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Correlation of Exclusive Breastfeeding with The Incidence of Acute Respiratory Infections in Toddlers

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Abstract

Background: Acute Respiratory Infection (ARI) is the most frequent mortality and morbidity among the pediatric population. An extensive study revealed the correlation between exclusive breastfeeding on decreasing incidence of ARI, but the evidence in Central Java has never been explored.

Objective: A study was done to prove the correlation of exclusive breastfeeding with the incidence of ARI in toddlers

Methods: This case-control study was conducted on December 2021 at the Ringinarum Health Center Kendal Regency. The sampling method was purposive sampling based on inclusion and exclusion criteria.

Results: The total number of samples obtained in this study was 124 samples. This study showed that the characteristics of toddlers with ARI, among others, the most frequent age is 24-35 months (30,6%); most of them were male (61,3%) and were not exclusively breastfed (69,4%). Furthermore, this study also found a correlation between the exclusivity of breastfeeding and the incidence of ARI in toddlers ($p<0,05$). Toddlers who were not exclusively breastfed had a 5,5 times greater risk of ARI than those who were exclusively breastfed (OR>1).

Conclusion: There is a correlation between exclusive breastfeeding with the incidence of acute respiratory infections in toddlers.

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INTRODUCTION

Acute respiratory infections, commonly called ARI, are acute infections about the nose, pharynx, paranasal sinuses, lungs, trachea, bronchus, and epiglottic.[1] ARI is a health problem that is the leading cause of morbidity and mortality in toddlers in the world.[2] Globally, the ARI accounts for around 3.5% morbidity and one per five mortality cases in toddlers.[2] ARI incidents in toddlers are very high, especially in developing countries.[2] Based on Riskesdas 2018, the prevalence of ARI in toddlers in Indonesia in 2018 reached 12.8%, especially in Central Java reached 13.8%.[1] Even referring to the 2016 Kendal District Health Profile, ARI is the most disease case in Kendal Regency with some 140,305 case.[3]

Regarding child morbidity, the incidence of ARI can be prevented by exclusive breastfeeding.[4] Exclusive breastfeeding is the liquid secretion of the mother's breast glands given to the baby during the first six months of life without adding and/or replacing it with other food or drinks.[5] Internationally, only 38% of infants aged 0-6 months who received exclusive breast milk reached 38%.[4] Meanwhile, at the national level, the number of infants who received exclusive breastfeeding reached 67.74%.[6] In 2019, the rate of exclusive breastfeeding for infants aged 0-6 months reached 66% in Central Java and 52.5% in Kendal Regency.[7]

There are several mechanisms underlying the prevention of ARI through exclusive breastfeeding, one of which is the transfer of maternal immunoglobulin A, which is specific for respiratory mucosal pathogens through breast milk.[8] Breast milk also contains antimicrobial factors such as lactoferrin, lysozyme, and oligosaccharides that aid in microbial clearance.[8] Actively, breast milk can also affect the maturation of the neonate's immune system, which is thought to have short-term effects and long-term effects on the child's immune response.[8]

Agus *et al.* explained that there is a correlation between exclusive breastfeeding and the incidence of ARI in toddlers.[2] This statement is also supported by Adius *et al.* research.[9] On the other hand, in a study conducted by Tazinya, exclusive breastfeeding was not significantly correlated with ARI.[10]

In connection with the various studies above, researchers are interested in research to prove the correlation between exclusive breastfeeding and the incidence of ARI in toddlers at the Ringinarum Health Center, Kendal Regency.

METHODS

This study was conducted in the working area of Ringinarum Health Center in December 2021. This study was an analytic observational study with a case-control design. The population reached were all toddlers aged 12-59 months who experienced ARI and came to the Ringinarum Health Center in 2019-2021. Samples for each case sample and control sample were 95 people, so the total sample in this study obtained to 124 toddlers. The inclusion criteria of this study included: a) patients diagnosed with ARI in the working area of the Ringinarum Health Center, Kendal Regency; b) age 12-59 months, while the control sample included: a) healthy patients in

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the working area of Ringinarum Health Center, Kendal Regency; b) aged 12-59 months.

Meanwhile, the exclusion criteria for both samples were: a) toddlers with a history of low birth weight; b) toddlers with incomplete immunization status; c) toddlers with poor nutritional status; d) toddlers who did not use BPJS Kesehatan for contribution assistance to pay the treatment; e) incomplete data in the medical record; f) incomplete data in the infant cohort. Sampling was carried out by applying non-probability sampling with the purposive sampling technique. The data on exclusive breastfeeding were obtained from the infant cohort, and the data on ARI were obtained from medical records. The analysis used in this study was the chi-square test. This research was conducted after the issuance of ethical clearance by the Health Research Ethics Committee Universitas Muhammadiyah Semarang with No. 141/EC/FK/2021.

RESULTS

The results obtained 62 toddlers with ARI and 62 non-ARI, so a total of 124 toddlers were obtained. Characteristics of toddlers based on age, the most frequent patient with ARI was 24-35 months (30,6%), while the most frequent age in non-ARI patients was 12-23 months (38,7%). Most toddlers with ARI were male (61.3%), while the highest gender in toddlers without ARI was female (69.4%). A total of 43 toddlers (69.4%) of the 62 toddlers with ARI were not exclusively breastfeeding. A total of 44 (71.0%) of the 62 non-ARI toddlers were exclusively breastfed.

According to table 2, it was found that 43 toddlers (69,4%) out of 62 toddlers with ARI were not exclusively breastfed. Meanwhile, 44 (71,0%) of the 62 toddlers non-ARI received exclusive breastfeeding.

DISCUSSION

This study showed that the dominant characteristics of toddlers who suffered from ARI were 24-35 months old. Meanwhile, the dominant characteristics of non-ARI toddlers were 12-23 months old. This situation is in line with research conducted by Windi *et al.*, which explained that children with ARI were generally distributed in the 2-year-old, while non-ARI toddlers were generally distributed in the 1-year-old.[11] The high incidence of ARI for toddlers occurs because of frequent contact with the outside environment and other people with ARI.[12] Toddlers are susceptible to disease because their immunity is not yet stable.[13]

The most frequent gender in toddlers with ARI is male. The most frequent gender in toddlers who do not suffer from ARI is female. This condition was also found in the study of Wibawa *et al.*, which explained that the highest number of ARI sufferers by gender was male, while in toddlers who were not ARI patients, the highest gender was female.[14] The high incidence of ARI in males is related to male children who are generally more active than girls.[15]

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Table 1. Characteristics of Toddlers at Ringinarum Health Center Kendal Regency Based on Age, Gender, and Exclusive Breastfeeding.

Univariate Analysis		Incidence of ARI				Total	
		ARI		Non-ARI			
		(n)	(%)	(n)	(%)	(n)	(%)
Age (month)	12-23	9	(14,5)	24	(38,7)	33	(26,6)
	24-35	19	(30,6)	9	(14,5)	28	(22,6)
	36-47	18	(29,0)	14	(22,6)	32	(25,8)
	48-59	16	(25,8)	15	(25,8)	31	(25,0)
Gender	Male	38	(61,3)	19	(30,6)	57	(46,0)
	Female	24	(38,7)	43	(69,4)	67	(54,0)
Exclusive Breastfeeding	Non-Exclusive Breastfeeding	43	(69,4)	18	(29,0)	61	(49,2)
	Exclusive Breastfeeding	19	(30,6)	44	(71,0)	63	(50,8)

Table 2. Correlation of Exclusive Breastfeeding and The Incidence of ARI in Toddlers at The Ringinarum Health Center, Kendal Regency.

Bivariate Analysis		Incidence of ARI				Total		p-value	*OR*
		ARI		Non-ARI					
		(n)	(%)	(n)	(%)	(n)	(%)		
Exclusive Breastfeeding	Non-Exclusive Breastfeeding	43	(69,4)	18	(29,0)	61	(49,2)	0,000	5,532
	Exclusive Breastfeeding	19	(30,6)	44	(71,0)	63	(50,8)		
Total		62	(100)	62	(100)	124	(100)		

The characteristics of toddlers based on exclusive breastfeeding, ARI patients were dominated by toddlers who were not exclusively breastfed, while toddlers dominated those non-ARI patients with exclusive breastfeeding. This study's results align with research conducted by Kusnan *et al.*, which stated that more than half of toddlers suffering from ARI were not exclusive breastfeeding, while toddlers who did not suffer from ARI were getting exclusive breastfeeding.[9] The high incidence of ARI in toddlers who were not received exclusive breastfeeding is related to the presence of macrophage cells and antibodies in breast milk that can protect toddlers from certain types of infection.[16]

Referring to the results of the Chi-Square test in this study, it was found that there was a correlation between exclusive breastfeeding and the incidence of ARI in toddlers at the Ringinarum Health Center, Kendal Regency. Based on this study, it can also be concluded that infants who were not exclusively breastfed have a risk of contracting ARI 5.5 times greater than those who are exclusively breastfed. The results of this study are in line with the research of Kusnan *et al.*, which explained that toddlers who were not given exclusive breast milk had

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a 3.85 times higher risk of contracting ARI.[9] Wibawa *et al.* also stated that based on their research, toddlers without exclusive breastfeeding have a four-fold more significant risk of contracting ARI than toddlers who are exclusively breastfed.[11] In addition, Amalia *et al.* also stated that toddlers not given exclusive breast milk were 2.3 times more likely to contract ARI than toddlers who received exclusive breast milk.[17]

Theoretically, exclusive breastfeeding can protect the form of maternal antibodies, nutrients, and immunomodulatory factors against infections that often occur during infancy and can reduce the frequency and severity of recurrent infections.[18] Breastfeeding has many nutritional benefits and is associated with reduced short-term morbidity and mortality from respiratory tract infections.[19] Breast milk has antibodies against *Haemophilus influenzae, respiratory syncytial virus, Streptococcus pneumoniae, Bordetella pertussis*, and other pathogens.[20] Breast milk also contains glutamate, certain long-chain polyunsaturated fatty acids, oligosaccharides, lysozyme, immunoglobulins, salt-stimulated lipases, growth factors, and many other bioactive factors, so breastfeeding is associated with a reduced risk of ARI.[20]

The mechanism that underlies the significant effect of breastfeeding is passive immunetherapy by transfer through the breast milk of maternal immunoglobulin A that is specific for respiratory tract mucosa and enteric pathogens and compensates for defects in immuneglobulin synthesis in neonates. Breast milk contributes to its protection against infection.[8] In addition, TGF-β found to be very abundant in breast milk, has been shown to have an impact on local and short-term immunity as well as long-term immunity.[21] Exclusively breastfed children are protected against respiratory infections for up to seven years compared to non-breastfed children.[22]

The variable studied concerning the incidence of ARI in this study was exclusive breastfeeding. While the risk factors for ARI in toddlers are not only influenced by exclusive breastfeeding but also influenced by environmental factors. Therefore, it would be better if an evaluation of environmental factors was also carried out, including exposure to cigarette smoke, house ventilation, residential density, and natural disasters.

CONCLUSION

This study found a correlation between exclusive breastfeeding and the incidence of ARI in toddlers at the Ringinarum Health Center, Kendal Regency ($p<0,05$). Toddlers who were not exclusively breastfed had a 5,5 times greater risk of ARI than those who were exclusively breastfed (OR>1).

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