

## Exclusive Breastfeeding and Exposure to Cigarette Smoke with The Incidence of Acute Respiratory Infection in Children Under Five

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### Abstract

Acute Respiratory Infection (ARI) is an infection of the respiratory tract, either the upper or lower respiratory tract. This disease is caused by bacteria or viruses that enter the respiratory tract and cause an inflammatory reaction. ARI is one of the most common diseases in children under five who visit the Singgani Health Center. This study aims to determine what factors are associated with ARI incidence in children under five at the Singgani Health Center, Palu City. This study uses an observational analytic method with a Cross-Sectional Study design. The number of samples used was 77 samples using the purposive sampling technique. The data was collected using a questionnaire; the data was then analyzed using the Chi-square test with univariate and bivariate analysis on SPSS. The results of this study indicate that there is a relationship between exclusive breastfeeding ( $p = 0.00$ ) and exposure to cigarette smoke ( $p = 0.02$ ) with the incidence of ARI in children under five. There is no relationship between nutritional status ( $p = 0.33$ ) and giving colostrum ( $p=0.66$ ) with the incidence of ARI in children under five at the Singgani Health Center, Palu City.

**Keywords:** Acute Respiratory Infection (ARI), Exclusive Breastfeeding, Exposure to cigarette smoke

### Key Messages:

- Children under 5 years who are exposed to cigarette smoke have a 2.96 times greater risk of developing ARI

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### 1. Introduction

Acute respiratory infection (ARI) is a high case in toddlers and children (1). In general, this acute respiratory infection affects the upper respiratory tract and lower respiratory tract, especially pneumonia (2). Under-five mortality due to acute respiratory infections worldwide is still a public health problem, especially in developing countries such as Indonesia. ARI in Indonesia is one of the main health problems because the incidence of ARI is still high, especially in toddlers. ARI is a type of infectious disease that usually attacks toddlers with a vulnerable age of fewer than five years (3). One of the factors that cause acute respiratory tract infections in toddlers is a history of exclusive breastfeeding. According to Ijana (2017) toddlers who were not exclusively breastfed as infants were 8.54 more at risk for acute respiratory infections than toddlers with a history of exclusive breastfeeding (4). Cigarette smoke from parents or residents of the same house as a toddler has the potential to cause the toddler to suffer from ARI, whereas if there is a tendency for smoking behaviour to increase in parents, the greater the potential for children under five to suffer from ARI. Breast milk colostrum is the initial milk

produced by new mothers, which is produced in the first 24 hours after giving birth. This yellowish liquid is very rich in protein, can clean the baby's digestive tract, contains natural immune substances, and prevents babies from all diseases and jaundice or jaundice. Based on the results of research and discussion conducted by Kody, 2016, it can be concluded that giving breast milk colostrum to infants aged 7-11 months can affect the incidence of ARI. Because there is an effect of giving breast milk colostrum on the incidence of ARI in infants aged 7-11 months with a p-value <0.05. Poor nutritional status appears as an important risk factor for the occurrence of ARI. Several studies have proven that there is a relationship between malnutrition and lung infections, so that children who are malnourished often get pneumonia. Infectious diseases themselves will cause toddlers to have no appetite and lead to malnutrition. In a state of malnutrition, toddlers are more susceptible to "severe ARI" even longer attacks (5).

This study aims to determine what factors are associated with the incidence of ARI in children under five at the Singgani Health Center, Palu City.

## 2. Methods

This type of research uses an observational analytic method with a Cross Sectional Stud design. The study was carried out at the Singgani Health Center in Palu City from August to October 2020. The population in this study was the total number of children under five who were at the Singgani Health Center in Palu City, totaling 3,186 children under five. The sample size was calculated using the Lemeshow formula so that the sample size used in this study was 77 people. The sampling technique in this study used the purposive sampling technique. The criteria for the sample taken are as follows: 1. Respondents in this study are mothers who have toddlers or who care for toddlers 2. Willing to be interviewed as respondents. The primary data in this study is in the form of data obtained directly from the respondents based on the results of direct interviews using questionnaires. Questionnaires in the form of written questions were used to obtain data or information related to the variables studied such as nutritional status, exclusive breastfeeding, colostrum administration and exposure to cigarette smoke, which were carried out by filling out questionnaires. The presentation of the data is done descriptively. The test used is the Chi-square test with  $\alpha = 0.05$  and confidence interval = 95%.

## 3. Results

Table 1 shows that children under five who have a history of nutritional status are less than 20% compared to children under five who have a history of good nutritional status by 80%, and the results of the che-square test show that there is no significant relationship between the nutritional status of toddlers and the incidence of ARI. with p value = 0.33. The history of exclusive breastfeeding shows that the proportion of children under five who experience ARI is greater, namely 88.2%, found in infants who do not have a history of exclusive breastfeeding and there is a significant relationship with the incidence of ARI with p = 0.00. then, toddlers who were given colostrum were 95.7% higher than those who were not given colostrum, which was 4.3% and there was no significant relationship with the incidence of ARI with p = 0.66. Furthermore, the number of toddlers who were exposed to cigarette smoke was greater, namely 65.7% compared to those who were not exposed to cigarette smoke, namely 34.4% and there was a significant relationship with the incidence of ARI with p value = 0.002.

**Table 1 Factors related to ARI in children under five at the Singgani Health Center, Palu City**

Research variable	ARI				Total		p	OR
	Yes		No		N	%		
	n	%	n	%				
<b>Nutritional status</b>								
Malnutrition	6	42.9	8	57.1	14	20.0	0.33	0.56
Normal	36	57.1	27	42.9	63	80.0		
<b>Exclusive breastfeeding</b>								
No	38	88.4	5	11.6	43	61.4	0.00	57.0
Yes	4	11.8	30	88.2	34	38.6		
<b>History of giving colostrum</b>								
No	2	66.7	1	33.3	3	4.3	0.66	1.70
Yes	40	54.1	34	45.9	74	95.7		
<b>Exposure to cigarette smoke</b>								
Yes	30	65.2	16	34.8	46	65.7	0.002	2.96
No	12	38.7	19	61.3	31	34.3		
<b>Total</b>	<b>42</b>	<b>60.0</b>	<b>35</b>	<b>40.0</b>	<b>70</b>	<b>100</b>		

## 4. Discussion

The results of the research conducted on 77 toddlers showed that 90.5% of ARI under five had no history

of exclusive breastfeeding, while 9.5% ARI under five were given exclusive breastfeeding. In infants who do not suffer from ARI who do not have a history of exclusive breastfeeding by 85.7%, while toddlers who have a history of exclusive breastfeeding are 14.3%. The Chi-square test that was carried out on the relationship between exclusive breastfeeding and the incidence of ARI in children under five showed a p-value of 0.00 less than 0.05 ( $0.00 < 0.05$ ) and an OR of 57.0. This means that there is a relationship between exclusive breastfeeding and the incidence of ARI and toddlers who are not given exclusive breastfeeding have a 57.0-fold greater risk of suffering from ARI when compared to toddlers who are exclusively breastfed.

These results are in accordance with the theory that breast milk is needed for infant health. Breast milk is the best food for babies. Breast milk is needed for baby's health and supports optimal growth and development of babies. Babies who are exclusively breastfed will get all the excess breast milk and their nutritional needs are met to the maximum so that they will be healthier, more resistant to infection, less prone to allergies and less sick (6). This study shows that non-exclusive breastfeeding has an effect on the incidence of ARI in toddlers. Breast milk contains IgA which is more in the form of secretory IgA (sIgA). sIgA has an immunologic role so that it can guard against susceptibility to infection. IgA is one of the mucosal immune systems that can bind to antigens on pathogenic microorganisms so that they cannot stick to the mucosa and inhibit their proliferation. In addition to the composition of breast milk as protective against infection, breast milk comes directly from the breast so it is not contaminated with foreign objects such as water, bottles, and formula milk which is more susceptible to infection. So that babies who are exclusively breastfed will be less likely to get infections (7). Breast milk can meet the nutritional needs of toddlers to grow normally until the age of 6 months. Breast milk in mothers can provide protection against allergies and infections. Because of this, it is clear that breastfeeding can prevent the transmission of ARI disease (8). Research conducted by Ahmed et al., (2020), stated that infants who were exclusively breastfed had a lower prevalence of ARI than infants who were not exclusively breastfed (p-value = 0.001) (9). Exclusively breastfed babies are better than babies who are not exclusively breastfed in preventing the incidence of ARI because babies with exclusive breastfeeding have a better immune system and are less prone to ARI than babies who are not exclusively breastfed.

The results of the Chi-square test showed that there was a relationship between exposure to cigarette smoke and the incidence of ARI in children under five (p-value  $0.02 < 0.05$ ) with OR = 2.96. This means that toddlers who are exposed to cigarette smoke have a 2.96-fold greater risk of suffering from ARI than toddlers who are not exposed to cigarette smoke. The results of the analysis show that smoking in the home is a risk factor for the incidence of ARI in children under five in the work area of the Singgani Public Health Center, Palu City. from toddlers and some of them are often close to toddlers or do not clean themselves first before interacting with toddlers. So toddlers are often exposed to cigarette smoke inhaled by these smokers. This study is also in accordance with research conducted by Tazinya et al., (2018), that there is a relationship between passive smoking and the incidence of ARI in infants with a p-value of 0.001 and OR = 4.67 (95% CI = 1.91-11.40) (10). There is a significant relationship between parental smoking history and the incidence of ARI with p-value 0.03 and OR=1.6 (11). Research conducted by Bourke (2012), found that there is a relationship between exposure to cigarette smoke and the incidence of ARI in children under five, which is 78.20% with a p-value of 0.001 (12).

Cigarettes have excellent effectiveness in dispersing toxic chemicals. If smoked indoors, then the entire house will become a place for nicotine, carbon monoxide, and various heavy carcinogens. A carcinogen is anything that can cause cancer. Cigarette smoke from residents of the house who live under the same roof as toddlers is a pollutant material in the living space and will increase the risk of illness in toddlers. So that smoking and exposure to cigarette smoke are very dangerous (8). Cigarette smoke inhaled by children will affect the ciliary activity of the respiratory tract (nasal cavities) and inhibit other local defence mechanisms so that if there are germs that enter through the respiratory tract, the child's defence system does not work optimally. Exposure to cigarette smoke caused by family members greatly disrupts air circulation which is continuously inhaled by other family members who do not smoke, especially toddlers (13). Toddlers whose parents smoke have a greater risk of developing respiratory tract disorders with symptoms of shortness of breath, coughing and excessive mucus. Hazardous materials and toxins in cigarettes not only cause health problems for smokers but also for those around them who don't smoke such as babies, children and mothers who become passive smokers because someone smokes at home (14). Continuous exposure to cigarette smoke can cause children to suffer from respiratory problems, especially aggravating the onset of asthma and lung disorders in adulthood. The more cigarettes smoked by the family, the greater the risk for the incidence of ARI (15). The limitations of this study are that in this study there are still several causes of ARI that were not investigated such as immunization status, low birth weight, education level, number of occupants in the house and environmental sanitation which are risk factors for the incidence of ARI in toddlers.

## 5. Conclusion

The conclusion of the study is that the factors that have a significant relationship with the incidence of ARI in toddlers are exclusive breastfeeding and exposure to cigarette smoke, while other variables do not show

significant results, namely the nutritional status of toddlers, giving colostrum.

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