

Effect of Aloe Vera Gel (Aloe Vera) on Accelerating Miliaria Healing in Infants (0-12 Months)

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Abstract: One of the skin diseases that often affects babies and toddlers is *miliariasis* or prickly heat. According to *the World Health Organization (WHO, 2016)* reported that of 80% of *miliariasis* sufferers per year, 65% of them occur in infants and toddlers. *Miliariasis* or prickly heat or often called sweat is a skin disorder caused by the closure of skin pores so that sweat cannot come out. Especially because the atmosphere around the baby is very warm or humid. Miliaria is common on the forehead, neck, parts of the body covered with clothing (chest and back), as well as places that often experience pressure or friction of clothing. Aloe vera can be used as an alternative medicine to help the healing process of miliariasis and wounds due to prickly heat. To determine the effect of giving aloe vera gel (*Aloe Vera*) on the acceleration of miliaria healing in infants (0-12 months). The design of this study is *quasi-experimental* with sampling using a *non-probability sampling* method with a *purposive sampling technique*. The research was conducted at *the Edelweiss Mom and Baby Aesthetic Care Center* from February 2024 to October 2024. The population in this study is children aged 0-12 months with miliaria with samples based on inclusion and exclusion criteria. A sample of 32 babies was divided into 2 groups, each of which was 16 babies with miliaria who were given aloe vera gel (*Aloe Vera*) topically and 16 other babies who were not given aloe vera gel (*Aloe Vera*). The statistical test used *univariate* analysis and *bivariate* analysis with $\alpha = 0.05$. The results of this study showed that as many as 32 babies were divided into two groups: an experimental group given aloe vera gel and a control group without treatment. The results showed significant improvement in the treatment group, with 68.8% of the babies experiencing a reduction in itching. The control group showed no significant changes. Wilcoxon and Mann-Whitney's statistical tests proved that aloe vera gel accelerates the healing of miliaria in babies. The application of aloe vera gel has been proven to be effective in accelerating the healing of miliaria in babies aged 0-12 months. Aloe vera gel can be a safe and effective alternative to natural therapy in overcoming skin problems in babies, especially miliaria. This study supports the use of aloe vera gel as part of infant skin care, with significant results in improving the condition of miliaria.

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INTRODUCTION

Children's health problems are one of the main problems in the health sector that are currently occurring in Indonesia. Indonesia is a tropical country where skin diseases are still one of the most common health problems in Indonesia. Skin diseases that often attack babies and toddlers are no exception. Skin diseases can be caused by several factors, namely the environment such as temperature, climate and environmental cleanliness as well as other factors such as personal habits. (Ministry of Health of the Republic of Indonesia, 2015)

In Indonesia, the prevalence of skin diseases based on Basic Health Research (RISKESDAS) by the Ministry of Health of the Republic of Indonesia in 2018 reached 6.8%, including affecting infants and toddlers. One of the skin diseases that often affects babies and toddlers is miliariasis or prickly heat. According to the World Health Organization (WHO, 2016) reported that of 80% of miliariasis sufferers per year, 65% of them occur in infants and toddlers. Infants and children have a higher risk of developing miliaria due to immaturity or immaturity of the eccrine ducts (sweat glands). (Guerra et al., 2022; Setyowati & Kusumastuti, 2019).

Miliariasis or prickly heat or often called sweat is a skin disorder caused by the closure of skin pores so that sweat cannot come out. Especially because the atmosphere around the baby is very warm or humid. Miliaria is common on the forehead, neck, parts of the body covered with clothing (chest and back), as well as places that often experience pressure or friction of clothing. The shape of miliaria can be seen in the form of nodules that sometimes contain water, and cause itching, accompanied by or without reddish skin, and will feel sore if the nodules are watery or burst due to scratches. (Morle, 2000; Mueser, 2008; Simanungkalit et al., 2021)

Even though miliariasis or prickly heat is considered harmless, you still have to be vigilant because at the beginning of babies or toddlers exposed to prickly heat there is a rapid increase in body temperature. Prickly heat can turn dangerous if signs of heat stroke appear, namely heat or fever $\geq 40^{\circ}\text{C}$ and also infection. So emergency treatment is needed so that miliariasis

does not cause more severe complications in infants or toddlers. (Shelov, 2004; Setyowati & Kusumastuti, 2019)

There are many ways that can be done to prevent prickly heat and accelerate the healing of prickly heat if prickly heat occurs in babies or toddlers. One type of medicinal plant that has the potential to be developed as a means of accelerating the healing of prickly heat is aloe vera (Aloevera). Aloe vera is a functional plant because all parts of the plant can be used, both for body care and to treat various diseases including miliariasis or prickly heat. (Furnawanthi, 2007; Mulianingsih & Ambarwati, 2021)

Aloe vera gel consists of about 98.5% - 99.5% water and the remaining 5% in the form of active ingredients including essential oils, amino acids, minerals, vitamins, enzymes, and glycoproteins. So aloe vera gel has immunomodulatory, moisturizing, wound healing, antioxidant, anti-inflammatory, antitumor, antibacterial, antifungal and cell regeneration effects. Aloe vera contains various anti-inflammatory agents such as salicylic acid, lignin components, saponins and anthraquinones consisting of aloin, barbaloin, anthranol, anthracene, aloetic acid, aloe emodin is the basic ingredient of drugs that are antibiotics and pain relievers. This aloe vera produces 6 antiseptic agents such as lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenol and sulphur. All of these substances are classified as antiseptics because they can kill germs or control the formation of bacteria, fungi and viruses. (Rajeswari et al., 2012; Khoirini, 2016; Wisesa, 2017; Minjares-Fuentes & Femenia, 2019; Ünlü, 2022)

Based on the results of the study, aloe vera (Aloe Vera) can be used as an alternative

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medicine to help the healing process of miliariasis and wounds due to prickly heat. Topical administration of aloe vera gel on wounds can speed up the wound healing process because aloe vera mucus contains glycoproteins, which prevent pain inflation and accelerate repair and glucomannan, which is a compound enriched with polysaccharides that can affect fibroblast growth factors and stimulate cell activity and proliferation and increase collagen production and secretion so that it can accelerate wound healing and stimulate skin growth including. (Novyana, 2016; Minjares-Fuentes & Femenia, 2019)

Based on a preliminary study conducted by researchers on March 26, 2023 at the Edelweiss Clinic, it was found that out of 10 babies aged 0-12 months experienced miliariasis or prickly heat. Therefore, researchers want to further research on "Effect of Aloe Vera Gel on Accelerating Healing of Miliaria in Infants (0-12 Months)".

METHOD

This study uses a type of quasi-experimental design and uses a control time series design. This research is basically a time series design, only using a comparison or control group (Notoatmodjo, 2018). The treatment group is a group that is given aloe vera gel (Aloe Vera) topically on the affected area of miliaria. Meanwhile, the control group was a group that was not given aloe vera gel (Aloe Vera). After 2 days, it will be observed that miliaria will have recovered or not good for the treatment group and control group. After that, the results will be compared between the control group and the treatment group. The sampling technique in this study was carried out by purposive sampling. The sample in this study was as many as 32 babies. The free variable was in the form of giving aloe vera gel (Aloe Vera) while the bound variable was in the form of accelerating the healing of infant miliaria (0-12 months). Univariate data analysis was presented in the form of a frequency distribution table to describe the characteristics of the baby, bivariate analysis using wilcoxon to analyze the difference in the acceleration of healing after the administration of aloe vera gel. And the Mann Whitney test to find out the relationship between the two groups.

RESULTS AND DISCUSSION

Overview of Respondent Characteristics

Table 1 Characteristics of Respondents including Age, Gender, and Weight of Respondents

No	Characteristics of Respondents	Frequency (n=50)	Percentage (%)
1.	Age		
	- 6 months	8	25
	- 7 months	4	12,5
	- 8 months	5	15,6
	- 9 months	5	15,6
	- 10 months	4	12,5
	- 11 months	3	9,4
	- 12 months	3	9,4
	Sum	32	100

2.	Gender		
-	Man	14	43,3
-	Woman	18	56,3
	Sum	32	100
3.	Weight		
-	5.8- 6.9 kg	9	28,1
-	7 – 8.9 kg	13	40,6
-	9.8 – 11 kg	10	31,3
	Sum	32	100

Source: Primary Data (2024)

Based on the table above, the number of respondents in this study can be seen based on several variables, namely age, gender, and weight. For the age variable, 8 respondents were 6 months old (25%), 4 people (12.5%) were 7 months old, 5 people (15.6%) were 8 months old, 5 people (15.6%) were 9 months old, 4 people (12.5%) were 10 months old, 3 people (9.4%) were 11 months old, and 8 people (25%) were 12 months old. This is in accordance with the criteria for babies according to WHO (2013) that the developmental age of babies is divided into 2, namely, neonates from birth to 28 days of age and babies from 29 days to 12 months of age.

Based on gender, the respondents consisted of 14 men (43.8%) and 18 women (56.3%). As for the weight variable, there were 9 respondents with a weight of 5.8 - 6.9 kg (28.1%), with a weight of 7 - 8.9 kg as many as 13 people (40.6%), and with a weight of 9.8 - 11 kg as many as 10 people (31.3%).

Acceleration of Itching Healing

Table.2 diagram of the percentage of acceleration of itching healing

Category	Control				Treatment			
	Pre Test		Post Test		Pre Test		Post Test	
	Frequency (F)	Percent (%)	Frequency (F)	Percent (%)	Frequency (F)	Percent (%)	Frequency (F)	Percent (%)
Very light	0	0%	0	0%	0	0%	4	25%
Light	0	0%	0	0%	0	0%	11	68,80%
Keep	3	18,80%	3	18,80%	3	18,80%	1	6,30%
Severe	8	50%	8	50%	5	31,30%	0	0%
Very severe	5	31,30%	5	31,30%	8	50%	0	0%

Source: primary data (2024)

Based on the table above, an analysis of the categories of conditions before and after treatment in the control group and treatment can be carried out. In the control group, before the treatment (pre-test), most of the respondents were in the severe (50%) and very severe (31.3%) categories, with a few in the moderate category (18.8%). After the treatment (post-test), there was no significant change in the control category, as the category distribution remained the same: 50% in the severe category and 31.3% in the very severe category. This shows that in the control group, the respondents' condition did not experience a significant improvement during the observation period.

On the other hand, in the treatment group, before the treatment (pre-test), the most common categories found were very severe (50%) and severe (31.3%), with a few in the

moderate category (18.8%). However, after the treatment (post-test), there was a significant change. In the post-test, most respondents switched to the mild category, which was 68.8%, and the very light category appeared with a percentage of 25%. Only 6.3% were still in the moderate category, and none of the respondents were in the severe or very severe category.

Bivariate Analysis

a. Normality Test

Table 3 Results of the Normality Test Data on the effect of aloe vera gel on the acceleration of miliaria healing in infants (0-12 months)

No.	Class	p-value	p-a	Criterion
1.	Pre Test	0.000	0.05	Abnormal
	Experiment	0.044	0.05	distribution
	Post Test			Abnormal
	Experiment			distribution
2.	Control	0.613	0.05	Normally
	(Post Test)	0.004	0.05	distributed
	Treatment			Abnormal
	(Post Test)			distribution

Source: Primary Data (2024)

b. Wilcoxon Test

Table 4 Results of different tests on the effect of aloe vera gel on the acceleration of miliaria healing in infants (0-12 months)

Variable	p-value	Z Score
Pre Test- Post Test	0,000	-3,541

Source: Primary Data (2024)

The results of the Wilcoxon test between pre-test and post-test in the experimental group (the use of aloe vera gel on the acceleration of miliaria healing in infants aged 0-12 months) showed a p-value of 0.000 and a Z-score of -3.541. Since the p-value obtained was less than 0.05 ($p < 0.05$), it can be concluded that there was a significant difference between the pre-test and post-test in the experimental group. A negative Z-score indicates that after the treatment (post-test), the respondent's condition showed a significant improvement in terms of miliaria cure. This shows the effectiveness of the use of aloe vera gel in accelerating the healing of miliaria in babies.

c. Mann Whitney Test

Table 5 Test Results of Difference in Post Test Values between the Experimental Group and the Control Group The effect of aloe vera gel on the acceleration of miliaria healing in infants.

Variable	<i>p-value</i>	<i>Z Score</i>
Post Test Control-Treatment	0,000	-4.859

Source: Primary Data (2024)

The results of the Mann-Whitney test between the control group post-test and the treatment group post-test produced a p-value of 0.000 and a Z-score of -4.859. A p-value smaller than 0.05 ($p < 0.05$) indicates that there is a significant difference between the control group and the post-test treatment group. A negative Z-score indicates that the treatment group (who received aloe vera gel therapy) showed better improvement in miliaria healing compared to the control group. These results indicate that treatment with aloe vera gel is more effective in accelerating the healing of miliaria in infants when compared to the control group that does not receive the treatment.

Discussion

Overview of Respondent Characteristics

Based on the table above, the number of respondents in this study can be seen based on several variables, namely age, gender, and weight. For the age variable, 8 respondents were 6 months old (25%), 4 people (12.5%) were 7 months old, 5 people (15.6%) were 8 months old, 5 people (15.6%) were 9 months old, 4 people (12.5%) were 10 months old, 3 people (9.4%) were 11 months old, and 8 people (25%) were 12 months old. This is in accordance with the criteria for babies according to WHO (2013) that the developmental age of babies is divided into 2, namely, neonates from birth to 28 days of age and babies from 29 days to 12 months of age.

Research was conducted on babies, because according to IDAI (2014) the baby's skin is still in the development stage so that its function is not completely perfect. One example is the process of absorption and excretion of sweat that is not optimal, which often causes babies to experience excessive sweating. Normally, sweat comes out through the pores of the skin, but in some babies, the skin that should be changing doesn't do it as it should. This condition can block the outlet of sweat. As a result, trapped sweat presses on the skin and forms small blisters the size of the base of a bouncing needle. Sometimes, between the blisters, small red spots appear that feel itchy. Frequent areas.

Miliaria, also known as tropical lichen, prickly heat, or bundet sweat, is a skin disorder in the form of dermatitis that occurs due to sweat retention and blockage in the pores of the sweat glands. This condition generally appears in environments with hot temperatures and high humidity (Tando, 2016).

Based on gender, the respondents consisted of 14 men (43.8%) and 18 women (56.3%). As for the weight variable, there were 9 respondents with a weight of 5.8 - 6.9 kg (28.1%), with a weight of 7 - 8.9 kg as many as 13 people (40.6%), and with a weight of 9.8 - 11 kg as many as 10 people (31.3%).

Acceleration of Itching Healing

Based on the table above, an analysis of the categories of conditions before and after treatment in the control group and treatment can be carried out. In the control group, before the treatment (pre-test), most of the respondents were in the severe (50%) and very severe (31.3%) categories, with a few in the moderate category (18.8%). After the treatment (post-test), there was no significant change in the control category, as the category distribution remained the same: 50% in the severe category and 31.3% in the very severe category. This shows that in the control

group, the respondents' condition did not experience a significant improvement during the observation period.

This is according to Sugiyono (2016), the control group is part of experimental research that does not receive certain treatments or interventions as applied to the experimental group. This group serves as a comparison to assess the effects of the treatment given to the experimental group. In the study, the control group was left under normal conditions without any intentional changes by the researchers. The results of the control group were then compared with the results of the experimental group to determine whether the given treatment produced a significant difference. Therefore, the control group has an important role in ensuring the internal validity of the research.

On the other hand, in the treatment group, before the treatment (pre-test), the most common categories found were very severe (50%) and severe (31.3%), with a few in the moderate category (18.8%). However, after the treatment (post-test), there was a significant change. In the post-test, most respondents switched to the mild category, which was 68.8%, and the very light category appeared with a percentage of 25%. Only 6.3% were still in the moderate category, and none of the respondents were in the severe or very severe category.

According to Sugiyono (2016), the increase in healing in the treatment group in experimental research is the result of providing certain interventions or treatments designed by researchers. This group received a treatment that was then compared with the control group to assess its effectiveness. If the treatment group shows a significant increase in recovery compared to the control group, it indicates that the treatment given has a positive effect. This proves that there is a cause-and-effect relationship between the treatment applied and the healing results achieved.

From these results, it can be concluded that the treatment provided has succeeded in having a significant impact on improving the condition of the respondents in the treatment group. In contrast, in the control group, the respondents' condition did not experience significant changes, which suggests that factors other than treatment may not be sufficient to influence the improvement of the condition.

Bivariate Analysis

a. Normality Test

Based on the results of the statistical test presented in the table above, the following analysis can be carried out:

1) *Pre Test Experiment and Post Test Experiment*

The test conducted between the pre-test and post-test in the experimental group produced a p-value of 0.000 for the pre-test and 0.044 for the post-test. Since the p-value in both tests was less than 0.05 ($p < 0.05$), it can be concluded that the data in both conditions (pre-test and post-test experiment) were abnormally distributed. This means that further data analysis may require non-parametric tests, such as the Wilcoxon test which is appropriate for abnormally distributed data.

In accordance with what was stated by Sugiyono (2016), if the Pre Test and Post Test data in the experimental group do not have a normal distribution, then the analysis used is a non-parametric method. One of the appropriate tests to compare two paired data under these conditions is the Wilcoxon Signed Rank test. This test serves to evaluate the difference between two measurements in the same group, even though the data does not meet the assumption of normal distribution, so the results obtained are still valid.

2) *Control (Post Test) and Treatment (Post Test):*

The test conducted between the control group post-test and the treatment group post-test produced a p-value of 0.613 for the control and 0.004 for the treatment. The p-value for the control group (0.613) was greater than 0.05, which indicates that the data in the control group were normally distributed. Meanwhile, the p-value for the treatment group (0.004) was smaller than 0.05, which indicates that the data in the treatment group

were abnormally distributed, non-parametric tests such as the Mann-Whitney test may be more appropriate to use in further analysis.

According to Sugiyono (2016), if the Post Test data in the control group and the treatment group are compared, then the selection of the type of statistical test depends on the distribution of data. If the data has a normal distribution, a parametric test such as the t-test (Independent Sample t-Test) is used. However, if the data is not normally distributed, the analysis is carried out with non-parametric tests, such as the Mann-Whitney test. The Mann-Whitney test was used to compare two independent groups under abnormal data distribution conditions, so as to still produce valid conclusions.

b. Effect of *aloe vera gel* on the acceleration of miliaria healing in infants (0-12 months)

Based on the results of the statistical tests presented, descriptive analysis can be explained as follows:

1) Wilcoxon Test

The results of the Wilcoxon test between pre-test and post-test in the experimental group (the use of aloe vera gel on the acceleration of miliaria healing in infants aged 0-12 months) showed a p-value of 0.000 and a Z-score of -3.541. Since the p-value obtained was less than 0.05 ($p < 0.05$), it can be concluded that there was a significant difference between the pre-test and post-test in the experimental group. A negative Z-score indicates that after the treatment (post-test), the respondent's condition showed a significant improvement in terms of miliaria cure. This shows the effectiveness of the use of aloe vera gel in accelerating the healing of miliaria in babies.

Based on research conducted by Nanang Roswita Paramata and Nova Afriyani Abas (2024) entitled "The Effect of Aloe Vera Compresses on Dermatitis Patients in the Working Area of the Sumalata Health Center, North Gorontalo Regency", the use of aloe vera has been proven to have a positive effect on accelerating the dermatitis healing process. In this study, aloe vera was used in the form of a compress that was applied to the inflamed skin area. The results of the study showed that aloe vera compresses can reduce inflammatory symptoms, such as redness, itching, and swelling, as well as speed up skin recovery. Aloe vera contains active compounds such as polysaccharides and glucomannans that have anti-inflammatory, antibacterial, and soothing properties, which are effective for relieving irritation due to dermatitis.

These findings support the claim that the use of aloe vera can be an effective option in the management of skin diseases, including dermatitis, by providing benefits in the faster healing process and reducing the symptoms arising from the condition. This study provides further evidence that aloe vera has the potential as a safe and effective natural therapeutic alternative to treat skin disorders such as miliaria and dermatitis in infants and children.

According to Changa XL, Wanga C, Fengb Y, and Liua Z. (2006) in their study entitled "*Effect of heat treatment on the stabilities of polysaccharides substances and barbaloin in juice from Aloe vera Miller*", aloe vera has a number of benefits related to the content of polysaccharides and barbaloin in aloe vera juice. The polysaccharides present in aloe vera are known to be beneficial for improving skin hydration, accelerating wound healing, and relieving inflammation. Barbaloin, another natural compound in aloe vera, exhibits antimicrobial and anti-inflammatory activity. The study also concluded that heat treatment of aloe vera juice can affect the stability of the two compounds, which affects the effectiveness of the use of aloe vera in the treatment of skin and inflammation.

2) Mann-Whitney Test

The results of the Mann-Whitney test between the control group post-test and the treatment group post-test produced a p-value of 0.000 and a Z-score of -4.859. A p-value smaller than 0.05 ($p < 0.05$) indicates that there is a significant difference between the control group and the post-test treatment group. A negative Z-score indicates that the treatment group (who received aloe vera gel therapy) showed better improvement in

miliaria healing compared to the control group. These results indicate that treatment with aloe vera gel is more effective in accelerating the healing of miliaria in infants when compared to the control group that did not receive the treatment.

This is in accordance with a study conducted by Yosefina Meliana entitled "The Effect of the Application of Aloe Vera Therapy on the Severity of Pruritus in the Elderly with Atopic Dermatitis in the Social Welfare Section of Paduwau Maumere" aims to examine the effectiveness of aloe vera therapy in reducing pruritus (itching) in the elderly who suffer from atopic dermatitis. Atopic dermatitis is a skin condition characterized by inflammation, redness, and itching that is often a long-term problem, especially in advanced age.

In the study, aloe vera therapy was applied to an elderly group with atopic dermatitis to see its effect on reducing the severity of pruritus. The results showed that the application of aloe vera can significantly reduce the severity of itching (pruritus) in elderly patients suffering from atopic dermatitis. Aloe vera therapy has been proven to be effective thanks to the anti-inflammatory and antimicrobial content in aloe vera that helps reduce inflammation and relieve itching symptoms.

The results of this study are consistent with findings in other studies that show the benefits of aloe vera for treating various skin disorders, including miliaria. As in this study, aloe vera gel was also used to accelerate the healing process of miliaria in babies with positive results. Both studies show that aloe vera can be an effective natural therapy in dealing with skin problems involving inflammation and itching, both in the elderly and infants.

Overall, both the Wilcoxon test and the Mann-Whitney test showed that treatment with aloe vera gel had a significant effect on the acceleration of miliaria healing in infants, both in the experimental group and compared to the control group.

CONCLUSION

This study shows that the application of aloe vera gel (Aloe Vera) has a significant influence on the acceleration of miliaria healing in infants aged 0-12 months. Based on the results of statistical tests, both the Wilcoxon test in the experimental group and the Mann-Whitney test between the control and treatment groups showed that the use of aloe vera gel could significantly accelerate the healing process of miliaria. The treatment group that received aloe vera gel therapy showed significant improvement in terms of reduction in miliaria symptoms, with most respondents switching to the milder itch category at the post-test. In contrast, the control group that did not receive treatment showed no significant change.

The results of this study support the claim that aloe vera gel has the potential to be an effective natural therapy to treat skin problems in babies, especially miliaria, which often occurs due to excessive sweating of the skin.

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