The Relationship Between The Duration Of Breastfeeding With The Incidence Of Ari In Toddlers Aged 24-59 Months In The Working Area Of Imogiri Public Health Center Ii

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ABSTRACT

Background: The most drastic increase in Acute Respiratory Infections (ARI) among toddlers occurred in Bantul from 2019 to 2022. Imogiri PHC II serving the most ARI children under five years of age in 2022. Breastfeeding is a preventive factor for ARI because it contains protective substances, but in the Imogiri PHC II, the characteristics of the length of breastfeeding of children up to 2 years of age are not yet known. **Objective**: To determine the relationship between the duration of breastfeeding and the incidence of ARI among toddlers 24-59 months in the Imogiri PHC II. **Methods**: This research design is cross sectional, primary data using data collection forms and secondary data using Maternal and Child Health (MCH) books. The target population is toddlers 24-59 months, the target population is toddlers 24-59 months in the Imogiri PHC II. Sample 100 respondents, inclusion criteria: (1) Mother of toddlers 24-59 months, (2) Bringing MCH book, (3) Complete toddler immunization, exclusion criteria: (1) Low birth weight, (2) Cooking using traditional fuel. The sampling technique was purposive sampling. Using chi-square test (α = 0.05). **Results**: There is a relationship between duration of breastfeeding, exclusive breastfeeding, occupancy density, ventilation area, and the presence of smokers with the incidence of ARI among children 24-59 months. There was no relationship between nutritional status and the incidence of ARI among toddlers 24-59 months. **Conclusion**: There is a relationship between the duration of breastfeeding and the incidence of ARI among children under 24-59 months in the Imogiri PHC II area.

Keywords: ARI; Breastfeeding; Toddlers;

INTRODUCTION

ARI is responsible for nearly 20% of all deaths of children less than five years old worldwide.[1] Indonesia is one of the countries still facing challenges due to Acute Respiratory Infections (ARI), which consistently ranks first in terms of morbidity and mortality among toddlers. According to the 2018 Basic Health Research (Riskesdas), 12.8% of all ARI cases occur in children under five years of age.[2] The prevalence of ARI among children under five in DIY Province itself according to diagnosis by health workers is 10.6%.[3] There are signs and symptoms of ARI, including coughing, hoarseness, fever, and difficulty breathing.[4] The drastic increase in cases of toddlers with cough and difficulty breathing in 2022 is in Bantul Regency, which is 11.9%. Imogiri PHC II is the health center that serves the most children under five with cough and breathing difficulties in Bantul Regency in 2022, where there are 1,277 visits of children under five, which is 58% of the total number of children under five in the working area of Imogiri PHC II.[2]

WHO and UNICEF in the Global Nutrition Targets 2025 Breastfeeding Policy Brief state that one of the prevention of infant and toddler mortality is exclusive breastfeeding (6 months) and continued breastfeeding until the age of 2 years.[5] In Indonesia, the coverage of exclusive breastfeeding in 2019 was 67.74% and continued to decline until 2021 to 56.9%.[6] Exclusive breastfeeding coverage in DIY Province according to the Indonesian health profile in 2019 was 88.31%. The percentage of exclusive breastfeeding coverage has decreased in 2021 to 88.2%.[2]

Regarding the relationship between the length of breastfeeding and the incidence of ARI, according to a study conducted by Raheema, mothers who breastfeed their babies for 6 months have a lower risk of developing ARI than mothers who only breastfeed their babies for 3 months. The study showed that mothers who breastfeed their children longer are a protective factor from ARI.[7] In line with research conducted by Yassen which shows that the faster the period of breastfeeding significantly increases the risk of acute respiratory infections.[8] The same thing was found by Ni Putu Eka Gloria in her research where there was a significant relationship between breastfeeding and the incidence of ARI.[9]

No previous studies have explored data on maternal characteristics of breastfeeding for children up to 2 years. In accordance with the latest American Academy Pediatrics guidelines, breastfeeding is recommended to continue until the child is 2 years old or older, according to the wishes of the mother and child.[10] So, it should be important to know whether the mother's behavior in the duration of breastfeeding is in accordance with existing health recommendations, namely up to 2 years of age.

Based on the existing problems, this study was conducted to determine whether there is a relationship between the duration of breastfeeding and the incidence of ARI in children under 24-59 months of age in the working area of Imogiri PHC II. To determine the frequency of each of the incidence of ARI, history of breastfeeding duration, exclusive breastfeeding, nutritional status, the presence of smokers, occupancy density, and ventilation area in toddlers aged 24-59 months in the working area of Imogiri PHC II. Furthermore, to determine the respective relationships between exclusive breastfeeding, nutritional status, presence of smokers, occupancy density, and ventilation area with the incidence of ARI in children under 24-59 months of age in the working area of Imogiri PHC II.

MATERIAL AND METHOD

The type of research used was analytic observational with a cross sectional research design. The target population (not reached) in this study were all mothers with toddlers aged 24-59 months. Then, the population used is the affordable population, namely the total number of mothers with toddlers aged 24- 59 months in the working area of Imogiri PHC II. The sampling technique used in this study was purposive sampling with inclusion and exclusion criteria. Inclusion criteria: mothers with toddlers aged 24-59 months in the working area of Imogiri PHC II, carrying a MCH book, complete toddler immunization history. Exclusion criteria: toddlers with a history of Low Birth Weight (LBW), toddlers who live in homes that use traditional fuels for cooking such as firewood. The sample size was calculated using the Lemeshow sample size formula, and obtained a minimum research sample of 100 respondents. The research was conducted at the Lanteng II hamlet *posyandu*, Kajor Wetan hamlet *posyandu*, Kanten hamlet *posyandu*, Jetis hamlet *posyandu*, and Gondosuli hamlet *posyandu*, under the auspices of Imogiri PHC II on May 2-9, 2024.

The variables in this study are independent variables, dependent variables, and external variables. The independent variable is the duration of breastfeeding, the dependent variable is the incidence of ARI in toddlers, and the external variables are exclusive breastfeeding, nutritional status, the presence of smokers, occupancy density, and ventilation area. The type of data in this study used primary data and secondary data. Primary data were collected using data collection forms, WHO anthro application to determine z-score or nutritional status based on body weight measured using a step scale with an accuracy of

0.01 kg and height measured using a microtoise height measuring instrument with an accuracy of 0.1 cm. Secondary data were obtained from the Maternal and Child Health (MCH) book. Data analysis used chi-square (X2) statistical test for nominal and ordinal data, with 95% CI (P-value <0.05). Ethical clearance in this study has been obtained from the Health Research Ethics Committee of the Ministry of Health Poltekkes Yogyakarta, issued on February 23, 2024, with letter number DP.04.03/e-KEPK.1/291/2024.

RESULTS AND DISCUSSION

Researchers got 15 respondents from the Lanteng II Hamlet *Posyandu*, Selopamioro Village, 32 respondents from the Kajor Wetan Hamlet *Posyandu*, Selopamioro Village, 23 respondents from the Kanten Hamlet *Posyandu*, Kebon Agung Village, 18 respondents from the Jetis Hamlet *Posyandu*, Sriharjo Village, 12 respondents from the Gondosuli Hamlet *Posyandu*, Sriharjo Village. Respondents of this study were mothers who had toddlers aged 24-59 months in the working area of Imogiri PHC II in 2024. The following is the number and percentage of respondent characteristics:

Table 1. Characteristics of Respondents aged 24-59 months in the Working Area of Imogiri PHC II

Characteristics	frequency	Percentage (%)
Incidence of ARI		
Never	21	21
Low	56	56
High	23	23
Duration of Breastfeeding		
For ≥ 6 months	75	75
For < 6 months	25	25
Exclusive breastfeeding		
Exclusive	70	70
Not Exclusive	30	30
Nutrition Status		
Wasted	12	12
Good nutrition	83	83
At risk of overweight	4	4
Overweight	1	1
Presence of Smokers		
None	36	36
Available	64	64
Residential Density		
Qualified	82	82
Not eligible	18	18
Ventilation Area		
Eligible	80	80
Not qualified	20	20

Table 1 shows that many toddlers aged 24-59 months in the working area of Imogiri PHC II have a history of ARI with low frequency (occurring 1 to ≤ 3 times in the last 6 months) as many as 56 toddlers or 56%. Most had a history of breastfeeding duration ≥ 6 months, namely as many as 75 toddlers or 75% followed by a history of exclusive breastfeeding up to 6 months which dominated as many as 70 toddlers or 70%. From table 1, it can also be seen that most toddlers have fallen into the category of good nutritional status as many as 83 toddlers or 83%. Then, there are still many toddlers who live with active smokers as many as 64 toddlers or 64%. Judging from the characteristics of healthy settlements, most of the houses inhabited by toddlers have a qualified occupancy density of 82 houses or 83% and a ventilation area that has met the requirements of 80 houses or 80%.

Table 2. Cross-tabulation of the relationship between breastfeeding duration and ARI incidence

	Incidence of ARI						P-value
	Never		Low		High		
	n	%	n	%	n	%	
Duration Breastfeeding							
≥ 6 Months	20	95,2	54	96,4	1	4,3	0,000
< 6 Months	1	4,8	2	3,6	22	95,7	
Total	21	100	56	100	23	100	

Based on the data displayed in Table 2, it shows that of the 23 toddlers who have a history of high frequency of ARI events, most are toddlers with breastfeeding duration < 6 months, as many as 22 toddlers (95.7%). Then, of the 56 toddlers with a history of low ARI incidence, most were toddlers with breastfeeding duration ≥ 6 months, as many as 54 toddlers (96.4%). Most mothers breastfeed ≥ 6 months could have occurred because mothers who attended or joined the *posyandu* had an increase in good knowledge obtained from routine counseling to each mother in each *posyandu* by nutritionists from the Imogiri PHC II. The increase in maternal knowledge can then improve their parenting patterns for toddlers, one of which is knowledge about nutrition including the length of breastfeeding. This is in accordance with the results of research conducted by Allya, Ika, and Agnes that there is a relationship between breastfeeding knowledge and breastfeeding behavior with a p-value = 0.000. As well as a coefficient value of 0.558 which shows a strong correlation relationship.[11]

The results of this study indicate that there is a relationship between the length of breastfeeding with the incidence of ARI in toddlers aged 24-59 months with a p-value <0.05, namely p-value = 0.000. This study is in line with three studies conducted by Shafira, Evi, and Ni Putu, respectively. Research conducted by Shafira showed that there was a relationship between the length of breastfeeding with the frequency of ARI with p-value = 0.041.[12] Research conducted by Evi found that there was a relationship between the length of breastfeeding and the incidence of ARI as indicated by the p-value = 0.001.[13] Then, research conducted by Ni Putu showed the results that there was a relationship between breastfeeding and the incidence of ARI indicated by a p- value = 0.048.[9]

Lactoferrin contained in breast milk contains more than 600 amino acids that have antibacterial, antifungal, antiviral, anti-parasitic, anti-inflammatory, and immunomodulatory activation. Lactoferrin is distributed in saliva and all other secretions that wet mucous membranes such as the respiratory tract. Based on this, it can be seen that the optimal formation of these protective factors can be influenced by the history of how long a toddler gets breast milk. Research conducted by Rossa also shows that babies who are weaned early have a 2.7 times risk of suffering from ARI compared to babies who are weaned according to their age. This happens because breast milk can stimulate an active immune response so that it can provide long-term protection. A case control study conducted by Pandolfi showed that the length of breastfeeding can increase the protective factor against respiratory infections.[14]

Table 3. Cross tabulation of the relationship between exclusive breastfeeding and ARI incidence

	Incidence of ARI						P-value
	Never		Low		High		
	n	%	n	%	n	%	
Exclusive breastfeeding							
Exclusive	19	90,5	49	87,5	2	8,7	0,000
Not exclusive	2	9,5	7	12,5	21	91,3	
Total	21	100	56	100	23	100	

Examined in table 3 regarding the history of exclusive breastfeeding, shows that of the 23 toddlers who have a history of high frequency of ARI events, most are toddlers with a

history of not getting exclusive breastfeeding as many as 21 toddlers (91.3%). Then, of the 21 toddlers with a history of never experiencing ARI events, most were toddlers with a history of exclusive breastfeeding as many as 19 toddlers (90.5%). At the time of the study of 30 mothers who did not provide exclusive breastfeeding to their children, most of them were busy working. The decline in the mother's milk production which is considered unable to meet the needs of her child is also the cause of not giving exclusive breastfeeding. In line with research conducted by Taqwin, it is explained that mothers have low interest in providing exclusive breastfeeding in certain conditions such as working mothers and assume that insufficient breast milk can be given additional formula milk.[15] Mothers who work outside the home and have to leave their babies for a certain period of time have a lower probability of providing exclusive breastfeeding compared to mothers who do not work.[16]

The results of this study indicate that there is a relationship between exclusive breastfeeding and the incidence of ARI in children under 24-59 months of age with a p-value <0.05, namely p-value = 0.000. The p-value = 0.000 indicates that exclusive breastfeeding is one of the factors that influence the incidence of ARI in children under 24-59 months of age. This study is in accordance with research conducted by Wahyu and Pujiati, respectively. Research by Wahyu showed that there was a relationship between exclusive breastfeeding and the incidence of ARI with a p-value = 0.001.[17] Research by Pujiati also shows the results that there is a relationship between exclusive breastfeeding and the incidence of ARI with a p-value = 0.000.[18] Research by Rustam (2019) in Riau Province, found that infants who were not exclusively breastfed 1.7 times increased the incidence of ARI compared to infants who were exclusively breastfed. Lactoferrin in breast milk contains 600 amino acids for antibacterial, antifungal, antiviral, antiparasitic, anti-inflammatory, and immunomodulatory activation. Colostrum contains 5-7 g/L lactoferrin, which gradually decreases over time. At 1 month of age, infants consume about 260 mg/kg/day of lactoferrin and at 4 months of age about 125 mg/kg/day. From this it can be concluded that infants who are exclusively breastfed will optimally receive protective substances from breast milk.[19]

Table 4. Cross Tabulation of the Relationship between Nutrition Status and ARI Incidence

	Incidence of ARI						P-value
	Never		Low		High		
	n	%	n	%	n	%	
Nutrition Status							
Wasted	1	4,8	4	7,1	7	30,4	
Good nutrition	20	95,2	50	89,3	13	56,5	0,105
At risk of overweight	0	0	2	3,6	2	8,7	
Overweight	0	0	0	0	1	4,3	
Total	21	100	56	100	23	100	

Based on the analysis of nutritional status in Table 4, it was found that of the 23 toddlers who had a history of high frequency of ARI events, most were toddlers with good nutritional status, namely 13 (56.5%). This also occurs in toddlers with a history of low frequency of ARI events and never where most are toddlers with good nutritional status. This study is in line with research conducted by Resti which found that most respondents had toddlers based on the BB / TB index with good nutrition, which amounted to 95.24%.[20]

The results of this study indicate that there is no relationship between nutritional status and the incidence of ARI in toddlers aged 24-59 months in the working area of Imogiri PHC II with a p-value <0.05 which indicates the absence of a meaningful relationship, namely p-value = 0.105. This study is in line with research conducted respectively by Fatimawati, Sukfitrianty, and Sitti. Research conducted by Fatmawati showed that there was no relationship between nutritional status and the incidence of ARI with a p-value = 0.66.[21] Research conducted by Sukfitrianty showed similar results, that there was no relationship between nutritional status and the incidence of ARI indicated by p- value = 0.512.[22] Then, research conducted by Sitti showed the results that there was no relationship between

nutritional status and the incidence of ARI indicated by p-value = 0.445.[23] he study by Tri Bayu Purnama indicates that, specifically regarding malnutrition status, there is no significant relationship with the occurrence of acute respiratory infections (ARI).[24]

The absence of a relationship between nutritional status and the incidence of ARI in toddlers in the working area of Imogiri PHC II is possible because nutritional status is not the only factor predisposing to the incidence of ARI. In this study, another predisposing factor for ARI in toddlers with good nutritional status that can be known is the presence of smokers who live with toddlers. Where the results obtained most toddlers live with people who have smoking habits (64%). Although in this study there was no relationship between nutritional status and the incidence of ARI, parents should still pay attention to the nutritional status of toddlers. Nutritional status remains an important factor for growth, development, and supporting the formation of good immunity. This is in accordance with research conducted by Reni.

Research by Reni shows the results that there is a relationship between

nutritional status and infectious diseases in toddlers shown by p-value = 0.000. From this study, it can be seen that nutrition is a very important part of the growth of toddlers, and has a relationship with health. Children will be susceptible to infections when exposed to nutritional deficiencies. Poor nutritional status can prolong the duration of recovery from diseases such as diarrhea, vomiting, flu and fever. At the same time, malnutrition can reduce the body's ability to carry out immune response mechanisms.[19]

Table 5. Cross tabulation of the relationship between the presence of smokers and the incidence of ARI

	Incidence of ARI						P-value
	Never		Low		High		
	n	%	n	%	n	%	
Presence of smokers							
None	18	85,7	16	28,6	2	8,7	0,000
Available	3	14,3	40	71,4	21	91,3	
Total	21	100	56	100	23	100	

In table 5 regarding the presence of smokers, this study shows that of the 23 toddlers who have a history of high ARI frequency most are toddlers who live with smokers, namely 21 toddlers (91.3%). Then, of the 21 toddlers who did not have a history of ARI events, most were toddlers who did not live with smokers, as many as 18 toddlers (85.7%). This study is in line with research conducted by Cyprianus, Bernadeta, and Luckyta with the results of most toddlers having the closest person who has a smoking habit as much as 75.4%.[25] This was also revealed by research conducted by Nanda with most toddlers having family members who have a habit of 89.37%.[26]

The results of this study indicate that there is a relationship between the presence of smokers and the incidence of ARI in toddlers aged 24-59 months with a p-value <0.05, namely p-value = 0.000. This study is in accordance and in line with research conducted by Lilik, Evie, and Cyprian respectively. Research conducted by Lilik shows the results that there is a relationship between the presence of smokers with the incidence of ARI in toddlers indicated by p-value = 0.025.[27] Research conducted by Evie shows the results that there is a relationship between the presence of smokers and the incidence of ARI in toddlers indicated by p-value = 0.007.[28] Then, research conducted by Cyprianus shows the same results that there is a relationship between the presence of smokers and the incidence of ARI which is indicated by p-value = 0.004.[25]

Inhalation of tobacco smoke can lead to impaired cilia function, increased mucus volume, changes in humoral antigens, and quantitative and qualitative cellular changes. These impaired functions can have an impact on immunity and respiratory health, one of which is acute respiratory infections (ARI). Polycyclic aromatic hydrocarbons (PAHs) are one of the substances that are carcinogenic and can be stored in the environment for years. Hazardous substances from smoking activities can have adverse health effects, one of which is chronic obstructive pulmonary disease (COPD) and asthma.[29]

Table 6. Cross Tabulation of the Relationship between Residential Density and ARI Incidence

	Incidence of ARI						P-value
	Never		Low		High		
	n	%	n	%	n	%	
Residential Density							
Qualified	20	95,2	53	94,6	9	39,1	0,000
Not eliqible	1	4,8	3	5,4	14	60,9	
Total	21	100	56	100	23	100	

In table 6 in terms of healthy home requirements, one of which is the density of occupancy, this study shows that of the 23 toddlers who have a history of high frequency of ARI events, most are toddlers who live in homes with unqualified residential density, namely as many as 14 toddlers (60.9%). Then, of the 21 toddlers who did not have a history of ARI events, most were toddlers who lived in homes with eligible residential density, namely as many as 20 toddlers (95.2%). This study is in line with the results of research conducted by Warlinda and Nurhasanah which showed the results that most respondents had a qualified residential density of 69.4%.[30]

The results of this study indicate that there is a relationship between occupancy density and the incidence of ARI in toddlers aged 24-59 months with a p-value <0.05, namely p-value = 0.000. The research conducted by Lilik shows the results that there is a relationship between occupancy density and the incidence of ARI in toddlers indicated by p-value = 0.001.[27] Research conducted by Warlinda shows the results that there is a relationship between occupancy density and the incidence of ARI in toddlers with a p-value = 0.037.[30] Then, research conducted by Dina obtained similar results, namely there is a relationship between occupancy density and the incidence of ARI in toddlers indicated by p-value = 0.000.[31] In the study conducted by Muktarul Islam and colleagues, it was also found that children living in overcrowded homes are 3.61 times more likely to develop acute respiratory infections (ARI) compared to those living in less crowded households.[32]

Residential density is the ratio of floor area to the number of family members. Dense occupancy causes oxygen levels to decrease followed by an increase in carbon dioxide levels which causes an increase in humidity and a decrease in air quality in the house. Increased humidity and decreased air quality in the house can cause the occupants' endurance to decrease and facilitate the transmission of disease, especially to someone who is vulnerable, one of which is a toddler.[33]

Table 7. Cross Tabulation of the Relationship between Ventilation Area and ARI Incidence

	Incidence of ARI						P-value
	Never		Low		High		
	n	%	n	%	n	%	
Ventilation Area							
Qualified	19	90,5	50	89,3	11	47,8	0,002
Not eligible	2	9,5	6	10,7	12	52,2	
Total	21	100	56	100	23	100	

Seen in table 7 based on the ventilation area as a requirement for a healthy home, it is found that of the 23 toddlers who have a history of high frequency of ARI events, most are toddlers whose occupancy has an unqualified ventilation area, namely 12 toddlers (52.2%). Then, of the 21 toddlers who previously did not have a history of ARI events, most were toddlers whose occupancy had a ventilation area that met the requirements, namely as many as 19 toddlers (90.5%). This study is in accordance with research conducted by Sri which found the results of most respondents having a ventilation area that meets the requirements as much as 72%.[34]

The results of this study indicate that there is a relationship between ventilation area and the incidence of ARI in toddlers aged 24-59 months with a p- value <0.05, namely p-value = 0.002. This research is consistent and in line with research conducted by Dina, Ergha, and Eustakian. Research conducted by Dina shows the results that there is a relationship between ventilation area and the incidence of ARI in toddlers indicated by p-value = 0.033.[31] Research conducted by Ergha shows the results that there is a relationship between the area of ventilation with the incidence of ARI in toddlers indicated by p-value = 0.000.[35] Then, research conducted by Eustakian shows the same thing, namely there is a relationship between the area of ventilation with the incidence of ARI in toddlers indicated by p-value = 0.015.[36]

Air exchange in the house can run optimally if the ventilation area meets the requirements of a healthy home, which is at least 10% of the floor area. Home ventilation that does not meet health requirements will result in obstruction of the exchange process of air flow and sunlight entering the house. The obstruction of airflow and sunlight will cause poor humidity and temperature. Poor humidity and temperature in a bad house can make it easier for microorganisms to multiply. This can lead to ARI disease in toddlers, because the virus/bacteria that cause ARI that breeds also cannot get out and ARI transmission will occur faster.[37]

CONCLUSION

There is a relationship between the duration of breastfeeding, exclusive breastfeeding, the presence of smokers, occupancy density, and ventilation area with the incidence of ARI in children under 24-59 months of age in the working area of Imogiri PHC II. Then, it was found that there was no relationship between nutritional status and the incidence of ARI in children under 24-59 months of age in the working area of Imogiri PHC II.

Based on the results of the research obtained, it is recommended that the head of the PHC be able to provide decisions and policies through the best programs in the realm of Maternal and Child Health (MCH) in terms of prevention efforts and reduce the incidence of ARI in toddlers. Midwives are expected to provide assistance such as information counseling related to breastfeeding and fulfilling the nutrition of nursing mothers. Mothers are advised to carry out proper breastfeeding, care more about health at home by preventing smokers who smoke in the house, and can optimize ventilation by diligently opening especially in the morning. It is suggested that future researchers can improve the research design with a better one (cohort), and be more able to condition the situation when collecting data to minimize bias in the information obtained.

DATA AVAILABILITY STATEMENT

The data used in this study is available from the author upon reasonable request. The author is also willing to share his data with journals and scientific communities that may require it, thus making a further contribution to the advancement of science in this field.

DISCLOSURE STATEMENT

This statement emphasizes that the views and opinions expressed in this article are solely those of the author and do not reflect the official policy or position of any institution affiliated with the author; In addition, the data presented are the results of the author's research and have not been published in other journals.

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