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Association Between Nutritional Status and Basic Immunization Status with Pneumonia Among Children Aged 1–5 Years at Labuang Baji Regional Hospital, Makassar

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ABSTRACT

Background: According to the World Health Organization (WHO), pneumonia remains a leading cause of mortality among children under five years of age. Nutritional status and immunization are among the factors contributing to the occurrence of pneumonia in young children.

Objectives: This study aimed to determine the association between nutritional status and basic immunization status and the incidence of pneumonia among children aged 1–5 years.

Methods: This study employed a quantitative analytic observational design with a cross-sectional approach. Secondary data were obtained from medical records. A total of 92 respondents were selected using purposive sampling. Data were analyzed using the Kolmogorov–Smirnov test and the chi-square test.

Results: The results showed that 53 children (57.6%) had low body weight, 31 children (33.7%) had normal body weight, and 8 children (8.7%) were at risk of overweight. Regarding immunization status, 74 children (80.4%) had complete basic immunization, while 18 children (19.6%) had incomplete immunization. Statistical analysis revealed a significant association between nutritional status and pneumonia ($p < 0.001$), as well as between basic immunization status and pneumonia ($p = 0.035$).

Conclusion: Nutritional status and basic immunization status were significantly associated with pneumonia among hospitalized children aged 1–5 years at RSUD Labuang Baji.

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INTRODUCTION

Toddlers, defined as children aged 12–60 months, represent a critical stage of growth and development. During this period, adequate nutrition and optimal immune function are essential to support physical development and protect against infectious diseases. Insufficient nutritional intake and repeated infections during early childhood may weaken immune defenses and increase susceptibility to respiratory illnesses, including pneumonia.[1]

Pneumonia remains a major contributor to morbidity and mortality among children under five years of age, particularly in low- and middle-income countries. The World Health Organization (WHO) has identified pneumonia as the leading cause of death in this age group, with the majority of pneumonia-related deaths occurring in developing regions.[2] Pneumonia is characterized by inflammation of lung tissue caused by viral, bacterial, or fungal pathogens, with Streptococcus pneumoniae and Haemophilus influenzae being the most frequently identified bacterial agents.[3,4]

The occurrence and severity of pneumonia in toddlers are influenced by multiple interrelated factors, including nutritional status, birth weight, breastfeeding practices, immunization status, and micronutrient deficiencies. Poor nutritional status is known to impair immune responses, while incomplete immunization reduces protection against vaccine-preventable infections and their complications.[5,6,7] These factors remain important and modifiable determinants of childhood pneumonia.

In Indonesia, pneumonia continues to pose a significant public health challenge among children under five years of age. National health data indicate that pneumonia accounts for a substantial proportion of child mortality, while case detection coverage remains below national targets.[8] Regional data further show that pneumonia among toddlers continues to be reported annually in South Sulawesi, indicating persistent disease burden despite ongoing prevention efforts.[9] However, studies that simultaneously examine nutritional status and basic immunization in relation to pneumonia among toddlers in hospital-based settings in eastern Indonesia remain limited.

Given the continued burden of pneumonia and the preventable nature of its key risk factors, locally generated evidence is needed to strengthen integrated prevention strategies. Therefore, this study aimed to analyze the relationship between nutritional status and basic immunization status with the incidence of pneumonia among children aged 1–5 years at RSUD Labuang Baji, Makassar City.

METHOD

Study design

This study employed a quantitative research design and was analyzed using an analytic observational approach with a cross-sectional design. The research instrument consisted of secondary data obtained from medical records.

The study was conducted at RSUD Labuang Baji, Makassar, using hospitalization records from 2020–2022.

Population and sample

The study population consisted of 1,196 hospitalized pediatric patients aged 1–5 years at RSUD Labuang Baji during the period 2020–2022. A total of 92 respondents were included in the study. The inclusion criteria were hospitalized toddlers aged 1–5 years at RSUD Labuang Baji during 2020–2022 with complete medical record data. The exclusion criterion was toddlers with a history of low birth weight (LBW).

Samples were selected using an accidental sampling method, as this study utilized retrospective secondary data obtained from hospital medical records. This method was chosen because the availability of data depended on the accessibility and completeness of medical records during the study period. Accidental sampling allowed the researchers to efficiently include all eligible hospitalized pediatric patients aged 1–5 years who met the inclusion criteria and had complete medical record data, thereby minimizing data loss related to incomplete records.

[Author confirmation required: the abstract reports purposive sampling, whereas the methods report accidental sampling. Confirm the sampling technique and provide the sample-size calculation or justification.]

Data collection

Secondary data were obtained from hospital medical records. The recorded variables included patient characteristics, nutritional status, basic immunization history, and pneumonia diagnosis.

[Author confirmation required: provide the nutritional assessment index and cutoffs, the definition of complete basic immunization, the pneumonia diagnostic criteria, and the data-extraction period.]

Data analysis

Data were processed using SPSS software and analyzed using the chi-square test.

[Author confirmation required: the abstract additionally reports the Kolmogorov–Smirnov test. Confirm the tests used, the SPSS version, and the statistical significance level.]

Ethical statement

This study received ethical approval from the Health Research Ethics Committee of UIN Alauddin Makassar (Approval No. E.038/KEPK/FKIK/I/2024).

[Author confirmation required: specify whether informed consent was obtained or waived for this retrospective medical-record study.]

RESULTS

Univariate analysis

Table 1 shows the distribution of patient characteristics among toddlers aged 1–5 years. Most respondents were aged 12–36 months (58.^{7}%), and more than half were female (53.^{3}%). The majority of respondents were Muslim (94.^{6}%) and all were biological children (100%). Most patients had no previous history of hospitalization (97.^{8}%). Regarding parents' occupation, the largest proportion worked as entrepreneurs (33.^{7}%), followed by private employees (27.^{2}%) and housewives (21.^{7}%).

Table 1. Distribution of patient characteristics

Characteristics	Frequency (N)	Percentage (%)
Age		
12–36 months	54	58.7
37–60 months	38	41.3
Sex		
Male	43	46.7
Female	49	53.3
Religion		
Islam	87	94.6
Christian	5	5.4
Family status		
Biological child	92	100.0
Adopted child	0	0.0
History of hospitalization		
Yes	2	2.2
No	90	97.8
Parents' occupation		
Housewife	20	21.7

Characteristics	Frequency (N)	Percentage (%)
Civil servant	15	16.3
Entrepreneur	31	33.7
Private employee	25	27.2
Military/Police	1	1.1
Total	92	100.0

Table 2 shows the distribution of the study variables among the respondents. Half of the children were diagnosed with pneumonia (50.0%), while the remaining half were non-pneumonia cases (50.0%). These conditions were predominantly observed in toddlers aged 12–36 months, which represented the largest age group of the study population as shown in Table 1. Regarding nutritional status, underweight was predominantly observed in toddlers aged 12–36 months, accounting for the highest proportion of respondents (57.6%), followed by normal nutritional status (33.7%) and overweight (8.7%). The majority of respondents had complete basic immunization (80.4%), whereas 19.6% had incomplete immunization.

Table 2. Distribution of study variables

Variable	Frequency (N)	Percentage (%)
Disease diagnosis		
Pneumonia	46	50.0
Non-pneumonia	46	50.0
Nutritional status		
Very underweight	0	0.0
Underweight	53	57.6
Normal	31	33.7
Overweight	8	8.7
Basic immunization history		
Incomplete	18	19.6
Complete	74	80.4
Total	92	100.0

Bivariate analysis

Table 3 shows the association between nutritional status and pneumonia among children aged 1–5 years. Pneumonia was more frequently observed in underweight children (69.8%) compared to those with normal nutritional status (19.4%) and overweight (37.5%). Nutritional status and pneumonia diagnosis were assessed during the same hospitalization period, reflecting conditions at the time of admission. Statistical analysis using the chi-square test demonstrated a significant association between nutritional status and pneumonia ($p < 0.001$).

Table 3. Association between nutritional status and pneumonia

Nutritional status	Pneumonia N	Pneumonia %	Non-pneumonia N	Non-pneumonia %	p-value
Underweight	37	69.8	16	30.2	<0.001
Normal	6	19.4	25	80.6	
Overweight	3	37.5	5	62.5	
Total	46	100.0	46	100.0	

Percentages in category rows are within nutritional-status groups; total-row percentages are within diagnostic columns.

Table 4 demonstrates the association between basic immunization status and pneumonia among children aged 1–5 years. A higher proportion of pneumonia cases was observed among children with incomplete immunization (72.^{2}%) compared to those with complete immunization (44.^{6}%). Immunization status was assessed based on immunization history recorded in the medical records, while pneumonia diagnosis reflected the condition at the time of hospitalization. Both variables were evaluated concurrently due to the cross-sectional study design; therefore, a specific time interval between immunization completion and pneumonia diagnosis could not be determined. Chi-square analysis indicated a statistically significant association between immunization status and pneumonia ($p = 0.035$).

Table 4. Association between basic immunization status and pneumonia

Immunization history	Pneumonia N	Pneumonia %	Non-pneumonia N	Non-pneumonia %	p-value
Incomplete	13	72.2	5	27.8	0.035
Complete	33	44.6	41	55.4	
Total	46	100.0	46	100.0	

Percentages in category rows are within immunization groups; total-row percentages are within diagnostic columns.

DISCUSSION

The findings of this study demonstrate a statistically significant association between nutritional status and the incidence of pneumonia among toddlers. A large proportion of pneumonia cases occurred in children with poor nutritional status, and statistical analysis confirmed that nutritional status was significantly related to pneumonia incidence ($p < 0.^{05}$). This finding indicates that undernutrition remains an important risk factor for pneumonia in early childhood.

From a biological perspective, poor nutritional status compromises immune function by reducing antibody production, impairing cell-mediated immunity, and weakening mucosal defense mechanisms. These conditions increase a child's vulnerability to respiratory infections, including pneumonia.[10,11] As a result, malnourished children are more susceptible to infection and may experience more severe disease outcomes.

The results of this study are consistent with previous research conducted in Indonesia, which reported a higher incidence of pneumonia among toddlers with poor nutritional status.[12–14] Similar findings have also been reported in international studies, indicating that undernutrition significantly increases both the risk and severity of childhood pneumonia.[15] These consistent results emphasize the importance of improving nutritional status as a core component of pneumonia prevention strategies among children under five years of age.

This study also found a statistically significant association between basic immunization status and the incidence of pneumonia among toddlers. Children with incomplete immunization were more likely to experience pneumonia compared to those who had received complete basic immunization, highlighting the protective role of vaccination against infectious diseases.

Immunization enhances immune protection by inducing specific immunity that can prevent infection or reduce disease severity. Several vaccines included in the basic immunization schedule, such as measles and DPT, contribute to pneumonia prevention either directly or indirectly by preventing complications of vaccine-

preventable diseases.[16,17] Incomplete immunization leaves children more vulnerable to respiratory infections and their complications.

The findings of this study are in line with previous studies reporting a significant association between incomplete immunization and increased risk of pneumonia among children under five years of age.[18,19,20] A recent systematic review further supports that strengthening routine immunization coverage remains one of the most effective public health interventions for reducing pneumonia-related morbidity and mortality in children.[21]

CONCLUSION

This study concludes that nutritional status and immunization status are significantly associated with pneumonia among hospitalized children aged 1–5 years at RSUD Labuang Baji.

LIST OF ABBREVIATIONS

WHO: World Health Organization; LBW: Low birth weight; SPSS: Statistical Package for the Social Sciences; RSUD: Regional General Hospital; UIN: State Islamic University.

ETHICAL APPROVAL

Approved by the Health Research Ethics Committee of UIN Alauddin Makassar, Approval No. E.038/KEPK/FKIK/I/2024.

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