(RESEARCH ARTICLE)

The relationship between nutritional status and the incidence of ARI In toddlers aged 1-5 years

Risma Mubarokah [1], Irwanto [2, *] and Endyka Erye Frety [1]

[1] Midwifery Study Programme, Faculty of Medicine, Airlangga University, Surabaya, Indonesia.
[2] Département of Pediatrics, Faculty of Medicine, Ailangga University, Surabaya, Indonesia.

Abstract

Background: Acute Respiratory Infection (ARI) is a disease that causes the highest number of deaths (mortality) and morbidity (morbidity) in children under five in both developed and developing countries, including Indonesia. The prevalence of ARI cases in Indonesia increases every year, according to the Indonesian Ministry of Health, ARI pneumonia cases reached 386,724 (38.78%) in 2022 with 69.2% (267,733 cases) of them occurring in the 1-5 year age group.

Objective: This study aims to analyze the relationship between nutritional status and the incidence of ARI in toddlers aged 1-5 years in the working area of the Mulyorejo Community Health Center, Surabaya, Indonesia.

Method: This research uses an analytical observational study with a cross sectional approach. The samples in this research were toddlers who visited the Mulyorejo Community Health Center, Surabaya for the period November 2023-April 2024. The sampling technique used non-probability sampling, namely the purposive sampling method. The sample size was 100 toddlers. The research instrument is medical records. Research data was analyzed using the Mann-Whitney U Test.

Result: Most (76%) respondents had normal nutritional status. The results of the Mann-Whitney U test to analyze the relationship between the nutritional status of toddlers and the incidence of ARI in toddlers obtained P Value = 0.492.

Conclusion: These data show that there is no relationship between nutritional status and the incidence of ARI in toddlers aged 1-5 years in the working area of the Mulyorejo Community Health Center, Surabaya, Indonesia.

Keywords: Nutritional Status; ARI; Toddlers; Pneumonia; Infection

1. Introduction

Acute Respiratory Infections (ARI) are the highest causes of death (mortality) and morbidity (morbidity) in children under five in both developed and developing countries (Setiawati et al., 2021). In developing countries, one of which is Indonesia, ARI is included in the top 10 diseases frequently experienced by toddlers and children. In one year, the average toddler and child experiences ARI 3-6 episodes (KEMENKES, 2022). Toddlers are an age that is vulnerable to infectious diseases because body tissues are still in the process of being perfected so that the body's defense process cannot be optimal (Maisyarah et al., 2021).

In Indonesia, the prevalence of ARI cases increases every year. Based on case findings by the Indonesian Ministry of Health, 386,724 cases of ARI pneumonia were found (38.78%) in 2022 with 69.2% or 267,733 cases of which occurred

* Corresponding author: Irwanto

in the 1-5 year age group. One of the provinces that will find the most pneumonia cases in 2022 is East Java province. (RI Ministry of Health, 2022). From 2020 to 2022, East Java Province experienced fluctuations in pneumonia cases among toddlers. In 2020, the number of cases recorded reached 77,203, indicating a fairly high incidence rate that year. A downward trend occurred in 2021 with the number of cases reaching 74,071. However, in 2022, there will be a significant increase with the number of cases reaching 92,118 (East Java Health Office, 2022). For the city of Surabaya itself, in the period January to September 2022, 15,252 cases of ARI pneumonia were recorded. In children aged 0-5 years there were 9,312 cases and 5,940 cases in the age category over 5 years (Surabaya City Government, 2022).

Acute Respiratory Infection (ARI) is an acute infection that attacks one/more of the respiratory tract. Pneumonia is an acute infection that attacks lung tissue (alveoli). In toddlers, pneumonia is characterized by the appearance of symptoms of coughing and difficulty breathing such as rapid breathing, indrawing of the chest wall, and/or the presence of radiological images of the thorax/chest showing acute infiltrates (Setiawati et al., 2021). The causes of ARI are influenced by several factors, one of which is individual factors, such as nutritional status, age, immunization status, and regular consumption of vitamin A. Environmental factors can also influence the occurrence of ARI, including air pollution, house ventilation, and residential density) (Prasiwi et al. al., 2021).

Nutritional status describes the results or consequences of the nutritional intake a person consumes every day. Unbalanced nutritional intake will cause poor nutritional status so that toddlers are more susceptible to disease. A person who has good nutritional status will be better protected from disease, both infectious and degenerative diseases (Setiawati et al., 2021).

Based on the phenomenon above, research needs to be carried out regarding this matter. So researchers will conduct research with the title "The Relationship between Nutritional Status and the Incidence of ARI in Toddlers Aged 1-5 Years".

2. Material and Methods

This research is a quantitative research using an analytical observational study with a cross sectional research design. The population in this study were all toddlers aged 1-5 years in the working area of the Mulyorejo Community Health Center, Surabaya with a total of 2,708 toddlers. The sampling technique used non-probability sampling with a purposive sampling method and it was found that the sample size using the Slovin formula was 100 toddlers. Research data collection was carried out in April - June 2024 using secondary data, namely medical records of toddlers who visited the Mulyorejo Community Health Center, Surabaya in November 2023 - April 2024. Data were analyzed using univariate and bivariate analysis with the Mann-Whitney U test using the SPSS software tool.

2.1. Ethical Clearance

This research was approved by the ethics committee of the Faculty of Medicine, Airlangga University, Surabaya, Indonesia on May 22, 2024 with No. 06/EC/KEPK/FKUA/2024.

3. Results

The respondents in this study were toddlers aged 1-5 years who visited the Mulyorejo Community Health Center, Surabaya in the period November 2023 – April 2024, totaling 100 toddlers.

3.1. Characteristics of Respondents

Table 1 Characteristics of Toddlers

Characteristics of Toddlers	Frequency (n)	Percentage (%)
Age		
12-23 months	52	52,0
24-35 months	24	24,0
36-47 months	11	11,0
48-59 months	13	13,0

Gender		
Male	46	46,0
Female	54	54,0
Birth Weight		
> 2500 gram	95	95,0
< 2500 gram	5	5,0
Totals	100	100,0

Based on table 1, data shows that the age distribution of toddlers is mostly in the 12-23 month age range, namely 52 respondents (52%). More than half (54%) of toddlers are girls, namely 54 respondents. Most of the birth weights of toddlers were normal (>2500 grams), namely 95% or 95 respondents

3.2. Nutritional Status of Respondents

Table 2 Distribution of Nutritional Status of Respondents

Nutritional Status (W/H)	Frequency (f)	Percentage (%)
Malnutrition	2	2,0
Wasted	15	15,0
Normal	76	76,0
Risk of Overweight	4	4,0
Overweight	2	2,0
Obesity	1	1,0
Totals	100	100,0

The data in table 2 shows that the majority (76%) of toddlers have normal nutritional status, as many as 76 respondents.

3.3. Analysis of The Relationship between Nutritional Status and The Incidence of ARI

Table 3 Analysis of The Relationship between Nutritional Status and The Incidence of ARI in Toddlers

Nutrirional Status	Incidence of ARI				Totals		P Value
	Yes		No				
	n	%	n	%	n	%	
Malnutrion	1	2,3	1	1,8	2	2,0	
Wasted	9	20,0	6	10,9	15	15,0	
Normal	31	68,8	45	81,9	76	76,0	
Risk of Overweight	3	6,6	1	1,8	4	4,0	0,492
Overweight	0	0,0	2	3,6	2	2,0	
Obesity	1	2,3	0	0,0	1	1,0	
Total	45	45,0	55	55,0	100	100,0	

'Based on table 3, it can be seen that the results of the Mann-Whitney U test to analyze the relationship between the nutritional status of toddlers and the incidence of ARI in toddlers obtained P Value = 0.492 which is greater than the significance level α < 0.05, so H1 is rejected. This shows that there is no relationship between the nutritional status of toddlers and the incidence of ARI in toddlers

4. Discussion

Acute respiratory infections (ARI) are an important cause of morbidity and mortality in children under 5 years of age. Host factors such as malnutrition and vitamin A deficiency appear to play a dominant role in the incidence of ARI. Children who are malnourished or show signs of vitamin A deficiency have a much greater risk of ARI attacks (Pandey A, Chakraborty Ak. 1996). In Hong et al.'s study, inadequate nutrition and a compromised immune system did not have a synergistic impact on mortality in acute sepsis patients. Calorie restriction, by regulating inflammatory pathways, has been shown to increase cell survival in mammals (Heart TN. 2012).

In addition, the occurrence of severe stunting, low birth weight, population density, the number of siblings under 6 years of age in one household, lack of exclusive breastfeeding, and maternal smoking have been proven to be the main factors associated with severe HRSV ARI. (Okiro EA et al, 2012). Other research shows that there is a relationship between poor nutritional status, deficiency and obesity with the incidence of ARI in toddlers in Surakarta. Toddlers with poor and poor nutrition will experience leptin deficiency, while toddlers with obesity will experience leptin resistance, making them vulnerable to infection by both viruses and bacteria (Widyawati, et al. 2020).

From the research results, it was found that the majority of toddlers with poor nutritional status (60%) experienced ARI. The results of this study are also in line with research by Rizqullah et al (2021) which shows that most of the respondents who experienced pneumonia had poor nutritional status. This is due to a decrease in the number of secretory IgA, complement system and immune mediator cells due to malnutrition. So the immune system decreases and there is interference in the regeneration of the respiratory epithelium. The thymus gland and tonsils will atrophy so that the number of T lymphocyte cells decreases gradually. This can reduce the immune system, making the body more susceptible to infection with diseases including ARI (Rizqullah et al., 2021).

The frequency of ARI events in toddlers with poor nutritional status is higher compared to children who have good nutritional status. This is because toddlers who have good nutritional status will have more resistance (antibodies), so they can prevent or avoid diseases such as ARI (Retnowati M, 2019).

However, there are other studies that state that although malnutrition, rural areas, low income and maternal illiteracy are associated with the risk of LRTI according to bivariate analysis, this study failed to find an independent association with these factors. thus malnutrition was initially associated with acute respiratory infections; but after adjusting for covariates that could influence the results, the relationship no longer existed (Kabego L et al, 2018).

Another risk factor that can increase the occurrence of ARI is environmental conditions such as air quality and population density (Kolupe and Duda, 2023). Mulyorejo District is located in the center of Surabaya city with a fairly high population density. This causes an increase in social and economic activities, so it is possible that the use of motorized vehicles will also increase and this will be followed by a decline in air quality (DINKES SURABAYA, 2020). Another study by Masriadi (2014) in (Simunati et al., 2022) also explained that the results of epidemiological observations showed that morbidity rates in cities tend to be greater than in villages. This may be caused by the high level of residential density and environmental pollution in cities compared to villages. Decreased air quality is also caused by cigarette smoke so that ARI can also occur due to cigarette smoke inhaled by toddlers both from inside and outside the environment where the toddler lives (Chandra et al., 2022).

5. Conclusion

These data show that there is no relationship between nutritional status and the incidence of ARI in toddlers aged 1-5 years in the working area of the Mulyorejo Community Health Center, Surabaya, Indonesia.

Compliance with ethical standards

Disclosure of Conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This research follows research ethics and procedures such as applying for permission from the local health department and has met ethical requirements by the ethics committee of the Faculty of Medicine, Airlangga University..

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