtained, namely a significant relationship between poor children's personal hygiene was more influential in experiencing diaper dermatitis than children with good personal hygiene.¹² So it can be concluded that children's personal hygiene is still very influential with the occurrence of diaper dermatitis in children.

CONCLUSION

Based on the results of analysis and statistical tests using Chi-Square, it can be concluded that there is no relationship between the age of the child, the gender of the child, the mother's education level, the mother's occupation, and economic status with the occurrence of diaper dermatitis in children aged 0 to 36 months at Puskesmas in the working area of Tembalang District. There is a relationship between the frequency of diaper changing and personal hygiene with the occurrence of diaper dermatitis in children aged 0 to 36 months at Puskesmas in the working area of Tembalang District.

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