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The relationship between nutritional status and the severity of pneumonia in children aged 1-5

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Abstract

Background: Pneumonia is one of the leading causes of morbidity and mortality among children under five years of age. Nutritional status is known to play an important role in the immune system and may influence the severity of pneumonia.

Purpose: To determine the relationship between nutritional status and the severity of pneumonia in children aged 1-5 years.

Method: this study used an analytic observational method with a cross-sectional design. The sample consisted of 73 children selected using purposive sampling based on medical record data. Data were analyzed using the chi-square test.

Results: the results showed that most respondents were classified as wasted, accounting for 28 children (38.4%), followed by normal nutritional status in 25 children (34.2%) and severely wasted in 14 children (19.2%). In addition, a small proportion of respondents were classified as having a possible risk of overweight and overweight, each accounting for 3 children (4.1%), while no respondents were classified as obese (0%). The majority of respondents experienced severe pneumonia, accounting for 56 children (76.7%). Statistical analysis showed a significant relationship between nutritional status and the severity of pneumonia ($p = 0.034$; $p < 0.05$).

Conclusion: there is a significant relationship between nutritional status and the severity of pneumonia in children aged 1–5 years.

Keywords: Children; Nutritional Status; Pneumonia; Severity.

INTRODUCTION

Pneumonia remains one of the leading causes of morbidity and mortality among children under five years of age worldwide, particularly in developing countries, including Indonesia. Although most pneumonia-related deaths are preventable, its incidence remains high and continues to be a public health problem requiring special attention (Martin, Falconer, Addo-Yobo, Aneja, Arroyo, Asghar, & Partnership, 2022; Ministry of Health of the Republic of Indonesia, 2024).

In Indonesia, the number of pneumonia cases among children remains relatively high, with variations in case detection coverage across different regions. Lampung Province is among the provinces

with a high number of pneumonia cases, and Central Lampung Regency has been reported as the area with the highest number of pneumonia cases among children under five years of age, particularly within the working area of Haji Pemanggilan Primary Health Center (Ministry of Health of the Republic of Indonesia, 2021; Rosmawati, Windari, Anggraini, & Ningsih, 2024).

Nutritional status is an important factor associated with the severity of pneumonia in children. Malnutrition may increase the risk of severe pneumonia and mortality by impairing immune system function (Bourke, Berkley, & Prendergast, 2016; Ibrahim, Zambruni, Melby, & Melby, 2017;

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Rytter, Kolte, Briend, Friis, & Christensen, 2014). Several studies have demonstrated that children with undernutrition or poor nutritional status have a higher risk of developing severe pneumonia than those with normal nutritional status (Kirolos, Blacow, Parajuli, Welton, Khanna, Allen, & Nair, 2021; Adriani & Simarmata, 2022; Yadav, Yadav, Mahat, & Rimal, 2024; Nambuya, Mupere, Nabukeera-Barungi, Mubiri, Kamugisha, Rytter, & Nantanda, 2025).

Therefore, monitoring and improving nutritional status are essential components of efforts to prevent pneumonia and reduce its severity among children aged 1–5 years. Based on these considerations, a study on the association between nutritional status and pneumonia severity in children aged 1–5 years at Dr. H. Abdul Moeloek Regional General Hospital during 2024–2025 was conducted to obtain scientific evidence that may support the prevention and management of pneumonia in children (World Health Organization, 2025; Ministry of Health of the Republic of Indonesia, 2025; Ministry of Health of the Republic of Indonesia, 2024).

RESEARCH METHOD

This study employed an observational analytic research design with a cross-sectional approach. The study was conducted at Dr. H. Abdul Moeloek Regional General Hospital, Bandar Lampung, in February 25 to March 1, 2026. A total of 73

respondents were selected using a purposive sampling technique. The study population consisted of children aged 1-5 years diagnosed with pneumonia at Dr. H. Abdul Moeloek Regional General Hospital, Bandar Lampung, during 2024-2025.

The independent variable was the children's nutritional status, while the dependent variable was pneumonia severity. Data were collected from secondary data obtained from medical records and questionnaires. Statistical analysis was performed using the Chi-square test with a significance level of 0.05.

The research instruments used in this study were medical record data extraction sheets. The research indicators included nutritional status and pneumonia severity. Nutritional status was categorized based on anthropometric data recorded in medical records using weight-for-height (W/H) according to Indonesian Ministry of Health anthropometric standards, and classified into severely wasted, wasted, normal, possible risk of overweight, overweight, and obese. Malnutrition may increase the risk of severe pneumonia and mortality by impairing immune system function.

This study was approved by the Health Research Ethics Committee of the Faculty of Medicine, Malahayati University, under ethical approval number 028/KEPK-RSUDAM/II/2026.

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RESEARCH RESULTS

Table Characteristics of Respondent (N=73)

Variable	Results	P-value
Age (Mean±SD) (Years) (Range)	(2.05±1.01) (1-5)	
1	27/37.0	
2	22/30.1	
3	18/24.7	
4	5/6.8	
5	1/1.4	
Gender (n/%)		
Male	34/46.6	
Female	39/53.4	
Nutritional Status (n/%)		
Severely Wasted	14/19.2	
Wasted	28/38.2	
Normal	25/38.2	
Possible Risk of Overweight	3/4.1	
Overweight	3/4.1	
Obese	0/0	
Pneumonia Severity (n/%)		0.034
Mild	17/23.3	
Severe	56/76.7	

Table 1 shows that the mean age and standard deviation are (2.05 ± 1.01) with an age range of (1-5). Based on gender, the majority are 11 years old, namely 27 respondents (37.0%), with the majority having wasted nutritional status, namely 28 respondents (38.2%), and most respondents with severe pneumonia, 56 (76.7%). The results of the Chi-square test show a significance value of $p = 0.034$.

DISCUSSION

Based on age characteristics, the majority of respondents were 1 year old, accounting for 27 children (37.0%), followed by 22 children aged 2 years (30.1%), 18 children aged 3 years (24.7%), 5 children aged 4 years (6.8%), and 1 child aged 5 years (1.4%). These results showed that pneumonia occurred more frequently among children under 2 years of age. Clinically, this condition can be explained by the fact that the immune system in young children has not yet developed optimally,

making them more susceptible to infection. In addition, the respiratory tract structure of children, which is still narrow and immature, also increases the risk of obstruction and more severe infections (UNICEF, 2020; Yun, 2023).

Based on sex, the number of female respondents was higher, with 39 children (53.4%), compared with 34 male children (46.6%). Although there was a difference in number, this distribution did not show a marked difference, indicating that pneumonia can occur in both sexes. This variation may have been influenced by the sample distribution at the study location.

The results of the nutritional status analysis showed that the majority of respondents had wasted nutritional status, accounting for 28 children (38.4%), followed by normal nutritional status in 25 children (34.2%) and severely wasted nutritional status in 14 children (19.2%). In addition, there were 3 children (4.1%) with possible risk of overweight status and 3 children (4.1%) with overweight status, while no

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respondents were found to be obese. The high proportion of children with wasted and severely wasted nutritional status indicates that malnutrition remains a fairly dominant problem among patients with pneumonia. Theoretically, nutritional status has an important role in maintaining the immune system. Children with wasted and severely wasted nutritional status often experience impaired immune function, including both cellular and humoral immunity, making them more susceptible to infections and severe disease manifestations (Bourke, Berkley, & Prendergast, 2016; Ibrahim, Zambruni, Melby, & Melby, 2017; Rytter, Kolte, Briend, Friis, & Christensen, 2014).

Based on pneumonia severity, the majority of respondents had severe pneumonia, accounting for 56 children (76.7%), while 17 children (23.3%) had mild pneumonia. The high proportion of severe pneumonia in this study may be caused by various factors, such as delays in treatment, clinical condition at the time of presentation to healthcare facilities, and the presence of other risk factors such as poor nutritional status. Clinically, severe pneumonia in children is characterized by symptoms such as shortness of breath, chest wall retractions, and impaired oxygenation that require more intensive management.

The results of the bivariate analysis using the Chi-square test showed that there was a significant association between nutritional status and pneumonia severity in children, with a p-value of 0.034 ($p < 0.05$). Based on the cross-tabulation results, it was observed that in the severely wasted group, the majority of respondents had severe pneumonia, accounting for 13 out of 14 children. A similar finding was observed in the wasted group, in which 24 out of 28 children had severe pneumonia. In contrast, in the normal nutritional status group, the distribution between mild and severe pneumonia was relatively balanced.

These findings are consistent with a previous study by Simarmata & Adriani, which stated that there was a significant association between nutritional status and the incidence and severity of pneumonia in children. The study showed that children with poor nutritional status had a higher risk of developing severe pneumonia than children with normal nutritional status (Adriani & Simarmata, 2022).

Similar findings also found that children with poor nutritional status were more likely to develop severe pneumonia compared to children with normal nutritional status. These studies further support the role of adequate nutritional status in reducing the risk and severity of pneumonia in children (Kharisma & Zahra, 2022; Rizone, Meirina, Hamdi, & Aldy, 2025).

A study by Yadav et al. (2024) also showed a significant association between nutritional status and pneumonia severity in children ($p < 0.05$). Children with poor nutritional status had a higher risk of developing severe pneumonia, with an odds ratio indicating an increased risk by several folds. Pathophysiologically, malnutrition causes decreased immunity, impaired mucociliary function, and damage to the epithelial barrier of the respiratory tract, thereby facilitating pathogen invasion and worsening the infectious process (Yadav, Yadav, Mahat, & Rimal, 2024).

This association may be explained by impaired immune responses in malnourished children, including reduced T-cell function, impaired cytokine production, and weakened mucosal barriers, which increase susceptibility to respiratory infections (Bourke et al., 2016; Ibrahim et al., 2017).

This finding is consistent with a study by Kirolos et al. (2021), which stated that malnutrition is an important factor contributing to increased pneumonia severity in children. Clinically, malnutrition causes suppression of the immune system, including impaired immune cell function and inflammatory responses, making the body more susceptible to infection and more likely to experience severe conditions (Kirolos, Blacow, Parajuli, Welton, Khanna, Allen, & Nair, 2021).

CONCLUSION

Therefore, it can be concluded that nutritional status is one of the important factors in determining pneumonia severity in children. Therefore, efforts to improve nutritional status in children are very important in the prevention and reduction of pneumonia severity.

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