RELATIONSHIP BETWEEN VITAMIN A DEFICIENCY AND PNEUMONIA INCIDENCE OF CHILDREN UNDER FIVE YEARS OF AGE IN WEST JAVA

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ABSTRACT

Background: The leading cause of mortality in children under five years of age is acute lower respiratory tract infections, especially bronchiolitis and pneumonia. Vitamin A supplement has been studied as a potential intervention to decrease severity and prevent acute lower respiratory tract infections from subsequent episodes. This study aimed to determine the relationship between vitamin A deficiency and pneumonia incidence of children under five years of age in West Java.
Subjects and Method: A cross-sectional study was conducted using the secondary data from Indonesian Demographic and Health Survey, 2017 in West Java. A sample of 594 toddlers under 5 years of age was obtained for this study. The dependent variable was pneumonia. The independent variable was Vitamin A intake. The data were collected using questionnaires. The data were analyzed by chi-square.
Results: As many as 38.6% children under five years of age did not get Vitamin A supplement. 26.8% of children suffered pneumonia. Inadequate Vitamin A intake increased the risk of pneumonia in children under five years of age (OR= 1.011, 95% CI 0.690 to 1.481; p= 1.000).
Conclusion: Inadequate Vitamin A intake increases the risk of pneumonia in children under five years of age, but it is not statistically significant.

Keywords: Vitamin A deficiency, pneumonia, prevention, under five years of age, children

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BACKGROUND

Pneumonia is an inflammation of the respiratory tract caused by infection to the lung tissue (alveoli cavity). It causes a reduced lungs function to exchange oxygen (O_2) and carbon dioxide (CO_2) into the bloodstream. Pneumonia is caused by infection with the bacteria *Streptococcus pneumonia* and *Haemophilus Influenzae type* b (Hib).

S*yncytial* virus is the most common in pneumonia. The virus *Pneumocystis jireveci* pneumonia occurs in infants infected with HIV and fungal (Histoplasma, Blastomyces, and Coccidioides). Signs and symptoms of pneumonia, including coughing, difficulty breathing or tachypnea with or without retraction of the ribs (WHO, 2020; Mahdi, 2008).

Globally pneumonia is called "The Forgotten Killer of Children". Pneumonia is one of the causes of morbidity and mortality in children under five years of age. High mortality rates of pneumonia occur in developing countries due to inadequate healthcare facilities (WHO, 2006).

WHO data in 2017 showed that pneumonia is still high in children under five years of age in several countries such as the Sahara-Africa country with 1,023 cases per year, 702 cases in South Asia, and 56% in Southeast Asian countries. The number of pneumonia cases in Indonesia until 2017 was high, around 511,434 (51.19%) cases (Minis-

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try of Health RI, 2018). West Java Province data showed that the number of pneumonia under five (Ministry of Health, 2017; Riskesdas, 2013; Bogor Health Office, 2018).

Vitamin A deficiency in children is still a public health problem in several developing countries, including Indonesia. The provision of vitamin A to children is still very low in Indonesia, reaching 90.1%. Vitamin A plays a very important role as an adequate food supply and healing for the bacterial infected tracheobronchial epithelial cells. Vitamin A is an important lung tissue healing process in pneumonia.

Children who suffer from pneumonia will be at risk of Vitamin A deficiency due to pneumonia. The reasons were pneumonia infection causes increased excretion of vitamin A in the urine, inadequate absorption of vitamin A in the body during the infection process, systemic stress occurs causing an increase in Vitamin A consumption, homeostasis disorders, impaired immunity, and keratinization in the child's respiratory system (Fawzi et al., 1998). This study aimed to determine the relationship of vitamin A administration with pneumonia in children under five years of age in West Java Province.

SUBJECTS AND METHOD

1. Study Design

A cross-sectional study was conducted using the secondary data from Indonesian Demographic and Health Survey, 2017 in West Java.

in 2016 was around 174,612 cases in children

The design of this study was a*cross-sectional study*. The data used are sourced from the 2017 Indonesian Demographic and Health Survey data. The data were collected using questionnaires. The data were analyzed by chi-square.

2. Population and Sample

A sample of 594 toddlers under five years of age was obtained for this study.

3. Study Variables

The dependent variable was pneumonia. The independent variable was Vitamin A intake.

4. Data Analysis

Univariate analysis was used to see the distribution of each variable in frequency and percentage. The data were collected using questionnaires. Bivariate analysis was conducted using chi-square.

RESULTS

1. Sample Characteristics

Table 1 showed the description of the sample characteristics of children under five included age, birth weight, exclusive breastfeeding, and administration of vitamin A. the total of 567 children under five; the majority did not experience pneumonia (73%). The majority of children under five were <3 years old (36%). Toddlers mostly had birth weight ≥2500 grams (90.0%), exclusive breastfeeding (65%), and given vitamin A (61%).

Table 1. Sample Characteristics (categorical data)

Characteristics	Categories	Frequency (n)	Percentage (%)
Age (years)	<3	206	36
	≥3	361	64
Birth weight (grams)	<2500	55	10
	≥2500	512	90
Exclusive breastfeeding	No	201	35
	Yes	366	65
Vitamin A supplement	No	219	39
	Yes	348	61
Incidence of Pneumonia	Yes	152	27
	No	415	73

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2. Bivariate Analysis

Table 2 showed that 93 out of 348 children under five were given vitamin A and had pneumonia (27%). 59 out of 219 children under five who were not given vitamin A had pneumonia (27%). Children under five years of age who were not given Vitamin A increased the risk of pneumonia, but it was not statistically significant (OR= 1.01; 95% CI= 0.69 to 1.48; p= 1.000).

Table 2. Relationship between vitamin A supplement and pneumonia

Variable	Pneumonia				OR	95% CI		p
	Pneumonia		Not Pneumonia					
	n	%	n	%		Lower Limit	Upper Limit	
Not given Vitamin A	59	27.0	160	73.0	1.01	0.69	1.48	1.000
Given Vitamin A	93	27.0	255	73.0				

DISCUSSION

Giving vitamin A to children aged between 6 months to 1 year must be given 2 times a year, while children aged 15 years are given vitamin A once a year (WHO, 2020). Children who are not given vitamin A can cause Vitamin A deficiency. Vitamin A deficiency is caused by inadequate Vitamin A absorption and the disruption in carotene formation to vitamin A.

The study Reyes (1997) stated that children aged 2 months had a risk of pneumonia 3.44 times than children aged 6 months (Fawzi, et al., 1998; Gary, 2015). Tian et al. (2020) study regarding neonatal Vitamin A supplementation against *Streptococcus pneumonia* stated that the development of asthma can be inhibited by vitamin A.

Streptococcus pneumonia can inhibit serum vitamin A resulting in the deficiency of vitamin A in serum and lungs. The study conducted in Tanzania also stated that giving vitamin A can significantly reduce the risk of death from gastrointestinal disease and respiratory complications in children under five suffering from measles by increasing humoral and cellular immunity (Fawzi, et al., 1998; Coutsoudis).

Tarigan (2020) study in Regional General Hospital (RSUD) in the city of Padang Sidimpuan showed no significant relationship between toddlers who received Vitamin A and the incidence of pneumonia.

Many factors cause insufficient intake Vitamin A in children, including the mothers and healthcare office representatives or representatives of community members. The study in Puskesmas Tapung Hilir 1, Kampar Regency showed a significant relationship between the role of cadres and the provision of vitamin A to children under five at the Posyandu Desa Beringin Lestari.

Therefore, cadres also had an important role in giving vitamin A. Cadres are representatives of the community, one of whose jobs are to carry out Family Business Nutrition Improvement tasks and motivate mothers to come to posyandu (Virgo, 2020).

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