Factors Affecting the Occurrence of Diarrhea in Infants Aged 7-14 Months in Puskesmas Alak Kupang City

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ABSTRACT

Diarrhea is a disease characterized by changes in the consistency of stools to liquid accompanied by an increase in the frequency of defecation more than usual > 3 times / day accompanied by changes, with or without blood and or mucus. Factors that cause diarrheal disease are infections, infections can be caused by bacteria, parasites and viruses. Busy parents often pay less attention to health and the impact of an unhealthy environment. The three children have digestive problems, which are still considered a habit and can be cured without having to go to a health facility. The purpose of this study was to identify and analyze the factors that influence the incidence of diarrheal disease in infants aged 7-12 months at the Alak Health Center, Kupang City. The type of research used is an analytical survey with a case control design. The population in this study was divided into case populations, namely all infants aged 7-12 months totaling 137 infants and controls were infants aged 7-12 months who did not experience diarrhea totaling 8,868 infants. Determination of the size of the control sample using a ratio of 1:1 with the case sample so that the number of control samples is the same as the case sample, namely 37 infants and the total sample is 74 infants. The sampling technique is simple random sampling. Analysis of the data used is the chi-square test. The results showed that there was a significant relationship with a history of premature birth (p-value = 0.015 with an odds ratio = 3.434), low birth weight (p-value = 0.015 with an odds ratio = 4.563), exclusive breastfeeding (p-value = 0.015 with an odds value ratio = 3.434), immunization status (p-value = 0.004 with odds ratio = 4.265) and history of allergies (p-value = 0.004 with odds ratio = 4.083) with the incidence of diarrheal disease at the Alak Health Center, Kupang City. Suggestions that health center health workers need to be able to increase prevention efforts from an early age by approaching the community and providing concrete education related to the incidence of diarrhea.

Keywords: Diarrhea, Premature, BBLR, Exclusive Breastfeeding and Immunization Status.

INTRODUCTION

Diarrhea is the second leading cause of death in children under 5 years. Globally, there has been an increase in the incidence of diarrhea and deaths from diarrhea in children under five from 2015-2017. In 2015, diarrhea caused about 688 million people sick and 499 deaths worldwide occurred in children under 5 years. WHO data states that almost 1.7 billion cases of diarrhea occur in children with a mortality rate of around 525,000 children under five each year. Every episode of diarrhea causes a loss of nutrients that children need to grow, so diarrhea is the main cause of malnutrition in children.[1]

The results of research conducted by UNICEF estimates that every 30 seconds a child dies from diarrhea in Indonesia, because diarrhea is the second killer of children under five after acute tract infections and every year 100,000 children under five die from diarrhea. National research shows that 31.4% of infant deaths and 25.3% of under-five deaths in Indonesia are caused by diarrhea.[2]

Diarrhea is still a public health problem in developing countries such as Indonesia in 2018 because it has a high incidence and mortality. It is estimated that there are 20-50 cases of diarrhea per 100 population each year. Death is mainly caused because the patient is severely dehydrated. 70-80% of sufferers are those aged under five. According to data from the Ministry of Health, diarrhea is the second disease in Indonesia that can cause death of children under five after pneumonia or pneumonia.[3]

Data from the Ministry of Health of the Republic of Indonesia states, the target coverage of services for infant diarrhea sufferers who come to health facilities is 20% of the estimated number of infant diarrhea sufferers. In 2018 the number of infant diarrhea sufferers served in health facilities was 1,637,708 or 40.90% of the estimated diarrhea in health facilities. In 2017 the number of diarrhea sufferers of all ages served in health facilities was 4,274,790 patients and there was an increase in 2018 to 4,504,524 sufferers or 62.93% of the estimated diarrhea in health facilities. Based on the Basic Health Research in 2018, the prevalence of diarrhea in infants in Indonesia decreased from 18.5% to 12.3%. However, East Nusa Tenggara (NTT) is a province with the incidence of diarrhea in second place from Papua which reached 10.9%. In 2015 diarrhea was in third place, namely 98,918 cases.[4]

Data from the Kupang City Health Office found diarrhea sufferers in Kupang City who received oralits treatment whose 3,936 cases in toddlers and 6,319 cases in all ages in 2018. The cases decreased in 2019 where in that year diarrhea sufferers who received ORS treatment were 2,577 cases. in toddlers and 4,611 cases in all ages.[5]

Diarrhea often attacks infants and toddlers, if not treated further it will cause dehydration which

can lead to death. for transmission of diarrheal disease can be by faecal-oral means, namely through food or drink contaminated by enteropathogens, direct hand contact with the patient, items that have been contaminated with the patient's feces or indirectly through flies. This mode of transmission is known as 4F, namely finger, flies, fluid, field.[6] One of the risk factors for diarrhea is environmental factors which include clean water facilities, sanitation, latrines, poor spades, bacteriological quality of water and house conditions.[7]

The risk factors that can cause diarrhea are environmental factors, behavioral factors in the community, low public knowledge about diarrhea, and malnutrition. Examples of a bad environment include inadequate sanitation conditions and inadequate clean water infrastructure facilities. People's behavioral factors such as rarely washing hands when going to eat and after defecating. Lack of exclusive breastfeeding can increase the risk of contracting diarrhea. According to research, the risk factors for diarrhea include the low level of community healthy lifestyle, especially the provision of good sanitation facilities to support environmental health.[8]

Alak Health Center is one of the health centers in the administrative area of Kupang City which has a high incidence of infectious diseases in infants aged 7-12 months, including diarrheal disease of 137 cases. Based on data on cases of diarrhea in Kupang City, Alak Health Center is the Puskesmas that has the highest cases. The results of the field descriptions which were discussed with health workers at the Alak Health Center, stated that the conditions that caused the occurrence of high cases of diarrhea in the work area were due to conditions of clean and healthy living behavior that were still not implemented by the community, either from poor environmental sanitation, activities CTPS is not practiced and health behavior is really not applied in the daily life of the community. the results of interviews conducted with 10 people in the community, in this case mothers who have babies, where 7 out of 10 mothers said that they admit that clean and healthy living behavior is still very lacking to be implemented. Not only that, even exclusive breastfeeding for their children cannot be fulfilled properly for reasons of work and several other factors. This study focuses more on diarrhea related factors that take places in Puskesmas Alak, which for those who were born with *Premature, BBLR, Exclusive Breastfeeding and incomplete Immunization status*.

MATERIAL AND METHOD

The type of research used is an analytical survey research with a case control design. This research was conducted in the working area of the Alak Health Center during July to December 2020. The population in this study was divided into 2 groups, namely the case population of all infants aged 7-12 months suffering from infectious diarrheal diseases totaling 37 people and the control population of some infants aged 7 -12 months who do not suffer from infectious diseases of diarrheal disease are 37 people so that. The sampling technique used in this research is simple random sampling and the sample is 74 people. The independent variables studied were history of prematurity, low birth weight, exclusive breastfeeding, complete immunization status and history of allergies, while the dependent variable was diarrhea. Measurement of research variables using interviews with the instruments used are questionnaires and direct observation of the location. The data that has been collected and has gone through the processing process is then analyzed using the Chi-Square test with a significance degree of = 0.05. The presentation of research data is presented in the form of tables and narratives.

Table 1: Distribution of Respondents Based on Age, Education and Type of Work at Alak Health Center, Kupang City in 2021.

Characteristics of Respondents	Category	Case	Control	Total	%
Age	20-30 years	7	17	24	32,4
	3-40 years	28	20	48	64,9
	> 41 years	2	0	2	2,7
Education	Junior high school	4	6	10	13,5
	Senior High School	11	15	26	35,1
	Bachelor	22	16	38	51,4
Type of Work	Doesn't work	15	23	38	51,4
	Private employees	15	5	20	27,0
	Government employees	7	9	16	21,6

Table 2: Relationship among Premature History, BBLR, Exclusive Breastfeeding and Immunization Status with Diarrhea Occurance at Alak Health Center, Kupang City in 2021.

Variable	Diarrhea				Total		p-value	OR
	Case		Control					
	n	%	n	%	n	%		
Premature History								
Yes	18	48,6	8	21,6	26	35,1	0,015	3,434
No	19	51,4	29	78,4	48	64,9		
BBLR								
Low	28	75,5	15	40,5	43	58,1	0,002	4,563
Tall	9	24,5	22	59,5	31	41,9		
Exclusive Breastfeeding								
Yes	29	78,4	19	51,4	48	64,9	0,015	3.434
No	8	21,6	18	48,6	26	35,1		
Immunization status								
Complete	20	54,1	8	21,6	28	37,8	0,004	4,265
No	17	45,9	29	78,4	26	62,2		

RESULTS

Characteristics of Respondents

Table 1 shows the characteristics of respondents based on age, education and type of work in the field work.

Table 1 shows that according to age, most of the respondents have the age of 31-40 years as many as 48 (64.9%) people. According to the level of education, some respondents have an undergraduate education level of 38 (51.4%) people. Regarding the type of work, most of the respondents have the type of work as IRT as many as 38 (51.4%) people.

Bivariate Analysis Results

This type of analysis provides results about relationships among Premature History, BBLR, Exclusive Breastfeeding and Immunization Status with Diarrhea Occurance.

Table 2 shows that according to a history of prematurity, most of the respondents in the case group experienced diarrhea (48.6%) while the control group did not experience diarrhea (78.4%). According to LBW, most of the respondents in the case group experienced diarrhea (75.5%), while the control group did not experience diarrhea (59.5%). According to Exclusive Breastfeeding, most of the respondents in the case group experienced diarrhea (78.4%) while the control group did not experience diarrhea (48.6%). According to immunization status, most of the respondents in the case group experienced diarrhea (54.1%) while the control group did not experience diarrhea (78.4%).

The results of the Chi-Square test showed that there was a relationship between a history of prematurity and the incidence of diarrhea (p-value = 0.015). Mothers with a history of premature have a risk of 3,434 times experiencing diarrhea. LBW was associated with the incidence of diarrhea (p-value = 0.002). Mothers with LBW status are at risk of 4.563 times of experiencing diarrhea. Exclusive breastfeeding was associated with the incidence of diarrhea (p-value=0.015). Mothers with no exclusive breastfeeding have a risk of 3,434 times experiencing diarrhea. Immunization status was associated with the incidence of diarrhea (p-value = 0.004). Mothers with incomplete immunization status have 4,265 times the risk of experiencing diarrhea.

DISCUSSION

Relationship of Premature History with Diarrhea Occurrence

According to the WHO definition, premature babies are babies born alive before 37 weeks of gestation (calculated from the first day of the last menstrual period). Premature babies or preterm babies are babies who are 37 weeks pregnant regardless of weight, most of them are born with a weight less than 2500 grams. Premature is also often used to indicate immaturity. Babies with very low birth weight (LBW) which is less than 1000 g are also referred to as immature neonates. Historically, babies with a birth weight of 2500 g or less were called premature babies. Generally, pregnancy is termed term if it lasts between 37-41 weeks calculated from the first day of the last menstrual cycle on a 28-day cycle. While labor that occurs before the gestational age reaches 37 weeks is called preterm labor.[9]

The results of the chi-square test between the variable history of prematurity and diarrhea obtained a p-value of 0.028, which means that there is a relationship between the variable history of prematurity and diarrhea, while the OR value obtained is 3.434, which means that infants aged 7-12 months with a history of premature birth are 3,434 times more at risk. experienced the incidence of diarrheal disease compared with infants aged 7-12 months who did not have a history of premature. According to researchers, this is because in premature

babies the organs are not fully formed, including the digestive organs. Premature babies, including premature babies 7 months, are prone to health problems. Because, the last week of pregnancy, is a very important phase for the improvement of vital organs, including the brain and lungs and weight gain. The immune system in the digestive tract of premature babies is also not able to fight bacteria or viruses that enter properly, so there is a risk of diarrhea.

This study is in accordance with the research conducted by Sulistiarini, *et al* regarding premature babies. In his research, it was stated that the risk factors experienced by premature babies or with a history of premature were digestive tract disorders, because the digestive system was still not functioning perfectly so that the absorption of nutrients was still weak and not good. Digestive muscle activity is still not perfect which results in reduced gastric emptying. Premature babies are easily bloated due to anorectal stenosis, ileal atresia, meconium peritonitis and mega colon.[9] This study is also in line with research by Nasar which states that infants with gestation less than 34 weeks or premature are susceptible to infectious diseases, one of which is diarrhea.[10]

Relationship between BBLR and the incidence of diarrhea

Low birth weight baby is a condition when the baby is born weighing less than 2500 grams. This LBW situation will have a bad impact on the baby's growth and development in the future. LBW can be caused by premature birth (birth before 37 weeks' gestation) with a body weight appropriate for gestational age (SMK), or because the baby weighs less than the proper weight or is small for gestational age (KMK), or both (WHO, 2014). . Low birth weight (LBW) babies are babies with a birth weight of less than 2,500 grams regardless of gestational age. Birth weight is the weight measured one hour after birth. LBW can occur in preterm infants (<37 weeks) or in term infants who experience intrauterine growth restriction or what we know as stunted fetal growth.[11]

The results of the chi-square test between the LBW variable and diarrhea obtained a p-value of 0.005, which means that there is a relationship between the LBW variable and diarrhea while the OR value obtained is 4.563, which means that infants aged 7-12 months born with LBW are 4.563 times more at risk. experienced the incidence of diarrheal disease compared to infants aged 7-12 months who were born without LBW. According to the researchers, this is because babies with low birth weights have immature immunity so they are susceptible to infectious diseases, one of which is diarrhea. In addition, babies with LBW generally have a gestation period of less than 34 weeks which makes their digestive organs not fully formed.

This study is in line with research conducted by Alifia with the title Characteristics and Incidence of Diarrhea in Toddlers in Klangon Hamlet, Sedayu District, Bantul Regency in 2020. Alifia stated that the risk factor that can cause diarrhea is Low Birth Weight (LBW). Babies with low birth weight have a lower immune system than babies with normal birth weight, thus, babies with low birth weight will be more susceptible to disease, especially infectious diseases.[12] Another study that supports this research is a study by Nasar, which states that gastric emptying time is slower in LBW infants than in term infants. Likewise, the suck and swallow function is still not perfect, especially if the baby is less than 34 weeks' gestation. Tolerance to the osmolarity of the formula given is still low, so the possibility of complications such as NEC (Neoritising Enterocolitis) or diarrhea is greater.[10]

Relationship of Exclusive Breastfeeding with Diarrhea

Exclusive Breastfeeding, hereinafter referred to as Exclusive Breastfeeding, is breast milk that is given to babies from birth for 6 (six) months, without adding and/or replacing with other foods or drinks

(PP No. 33 of 2012). Exclusive breastfeeding in the first month of a baby's life can reduce infant morbidity and mortality due to diarrhea, because newborns do not yet have a good immune system. The baby's body has not been able to fight bacteria or viruses that cause disease, the baby's body is protected by antibodies received through breast milk because breast milk has immunological preventive properties in the presence of antibodies contained in colostrum milk and other nutrients. Breast milk is also sterile, in contrast to other sources of milk such as formula milk or other liquids that are made manually which are not known to be contaminated by bacteria and other organisms that can cause diarrhea.[13]

The results of the chi-square test between the variable exclusive breastfeeding and diarrhea obtained a p-value of 0.028, which means that there is a relationship between the variable exclusive breastfeeding and diarrhea while the OR value obtained is 3.434, which means that infants aged 7-12 months who do not receive exclusive breastfeeding are more 3,434 times the risk of experiencing diarrheal disease compared to infants aged 7-12 months who are exclusively breastfed. According to researchers, this is because exclusive breastfeeding is produced naturally by the body which contains nutrients that are important for baby's growth and development and contains important antibodies in colostrum, besides that it is also safe and clean so that babies who get exclusive breastfeeding can reduce the risk of developing infectious diseases. the only one is diarrhea, on the other hand, babies who do not get exclusive breastfeeding are more at risk of developing diarrhea.

This study is in line with the research conducted by Omo with the title the relationship between exclusive breastfeeding and the incidence of diarrhea in infants in the Cibadak Health Center Work area in 2019. Omo stated that the risk factor that could cause diarrhea was exclusive breastfeeding, where mothers who did not give Exclusively breastfeeding their babies have an eight times greater risk of suffering from diarrhea in their babies than mothers who breastfeed exclusively.[14] Another study that supports this research is Elvalini, he states that the variable exclusive breastfeeding is the biggest variable at risk for diarrhea. Mothers who do not exclusively breastfeed their babies have a 4.8 times higher chance of having diarrhea than mothers who give exclusive breastfeeding to babies, because exclusive breastfeeding can provide immunity to babies so that babies are not susceptible to diseases such as diarrhea.[8]

Relationship of Immunization Status with Diarrhea Occurrence

Immunization is an effort that is done intentionally to provide immunity (immunity) in children so that they avoid disease. Immunization is also a very effective primary prevention effort to avoid contracting infectious diseases. Thus, the incidence of infectious diseases will decrease, the resulting disability and death will also be reduced. The purpose of providing immunization is to prevent certain diseases from occurring in a person and eliminate certain diseases as well as protect and prevent infectious diseases that are very dangerous for children.[15]

The results showed that there was a relationship between immunization status and the incidence of diarrheal disease at the Alak Health Center, Kupang City by analyzing the p-value (0.004) < (0.05) while the OR value obtained was 4.265, which means that infants aged 7-12 months with incomplete immunization status is 4,265 times more likely to experience diarrheal disease than infants aged 7-12 months who receive complete immunization. Based on the survey and data collection that has been carried out, the immunization status is classified as good enough because the people there, including the community, are included in urban areas so they are open to receiving health information and supporting whatever government decisions are related to population health, especially related to children's health related to the fulfillment of health status. immunization.

The results of this study most of the children have received complete immunization. Baduta children who do not get immunizations because the mother forgets the immunization schedule and the incidence of diarrheal disease is most likely due to the implementation of healthy clean living behavior in the household and the possibility that children under two who receive complete immunizations will still experience diarrhea. Another thing is most likely caused by other factors, namely the behavior of children who are in the age range of 7-12 months where children are in an active period of growth and development in interacting with surrounding objects such as picking up toys, eating food carelessly without parental control, so that immunization status is not as a risk factor for diarrheal disease.

Another study conducted by Monalisa, *et al* regarding the risk of diarrhea in children aged 6-59 months on the Indonesian island of Sumatra (2014 IFLS data analysis) showed that measles immunization had a relationship with the incidence of diarrhea where the results of the analysis test p-value = 0.005 with an OR value of 1.531 so that toddlers who do not get measles immunization are at 1.531 times risk of suffering from diarrhea compared to toddlers who get measles immunization.[16] However, it is different from the research by Urrahmah, that there is no relationship between measles immunization status and the incidence of diarrhea in children with a p-value of 0.060, the reason being that this is influenced by behavioral factors associated with aspects of hygiene, diarrheal disease is a digestive disease that spreads more often due to food and drink, so that people with poor personal hygiene conditions will have the potential to cause the spread of diarrheal disease.[17]

CONCLUSION

There is a significant relationship between a history of prematurity, BBLR, exclusive breastfeeding and immunization status with the incidence of diarrheal disease at Alak Health Center in Kupang City. It is recommended that health workers at the puskesmas should make prevention efforts from an early age such as socialization, home visits and improving clean water sanitation to the community so that it can be practiced and improve clean and healthy living behavior.

ETHICAL CLEARANCE

This research has received ethical approval from the health research ethics committee of the public health faculty of Nusa Cendana University (No.2021010-KEPK).

REFERENCES

1. World Health Organization. WHO methods and data sources for country-level causes of death 2000-2016. World Healing Organs; 2018.

2. Afriani B. Role of Health Officers and Availability of Clean Water Facilities with Diarrhea. J Aisyah J Health Sci. 2017;2(2):117-22.

3. Ministry of Health of the Republic of Indonesia. Guide to Dissemination of Diarrhea Management in Toddlers. 1st ed. Jakarta: Directorate General of Disease Control and Environmental Health, Ministry of Health, Republic of Indonesia. 2011.

4. Provincial Health Office of NTT. East Nusa Tenggara Health Profile Report 2019. Kupang City. 2019. Available from: https://farmalkes. kemkes.go.id/article/information-publik/

5. Kupang City Health Office. Kupang City Office Health Profile 2019. Kupang City. 2019. Available from: https://dinkes-kotakupang.web. id/bank-data.html

6. Subagyo B. Acute Diarrhea in Children. Revision. Surakarta: UNS Press. 2012.

7. Asmi N. Strategy Program in Reducing the Incidence of Diarrhea in Toddlers in Parepare City. J Ilm Mns and Health. 2020;3(1).

8. Elvalini S. The relationship between exclusive breastfeeding and the incidence of diarrhea at the Pulo Brayan Health Center. Journal, Univ Tarumanegara. 2018;2(2).

9. Sulistiarini et al. Factors Affecting Premature Birth in Indonesia. E-J Widya Health Env. 2016;1(2):109-15.

10. Nasar S. Nutrition management in low birth weight infants. Sari Pediatr. 2016;5(4):167-70.

11. Pudjiadi S. Child Development. Jakarta: EGC; 2010.

12. Alifia S. Characteristics and Incidence of Diarrhea in Toddlers in Klangon Hamlet, Sedayu District, Bantul Regency in 2020. Ministry of Health Poltekkes; 2020.

13. Ministry of Health of the Republic of Indonesia. Indonesian Health Profile 2011. Center for Data and Information - Ministry of Health of the Republic of Indonesia. Jakarta; 2012. Available from: https://www.kemkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/profil-kesehatan-indonesia-2011.pdf

14. Omo S. The Relationship of Exclusive Breastfeeding with the Incidence of Diarrhea in Babies in the Work Area of the Cibadak Health Center in 2019. J Banten Health Polytechnic. 2020;2(1).

15. Ministry of Health of the Republic of Indonesia. Basic Health Research (Riskesdas) 2018. Jakarta; 2019.

16. Monalisa et al. Risk of Diarrhea in Toddlers Age 6-59 Months in Sumatra Island, Indonesia (IFLS Data Analysis 2014). J Public Health Sciences. 2020;9(2):129-36.

17. Urrahmah A. Relationship of Nutritional Status and Measles Immunization with Diarrhea Incidence in Children Age 10-60 Months in the Work Area of the Palaran Health Center. Borneo Student Res. 2019;1(2):232-9.

18. Parellangi, Syafar M, Palutturi S, Birawida AB, Mallongi A, Soedirham O, *et al*. Identification of Family Adaptive Behavior in The Dayak Tribe in An Effort to Prevent Stroke. Pharmacogn J. 2022;12(3):334-8.

19. Ernyasih, Mallongi A, Daud A, Palutturi S, Stang, Thaha R, *et al*. Model Prediction of Potential Disease Effects from PM2.5 Emission Among School Children in Coming 30 years in South Tangerang. Pharmacogn J. 2023;15(3):400-4.

20. Asrina A, Payapo R, Idris FC, Palutturi S, Mallongi A. Health Behavior and Social Support in Postpartum Mothers Treatment in Ba'ukup Tradition in Maluku. Pharmacogn J. 2023;15(3):438-42.

21. Siokal B, Amiruddin R, Abdullah T, Thamrin Y, Palutturi S, Ibrahim E, *et al*. The Influence of Effective Nurse Communication Application on Patient Satisfaction: A Literature Review. Pharmacogn J. 2023;15(3):479-83.

22. Pobas S, Nazaruddin B, Palutturi S, Russeng SS, Mallongi A. Policy Implementation of Hypertension Prevention and Control Program in Banjarmasin. Pharmacogn J. 2023;15(4):641-9.