



## Original Research

# History of Low Birth Weight and Exclusive Breastfeeding on the Incidence of Acute Respiratory Infection in Children Under Five Years

Ni Wayan Wiwin Asthiningsih<sup>1</sup>, Milkhatun Milkhatun<sup>1</sup>, Alfi Ari Fakhrrur Rizal<sup>1</sup>

<sup>1</sup> Faculty of Nursing, Universitas Muhammadiyah Kalimantan Timur, Indonesia

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### Abstract

Acute Respiratory Infections (ARI) are one of the main causes of infectious disease morbidity and mortality worldwide. Acute Respiratory Infection (ARI) is a health problem that often occurs in children, and the group most at risk is children under five years. This study aimed to determine the relationship between nutritional status and exclusive breastfeeding on the incidence of ARI in the working area of the Loa Bakung Public Health Center, Samarinda. This type of research is quantitative research using a cross-sectional approach. The samples in this study were parents of children under five who visited the Posyandu in the working area of the Loa Bakung Public Health Center, Samarinda. The sampling technique used was purposive sampling with a total sample of 181 respondents. The analytical test used in this research is chi-square. The chi-square test results on the history of LBW obtained a p-value = 0.373 and exclusive breastfeeding with a p-value = 0.440. This shows no relationship between a history of LBW and exclusive breastfeeding on the incidence of ARI at the Loa Bakung Public Health Center, Samarinda. The incidence of ARI in children under five years at the Loa Bakung Public Health Center, Samarinda, is not influenced by a history of LBW and exclusive breastfeeding. Still, other factors could have influenced the incident that was not carried out in this study. The role of parents is very important in maintaining the health of their children under five years to prevent the occurrence of ARI in their children under five years.

## INTRODUCTION

Infants and children under five years are a group of people who are vulnerable to various diseases, especially infectious diseases. One of these infectious diseases is Acute Respiratory Infection (ARI). Acute Respiratory Infection (ARI) is an infectious disease that attacks one or more parts of the respiratory tract, from the nose (upper tract) to the alveoli (lower tract), including adnexa tissue, such as sinuses, middle ear

cavity, and pleura. ARI is a respiratory tract infection that lasts for 14 days.<sup>1</sup>

Acute Respiratory Infection (ARI) in Indonesia is a disease that often occurs in children. According to WHO (World Health Organization) data, it is estimated that the incidence of ARI in developing countries with under-five mortality rates above 40 per 1000 live births is 15-20% per year in the under-five age group.<sup>2</sup> Southeast Asia has a prevalence that ranks first in the

Corresponding author:

Ni Wayan Wiwin Asthiningsih

[nww131@umkt.ac.id](mailto:nww131@umkt.ac.id)

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incidence of ARI, estimated to be more than 80%.

Indonesia's Health Profile data in 2018 shows the incidence of ARI in Indonesia according to the results of the 2018 Basic Health Research (RISKESDAS) of 20.06%, almost the same as the previous year's data of 20.56%.<sup>3</sup> ARI is one of the main causes of patient visits at the Puskesmas (40%-60%) from year to year and always ranks first as the cause of infant or toddler mortality and is always on the list of the 10 most common diseases every year in health facilities, such as community health centers. Report <sup>4</sup> states that cases of ARI among children under five in the city of Samarinda rank the highest, with 378 cases (18.01%). Most cases of ARI among children under five in Samarinda City occurred at 12 - 23 months, with 387 cases (19.3%).

Several factors that can increase the risk of acute respiratory infection are divided into two factors, namely intrinsic factors and extrinsic factors. Intrinsic factors include age, exclusive breastfeeding, immunization status, and birth weight. Extrinsic factors include the mother's knowledge, home environmental conditions, socioeconomic conditions, and parents' occupations. Birth weight is one of the intrinsic factors that influence the incidence of ARI. The main causes of death in LBW are asphyxia, respiratory distress syndrome, infection, hypothermia complications in LBW infants, the formation of anti-pneumonic substances, and other respiratory tract diseases.<sup>5</sup>

One of the other intrinsic factors influencing the incidence of ARI is exclusive breastfeeding. The World Health Organization (WHO) revealed that exclusive breastfeeding could reduce infant mortality due to acute respiratory infections (ARI). The results of a preliminary study conducted in the working area of the Loa Bakung Public Health Center, Samarinda City, still found phenomena or health problems found in the community,

especially in children aged 0-5 years, namely ARI that had not been resolved. This is evidenced by the incidence of ARI, which always occupies the list of the top 10 monthly and annual diseases at the Loa Bakung Public Health Center for 2020.

The publications focused more on the history of LBW and exclusive breastfeeding with the incidence of ARI in children under five years. This makes the researchers want to prove whether there is a similar phenomenon where a history of low birth weight and exclusive breastfeeding influence the incidence of ARI in children under five years in the working area of Loa Bakung Public Health Center, Samarinda City.

## METHODS

This research is a type of quantitative research with a cross-sectional design. The study was conducted on 64 sample children aged 12-59 months who visited and registered at the Loa Bakung Public Health Center. This research was carried out at the Loa Bakung Public Health Center for 13 days, starting on May 11 - 23, 2020. The population in this study was all children aged 12-59 months who visited and registered (recorded in the child register book) at the Loa Bakung Public Health Center in April 2020, with as many as 181 children under five years. The study was conducted on 64 samples by taking samples by accidental sampling or by chance being met by the researcher if deemed suitable as a data source. Determination of the sample size is determined using the Slovin formula.

The research instrument used was a questionnaire sheet. Other instruments used are MCH books, medical records, or patient cards. Primary data were obtained directly from respondents by using a questionnaire sheet. The primary data collected were the characteristics of the mother respondents, the characteristics of children under five years, and exclusive breastfeeding. Secondary data in this study

is data collected related to the purpose of the study, such as the baby's birth weight obtained from the MCH book records and the results of the ARI examination obtained from medical records.

After all the data is collected, the data will be verified, after which data analysis is carried out. Hypothesis testing using the chi-square test with a significance value of  $p < 0.05$ . This research has received ethical approval from the Health Research Ethics Commission, the Universitas Muhammadiyah Kalimantan Timur, with the number 003/KEPK-UMKT/2020.

## RESULTS

Table 1 describes the characteristics of respondents based on maternal age, mostly in the age range of 21-30 years (59.4), the majority of mothers' education is high school (70.3), mothers mostly work as housewives (62.5%), ages under five the majority were 36-47 months (32.8%), most of the respondents under five were female (68.8%).

Table 2 describes the characteristics of the variables; the data obtained are children who are exclusively breastfed (56.2%) and not exclusively breastfed (43.8), children under five years with a history of low birth weight (34.4%), and children under five years who experience ARI (35, 9%).

Table 3 shows the results of calculations using chi-square analysis with a significant = 5% in 64 respondents under five,  $p$ -value = 0.008  $< 0.05$  so that  $H_0$  is accepted, and  $H_a$  is rejected, which means that there is a relationship between exclusive breastfeeding and the incidence of ARI in children under five years at the Loa Bakung Public Health Center, Samarinda. In addition, for the analysis of the history of LBW with the incidence of ARI,  $p$ -value = 0.007  $< 0.05$ , which means that there is a relationship between a history of LBW and the incidence of ARI in children under five at

the Loa Bakung Public Health Center, Samarinda.

Table 1  
Characteristics of Respondent (n=64)

Indicator	f	%
Mother's age		
≤ 20 years	1	1,6
21 - 30 years	38	59,4
31 - 40 years	25	39,1
Mother's education		
Elementary	6	9,4
Junior High	4	6,3
Senior High	45	70,3
Undergraduate	9	14,1
Mother's occupation		
Housewife	40	62,5
Private	23	35,9
Employees		
Government	1	1,6
Employees		
Toddler's age		
12 - 23 months	11	17,2
24 - 35 months	17	26,6
36 - 47 months	21	32,8
48 - 59 months	15	23,4
Gender		
Male	20	31,3
Female	44	68,8

Table 2  
Characteristics of Variable (n=64)

Indicator	f	%
LBW history		
Normal	42	65,6
LBW	22	34,4
Exclusive Breastfeeding		
Exclusive	36	56,2
Breastfeeding		
Not exclusive breastfeeding	28	43,8
ARI incident		
ARI	23	35,9
No Ari	41	64,1

Table 3  
Analysis of the relationship between a history of LBW and exclusive breastfeeding with the incidence of ARI in children under five years

Variable	ISPA Incident				p
	ISPA		No ARI		
	f	%	f	%	
LBW history					
Normal	20	31,3	22	34,4	0,007
LBW	3	4,7	19	29,7	
Exclusive Breastfeeding					
Exclusive Breastfeeding	18	28,1	18	28,1	0,008
Not exclusive breastfeeding	5	7,8	23	35,9	

## DISCUSSION

Based on the results of the study, it is known that as many as 20 (31.3%) respondents with a history of normal birth and 3 (4.7%) respondents with a history of LBW who experienced ARI, while as many as 22 (34.4%) respondents had a history of normal birth and 19 (29,7%) respondents with a history of LBW who did not experience ARI at the Loa Bakung Public Health Center, Samarinda.<sup>6</sup> said that premature infants, in particular, those born before 32 weeks' gestation suffered significantly more respiratory morbidity due to pulmonary immaturity at birth. In addition, they also suffer from relatively poor breastfeeding as they will not be strong enough to receive sufficient nutrition by mouth to gain weight before 37 weeks. This is in line with study <sup>7</sup>, which showed that as many as 15 (11%) children with a history of LBW were at risk of experiencing ARI. Low birth weight is associated with a markedly increased risk of LRI mortality among all racial groups.

Birth weight determines physical and mental growth and development in infancy. According to other research, LBW is very easy to be infected with diseases, especially ARI, because during pregnancy, the mother has poor nutritional status, does not check her womb regularly to the posyandu or doctor, and does not maintain the cleanliness of the surrounding

environment, and lacks adequate rest (for working mothers) so that the baby is in good health. Contents can be infected with the disease.<sup>8</sup> This is in line with study, which showed that low birth weight was one of the risk factors for the occurrence of ARI with a p-value = 0.0005, which is very significant, about 3 times the proportion of the case group was higher with less birth weight, which was < 2500 grams. Low birth weight in term infants is a surrogate marker of intrauterine growth restriction.<sup>9</sup> This presents a high risk of ARI due to structural deformation that endangers lung health and impaired immune competence. The same study was also conducted by other research who said the effect of LBW on ARI showed significant results, namely with a p-value of 0.04 with an RR value of 1.15 times (95% CI 1.00 - 1.31) which means that children under five years with LBW are at risk 1.15 times to experience ARI when compared to children under five years with normal birth weight.<sup>10</sup>

This study also found that 19 children under five years with a history of LBW did not experience ARI. This is in line with research, which showed that out of 48 children under five years with LBW birth weight, 28 children under five years (58.3%) had ARI while 20 children under five years (41.7%) did not experience ARI because actually viral infection is a self-limiting disease, so if babies with LBW given exclusive breastfeeding and complete immunization will have the body's defenses like children with normal birth weight.<sup>11</sup> The same study was also conducted by other research, which showed that p = 0.008 (p > 0.05), so there was a significant relationship between birth weight and a history of ARI.<sup>12</sup> The theory states that low birth weight is a baby born <2500 grams. Low birth weight can cause impaired growth, maturation of tools and organs of the body that are not yet perfect, immunity to infectious diseases is very weak, as a result of low birth weight can experience fatal infections and complications in infants and can even cause mortality.<sup>13</sup>

In contrast to the results of research conducted by other research with a p-value of  $LBW = 0.093$ , there is no relationship between LBW and the incidence of ARI. This is because the toddler's immune system to infection is more influenced by current weight or nutritional status, not birth weight. In addition, if it is supported by the provision of complete immunization, especially measles immunization, the child is not susceptible to infectious diseases (ARI). The same study was also conducted other research which said there was no relationship between LBW and ARI in children aged 6-23 months.<sup>14</sup> This can happen because ARI is not only influenced by LBW, but several other risk factors outside the research variables can cause ARI. In addition, children who have a history of LBW births are caused by not getting the nutrients needed during pregnancy; if supported by good nutritional status and exclusive breastfeeding, the child is not susceptible to ARI disease.

According to other research, babies born with a birth weight less than 2500 grams or LBW are more susceptible to ARI or other respiratory tract diseases because babies born with LBW have a low body defense system, so pathogenic microorganisms will more easily enter and infect children under five years, including the ARI.<sup>15</sup> LBW is also closely related to the nutritional status of the mother during pregnancy; the nutritional status of pregnant women can affect the growth and development of the fetus so that the baby is born with a weight of <2500 grams.<sup>10</sup>

The results of this study also showed that as many as 18 (28.1%) respondents under five received exclusive breastfeeding and 5 (7.8%) respondents under five did not receive exclusive breastfeeding which had ARI, while as many as 18 (28.1%) respondents under five were breastfed. Exclusive breastfeeding and 23 (35.9%) respondents under five did not receive exclusive breastfeeding and did not experience ARI at the Loa Bakung Health

Center Samarinda. This is in line with research, which shows a relationship between exclusive breastfeeding and the incidence of ARI in infants. Research 16 shows that the analysis of the relationship between exclusive breastfeeding and history of ARI was obtained by 14 respondents (14.7%).<sup>1</sup> In comparison, those who were given exclusive breastfeeding but not ARI were 81 respondents (85.3%). There was a significant relationship between exclusive breastfeeding and a history of ARI,  $p < 0.05$ .

Children under five years who are not exclusively breastfed are more susceptible to ARI because breast milk contains immunoglobulin A (Ig. A) and immunoglobulin M (Ig. M) ingredients. Ig. A is an antibody that functions to agglomerate and destroys germs. At the same time, Ig.M prevents the proliferation of viruses and neutralizes toxins and micro-organisms so that children under five years who are not exclusively breastfed will develop ARI. If left untreated, ARI will cause more pain and will cause death.<sup>1</sup> According to a study conducted, children under five years with the incidence of ARI tend not to get exclusive breastfeeding, which is 90.9%.<sup>17</sup> Exclusive breastfeeding is the best food with complete content for babies. Exclusively breastfed babies will be more healthy and less sick compared to infants who are not exclusively breastfed.<sup>8</sup>

Another study was also conducted on 18, which showed that out of 96 respondents, 66 respondents (68.8%) did not give exclusive breastfeeding, while 30 respondents (31.3%) did. The low rate of exclusive breastfeeding can be influenced by several factors, including the lack of mothers' knowledge about the importance of breastfeeding, working mothers, husband and family support, and the socio-culture that develops in the community. Research conducted other research shows that the incidence of ARI varies widely between groups, and the incidence of ARI is much higher in the group that is not

exclusively breastfed compared to those who are exclusively breastfed. The relative risk of increasing ARI in infants who are not exclusively breastfed is 2.46.<sup>19</sup>

According to other research an increase in the practice of breastfeeding programs is very much needed by focusing on exclusive breastfeeding and handling ARI diseases because of the large impact on the health of children under five years.<sup>20</sup> Breast milk has elements that meet the baby's nutritional needs over about six months unless the mother is severely malnourished and the composition of breast milk changes with the baby's needs. Antibodies and macrophage cells in breast milk and colostrum protect against certain types of infection. Therefore, infants who receive exclusive breastfeeding are rarely affected by respiratory diseases, infectious diseases, and diarrhea.

The same study was also conducted other research with the value = 0.007, which means a relationship exists between exclusive breastfeeding and the incidence of ARI in children aged 12-24 months.<sup>21</sup> Calculation of Odds Ratio (OR) means that children who do not get exclusive breastfeeding 4 times risk of experiencing ARI incidence compared to children who are exclusively breastfed. Similar results were obtained in study <sup>22</sup>, which showed a significant relationship between exclusive breastfeeding and the incidence of ARI ( $p=0.044$ ,  $Cc=0.276$ ). This is also in line with research <sup>23</sup>, which shows a difference in the incidence of ARI in children under five years who are exclusively breastfed and non-exclusive with a  $p$ -value of 0.003, which means that the first hypothesis ( $H_1$ ) is accepted if  $p < 0.05$ .

The results of this study are under the theory that states that ARI is caused by several factors, one of which is exclusive breastfeeding, which shows that the incidence of ARI is lower in exclusively breastfed children. This is because breast milk, apart from being a source of nutrition, can protect babies through the various

components of the immune substances it contains. Various scientific studies have been carried out by experts on the composition of breast milk and its effect on infant health.<sup>14</sup> Based on research conducted <sup>1</sup>, there are several reasons why mothers do not give exclusive breastfeeding to their babies, among others, consider that breast milk is not sufficient, respondents work outside the home, think formula milk is better and more practical than breast milk, cannot express breast milk. Some mothers still follow the old belief by directly giving food other than breast milk at 0-6 months.

## CONCLUSION

ARI is one of the health problems that children under five years often experience. Children under five years with a history of low birth weight and who did not receive exclusive breastfeeding at the age of 0-6 months are at risk of developing ARIs compared to children born with normal weight and receiving exclusive breastfeeding. To support the success of the ARI prevention program, mothers must be diligent in routine pregnancy check-ups during the prenatal period to prevent the occurrence of LBW and be taught proper breastfeeding techniques to avoid early infant feeding so that they can be optimal in exclusive breastfeeding.

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## CONFLICTS OF INTEREST

The author does not have a conflict of interest that could bias the results in the research that has been done.

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