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The Relationship between Nutritional Status and Degree of Pneumonia in Toddlers at Universitas Kristen Indonesia General Hospital

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Article Info:

Abstract

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Pneumonia is an acute respiratory infection that majorly causes the death of children in the world, especially in developing countries. Malnourished is a risk factor for pneumonia in children under five years. This study aims to determine the association between nutritional status and pneumonia severity in children under five years in the Universitas Kristen Indonesia General Hospital. The design of this study was an analytical cross-sectional. The data was collected from December 2016 – to January 2017 in central to the medical record of UKI General Hospital. The subject was all infants hospitalized with pneumonia from 2013 to 2015. The indicator used for nutritional status was based on weight for height according to WHO 2007 chart. Pneumonia was found most in 13 – 24 months (36,6%). Thirteen of 82 children with normal nutritional status and 24/82 children with undernutrition had severe pneumonia (p = 0,025). Undernutrition status was significantly associated with the severity of pneumonia.

Keywords: nutritional status, the severity of pneumonia, children under five years

INTRODUCTION

The goal of development in the health sector is to improve the health status of the community, and for this reason, various public health service efforts are carried out. Health service efforts are every activity to maintain and improve health carried out by the government and the community. Health care includes both curative and rehabilitative aspects. Meanwhile, health improvement has preventive and promotive aspects. Acute Respiratory Infection (ARI) is one of the most common causes of death in children in developing countries. Almost all deaths due to ARI in children under five are caused by acute lower respiratory tract infections, the most common being pneumonia [1; 2; 3].

Based on WHO/UNICEF data in 2006 in "Pneumonia: The Forgotten Killer of Children," Indonesia is ranked 6th for pneumonia in children under five, with the number of sufferers reaching 6 million people. It is estimated that about half of the total death cases in children suffering from pneumonia in the world are caused by pneumococcal bacteria [4]. Pneumonia is an inflammation of the lung parenchyma from the terminal bronchioles, which includes the respiratory bronchioles and alveoli, and causes consolidation of lung tissue and local gas exchange disorders [5].

Pneumonia can be classified into two forms based on the place of infection, namely Community-Acquired Pneumonia (CAP) which often occurs in the community, and Hospital Acquired Pneumonia (HAP) or hospital-acquired nosocomial Pneumonia. Apart from being different in the location where the infection occurs, the two forms of pneumonia also differ in the spectrum of etiology, clinical features, underlying disease or comorbidities, and prognosis (more complex in HAP). According to its degree, pneumonia can be classified into non-pneumonia, pneumonia, and severe based on clinical symptoms [6].

The bacterium that causes Pneumonia, Streptococcus pneumonia, is a normal flora in the healthy human esophagus. However, when the immune system decreases, caused by old age, nutritional problems, or health problems, the bacteria will multiply immediately after infection. The infection can quickly spread throughout the body through the bloodstream. Conditions in individuals generally cause symptoms, namely high fever, shortness of breath, sweating, and a rapidly increasing heart rate. As a result, lips and nails can turn blue because the body lacks oxygen intake. Even in severe cases, patients will show symptoms of chills, green mucus when coughing, and chest pain [5].

The risk always factors present (definite risk factors) in pneumonia include malnutrition, low birth weight, not getting breast milk, indoor air pollution, and dense settlements [7]. Toddlers with malnutrition and poor nutrition increase the risk of pneumonia in toddlers [8]. In under-nourished children

under five, the body's defense system decreases so that they are susceptible to infection [9]. Malnutrition and malnutrition are the statuses of a person's condition who lacks nutrition or whose nutrition is below average, and malnutrition lacks nutritional materials such as protein, carbohydrates, fats, and vitamins needed by the body [0].

Malnutrition usually occurs in children under 5 (five) years or toddlers. Malnutrition is the most severe form of the process of chronic malnutrition. Toddlers aged 12-59 months are an age group that is prone to health and nutrition problems. At this age, their needs increase, while they cannot ask for and find food on their own and often at this age are no longer cared for, and the management is left to others so that the risk of malnutrition will be even greater. Children who are malnourished will experience a decrease in body resistance so that children are susceptible to infectious diseases [11].

Based on the background description, pneumonia is one of the public health problems and is one of the leading causes of death. Therefore, the researcher will conduct a study to see whether there is a relationship between nutritional status and the degree of pneumonia in children under five at Universitas Kristen Indonesia (UKI) General Hospital from 2013 to 2015. The purpose of the study was to see the profile of pneumonia in children under five who were treated at the UKI General Hospital from 2013 to 2015.

LITERATURE REVIEW

Acute lower respiratory tract infections (ISNBA) cause high morbidity and mortality in children. Pneumonia is an inflammation of the lung parenchyma, distal to the terminal bronchioles, including the respiratory bronchioles and alveoli, and causes consolidation of lung tissue and local gas exchange disturbances [12]. Pneumonia based on transmission is classified as community-acquired pneumonia (information from the community) and nosocomial infection (Pneumonia that occurs in patients admitted to hospital/hospital-acquired pneumonia and thus exposed to various groups of causative agents in addition to medical conditions or medical interventions that can cause pneumonia). Predispose to specific infection pathways). An additional subtype of pneumonia is aspiration pneumonia, in which oral flora (including anaerobic bacteria) is aspirated into the lungs, and this condition often results from loss of consciousness, neuromuscular disease, and/or seizures [13]. The are some pneumonia classifications based on clinical and epidemiological, and they are community pneumonia, nosocomial pneumonia, aspiration pneumonia, and pneumonia in immunocompromised patients.

Based on the pattern of management of patients with ARI in children under five, the classification of pneumonia is divided into groups aged less than two months and ages two months to 5 years, as follows: severe pneumonia and non-pneumonia (aged less than two months), and severe Pneumonia, Pneumonia, and Pneumonia. not pneumonia (aged two months to 5 years. Clinical classification of children aged two months to 5 years who have symptoms of cough or difficulty breathing [3; 14].

Pneumonia can be caused by bacteria, viruses, microplasma (intermediate forms of bacteria and viruses), and protozoa [5]. Many risk factors can cause pneumonia in toddlers, including risk factors that occur in toddlers and environmental factors. The airways that deliver air to the lungs are the nose, pharynx, larynx, trachea, bronchi, and bronchioles. A ciliated mucous membrane lines the respiratory tract from the nose to the bronchioles. When air enters the nasal cavity, it is filtered, warmed, and humidified. Under normal circumstances, the lower respiratory tract from the pharynx to the alveoli is always sterile. There are several lung defense mechanisms:

filtration of particles in the nose, prevention of aspiration by the epiglottic reflex, cough reflex, purification system by the mucociliary layer, and immune response. If this lung defense mechanism is disturbed, foreign particles or organisms can enter or infect the upper to lower respiratory tract, and pneumonia is more likely [15].

There are different routes that infectious agents take to get to the lungs and cause pneumonia. This contagious agent most often enters the lungs by inhalation. The most common cause of respiratory tract infections is a virus. Primary viral infection causes the mucosa to swell and produce much mucus so that bacteria can overgrow in the mucosa. Pneumonia usually begins in the right lower lobe, right middle, or lower left, because the gravitational force of these areas is most likely to carry aspirated upper airway secretions during sleep. The cough reflex, a clinical symptom of pneumonia, is stimulated by materials that pass through the barriers, namely the glottis and larynx, which protect the lower respiratory tract [16].

Certain bacteria can show certain pathological features compared to other bacteria. Streptococcus pneumoniae infection usually manifests as patches of consolidation evenly throughout the lung fields (bronchopneumonia), and in adolescents, it can be in the form of consolidation in one lobe (lobar pneumonia). Pneumatoceles or small abscesses are often caused by Staphylococcus aureus in neonates because Staphylococcus aureus produces a variety of toxins and enzymes such as hemolysin leukocidin, staphylokinase, and coagulase. These toxins and enzymes cause hemorrhagic necrosis and cavitation. Coagulase interacts with plasma factors and produces an active ingredient that converts fibrinogen to fibrin, resulting in a fibrinopurulent exudate. There is a correlation between coagulase production and bacterial virulence. Staphylococci that do not produce coagulase rarely cause severe disease. Pneumatoceles may persist for months but usually do not require further therapy [6].

Nutritional status is a measure of the condition of a person's body which can be seen from the food consumed and the use of nutrients in the body. Nutritional status is divided into undernutrition status, regular nutrition, and overnutrition [9]. Normal dietary status is a measure of nutritional status in which there is a balance between the amount of energy that enters the body and the energy released from outside the body according to individual needs. The point that enters the body can come from carbohydrates, proteins, fats, and other nutrients. Normal nutritional status is a condition that is highly desired by everyone [17]. Undernutrition is a person's healthy state where the amount of energy that enters is less than the energy expended. It can happen because the amount of energy that enters is less than the recommended individual needs.

Overnutrition is a person's nutritional state in which the amount of energy that enters the body is greater than the amount of energy expended. It happens because the amount of energy that enters exceeds the recommended energy adequacy for a person; eventually, excess nutrients are stored in the form of fat that can cause a person to become fat [18]. Malnutrition is a condition that occurs due to not fulfilling food intake. Malnutrition can occur because a person experiences a deficiency of one or more nutrients in the body [9]. The consequences of malnutrition include decreased immunity (susceptibility to infectious diseases), disturbances in growth and development, lack of energy which can reduce labor productivity, and difficulty in receiving education and knowledge about nutrition [19]. Malnutrition is one of the nutritional problems faced by developing countries. It can happen due to low levels of education, lack of nutrition knowledge, and behavior that is not yet aware of nutritional

status. Examples of malnutrition problems include PED (Protein Energy Deficiency), IDD (Iodine Deficiency Disorders), and Iron Nutrient Anemia (INA) [20; 21; 22]. Factors related to nutritional status are age, eating frequency, energy intake, protein intake, carbohydrate intake, fat intake, education level, income, and knowledge [23; 24; 25; 26].

There are several ways to assess the nutritional status of community groups. One of them is by measuring the human body, known as anthropometry. In evaluating the nutritional status, anthropometry is presented in the form of an index associated with other variables. The variables are as follows: age, weight, and height.

RESEARCH METHOD

This research is an analytical study with a cross-sectional method to see the relationship between nutritional status and the degree of pneumonia in children under five at the UKI General Hospital from 2013 to 2015. Medical record sampling

was carried out in the medical records section of the UKI General Hospital. From December 2016 to January 2017. This study used research subjects in the form of secondary data obtained from the medical records of all under-five patients with pneumonia hospitalized at the UKI General Hospital from 2013 to 2015. With the following criteria: a) Pneumonia patients under five who were treated at the UKI General Hospital from 2013 to 2015; b) Pneumonia patients with incomplete status; and c) Pneumonia patients with a history of heart defects or other congenital diseases.

RESULT AND DISCUSSION

This research was conducted in 2016 in the Medical Record at the UKI General Hospital. From the medical record search results, it was found that the number of under-five patients with pneumonia was 130 patients for the period 2013 - 2015, but those who met the research inclusion criteria were as many as 82 patients. Patient characteristics can be seen in table 1.

Table 1: Patient Characteristics

Characteristics	Number	%
Gender		
Male	38	46.3
Female	44	53.7
Age Group		
0 – 12 Months	28	34.1
13 – 24 Months	30	36.6
25 – 36 Months	13	15.9
37 – 48 Months	5	6.1
49 – 60 Months	6	7.3
Nutritional status		
Good Nutrition	40	48.8
Malnutrition	42	51.2
Pneumonia Degree		
Pneumonia	45	54.9
Severe Pneumonia	37	45.1

Based on the table above, out of 82 toddlers, 38 toddlers (46.3%) are male, and 44 toddlers (53.7%) are female. The age group in this study was divided into five age groups. Of the 82 toddlers, 28 toddlers (34.1%) were in the 0-12-month age group, 30 toddlers (36.6%) were in the 13-24-month age group, as many as 13 toddlers (15.9%) were in the age group of 25-36 months, as many as five toddlers (6.1%) were in the age group of 37-48 months, and as many as six toddlers (7.3%) were in the age group 49-60 months. Nutritional status in this study was divided into two groups, namely good nutrition and poor nutrition. In this study, as many as 40 toddlers (48.8%) had good nutritional status, and 42 toddlers (51.2%) had poor dietary quality. Based on the degree of pneumonia, 45 children under five (54.9%) had pneumonia, and 37 children (45.1%) had severe pneumonia.

Table 2: Results of Cross Tabulation between Nutritional Status and Degree of Pneumonia in Toddlers with Pneumonia at UKI General Hospital

		Derajat Pneumonia		Total	P
		Pneumonia	Severe Pneumonia		
Nutritional status	Good	27 (32.2%)	13(15.9%)	40(48.8%)	
	Poor	18(22%)	24(29.3%)	42(51.2%)	0,025
Total		45(54.9%)	37(45.1%)	82(100%)	

Based on the table above, from 82 toddlers, 27 toddlers (32.9%) had good nutrition and had pneumonia, 13 toddlers (15.9%) had good food and experienced Severe Pneumonia, and 18 toddlers (22.0%) had poor nutrition. They had pneumonia, and as many as 24 children under five (29.3%) had poor nutrition and experienced Severe Pneumonia.

There were 44 female pneumonia sufferers, while 38 male patients had pneumonia. Immune status is not influenced by gender but by genetics, age, metabolic, environmental and nutritional, anatomical, physiological, and microbiological factors. In line with the research of Domili et al., stated that there was no relationship between gender and the incidence of pneumonia in children under five [27]. Most of the pneumonia sufferers in toddlers are in the age group of 13-24 months, and this is in line with research results which found that the most pneumonia sufferers were at the age of 12 to 35 months [28]. Another study stated that the highest age for children with pneumonia was under two years or 24 months [29]. Age is one of the risks associated with the incidence of pneumonia. Developing pneumonia is more significant in children under two years of age [16]. The smaller the period, the more susceptible to infection because the immune system in children aged one to five years is still immature. Susceptibility to infection in infants is also lower than in older children.

This study found that 40 toddlers (48.8%) had good nutrition and 42 toddlers (51.2%) had poor nutrition. Of the 82 children under five, 45 children (54.9%) had pneumonia, and 37 children (45.1%) had Severe Pneumonia. Nutritional status is a measure of the condition of a person's body which can be seen from the food consumed and the use of nutrients in the body. Nutritional status is divided into lower nutritional status, normal nutrition, and overnutrition [13]. A good dietary status will increase the body's strong resistance so that the body will not be susceptible to various types of diseases, especially infectious diseases. Children with good nutritional status will also be good at fighting the dangers of infection.

In contrast to a lack of or poor nutritional status, they will have a low immune state so they will be susceptible to infectious diseases, especially pneumonia. Lack of nutritional status will also cause the condition of the immune system to decrease so that various diseases can arise quickly. The body's resistance will fall if the healthy health condition decreases. A reciprocal relationship between poor or poor nutritional status and infectious diseases is a cause-effect relationship.

Based on table 2, it was found that 40 toddlers who had good nutrition were 27 toddlers experiencing pneumonia and 13 toddlers experiencing Severe Pneumonia. Of 42 toddlers who have poor nutrition, as many as 18 toddlers are experiencing pneumonia, and 24 toddlers are experiencing Severe Pneumonia. Nutritional status is a significant factor in the onset of pneumonia. Dietary supplies strongly influence immunological ability in the body, so a state of nutritional deficiency will increase susceptibility and severity of infection [7]. There is a relationship between nutritional status and the incidence of pneumonia in children under five [27]. From the results of this study, toddlers with low dietary status/are more or less at risk of developing pneumonia compared to toddlers with average or good nutritional status. The importance of providing nutrition is necessary for the development and growth of cells so that the body can defend itself from pneumonia.

Poor nutrition will make toddlers more susceptible to infections, such as pneumonia. The results of this study also follow the theory that states that the nutritional status of toddlers affects the body's resistance to bacterial and viral infections that can cause pneumonia. Toddlers who experience poor dietary rates (less and inadequate) experience ARI. It follows the theory that there is a very close relationship between infectious diseases (bacteria, viruses, parasites) and poor and poor nutrition. Nutritional status accelerates malnutrition, thereby accelerating the occurrence of ARI [30]. More children with pneumonia in 2008 – 2012 than Severe Pneumonia. Severe pneumonia in toddlers is characterized by epigastric, intercostal, and suprasternal retractions and in toddlers with poor nutrition.

Poor nutritional status can cause immune system disorders. The cells contained in the immune system are found in specific tissues and organs, namely lymphoid tissue as immune tissue. The thymus is one of the primary lymphoid organs. T cells, produced by the thymus in toddlers, play a significant role in the body's defense mechanism against foreign objects. The thymus organ is susceptible to malnutrition because a lack of protein can cause thymus atrophy, and almost all of the body's defense mechanisms deteriorate in a state of malnutrition [31]. Literature research shows a relationship between nutritional status and the degree of pneumonia in children under five. It strengthens the results of this study. Toddlers who are well nourished can get pneumonia because the risk factors for pneumonia are not only nutritional status. Other risk factors for pneumonia in children under five are immunization status, not breastfeeding, the child's age, and environmental factors. Breast milk is an early protector and prevents infectious diseases. Chronic illness, iatrogenic, trauma to anesthesia, aspiration, and inadequate antibiotic treatment contribute to an increased risk of pneumonia.

CONCLUSION

There is a relationship between nutritional status and the degree of pneumonia in children under five at the UKI General Hospital. The highest incidence of pneumonia in under-five girls was 44 patients (53.7%), and in the age group 13-24 months, as many as 30 patients (36.6%). The nutritional status of under-five patients with Pneumonia at UKI General Hospital based on the WHO BB/TB curve, of 82 patients, 42 patients (51%) had poor nutritional status. The degree of pneumonia in under-five patients at UKI General Hospital was obtained as many as 45 patients (54.9%) had pneumonia. Therefore, it is highly expected that health agencies need to hold programmed counseling to the community about nutrition in toddlers and the dangers of pneumonia in toddlers and pay attention to the completeness of medical record data. In addition, for people who have children, especially children under five years old, it is necessary to carry out routine checks to control and improve the health and nutrition of toddlers.

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