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Nutrition Status and Immunization as Determinant of Acute Respiratory Infection on Toddlers

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ABSTRACT

Acute Respiratory Infection (ARI) is one of infectious disease that is caused by micro bacteria or virus that can cause death to children in Indonesia in which the nutrition status and immunization become risk determinant factor. This research aimed to attain information about the nutrition status and immunization as a determinant of Acute Respiratory Infection (ARI) among toddlers (1-4 years old) in Bandung District, West Java, Indonesia. Analytical correlational survey was used in this research by using cross sectional scheme. Incidental sampling by having 94 respondents was used in this research. The data was analyzed by using univariate and bivariate along with Chi Square statistical test. The result showed that the nutrition status as a determinant of Acute Respiratory Infection (ARI) among toddlers with p-value 0.029, so Ho was rejected. Meanwhile, the status of immunization as a determinant of Acute Respiratory Infection (ARI) with p-value 0.005, so Ho was rejected. The nutrition status and immunization were determinant factors that caused Acute Respiratory Infection (ARI) among toddlers. Suggestion: health workers needed to improve preventive and promotive efforts in dealing with the demand of good nutrition status and the importance of complete immunization for infants so that toddlers were avoided from Acute Respiratory Infection (ARI), thus, they could grow well and normal.

Keywords: Nutrition status, Immunization, ARI, Toddlers

INTRODUCTION

Acute Respiratory Infection (ARI) is one of infectious disease that was caused by micro bacteria such as *Streptococcus pneumoniae, Mycoplasma pneumoniae, Chlamydia spp, Streptococcus pyogenes, Corynebacterium diphtheriae,* and respiratory viruses, along with Candida fungi[(1)]. ARI is divided into three groups, which are severe pneumonia, moderate pneumonia, and mild (no) pneumonia[(2)]. Riskesdas (Basic health research) conducted in 2007 reported that the death among toddlers in Indonesia reached 15.5%.

The prevalence of ARI among toddlers increases from time to time. According to Riskesdas[(3)], the prevalence of ARI for all ages reached 4.50%, while period prevalence ARI among toddlers reached 1.85%.[(3)] According to range of age, the highest rate of ARI was among 1-4 years old toddlers. The highest rate of ARI was found in five provinces which were East Nusa Tenggara 3.85%), Aceh (3.56%), Bangka Belitung Islands and West Sulawesi (3.48%), and Central Kalimantan (3.27%)[(4)].

The database of ARI according to Ministry of Health[(5)] in West Java, toddlers who suffer from ARI reached 197.654 with percentage of 24,73%. In West Java, the total of the disease in 2012 was estimated about 20.687. Bandung District was in the highest position for the prevalence of ARI, which was estimated about 320 thousands of toddlers from 3,2 million civilians were infected. It was also reported in 2010, Health Office in Bandung District found 21.929 cases with two death reported, in 2011 there were 22.371 cases with two death reported, in 2012 about 183.640 cases, and in 2013 with 144.366 cases[(5)].

There are so many factors which caused ARI among toddlers, such the their mother's education. According to Atira and Magatua[(3)], the mother's education was very influential against pneumonia cases. The same statement came from Anwar & Dhamayanti[(6)] who stated that age, sex, and physical environment, and individual aspect gave influence to pneumonia cases[(6)]. Besides those factors, the nutrition status and immunization could make ARI worse. Moreover, it was approprite with conducted research by Mading and Adyana[(7)] who stated that nutrition status and immunization could make infection got worse, including ARI. From this case, it could be

concluded that toddlers needed to get extra attention so that MDGs target in decreasing the death could be smoothly realized. Way to prevent ARI among toddlers could be done by improving the quality of nutrient and giving toddlers immunization along with the management of pneumonia prevention[3]. This research aimed to attain data about the nutrition status asnd immunization as a determinant factor of ARI among toddlers (1-4 years old)[7].

METHODS

This research was primary data analysis which used correlative analytic survey method by using cross sectional design based on theory of Notoatmodjo[8]. The research variables in this research were nutritional status, immunization, and Acute Respiratory Infection (ARI) among toddlers and the determinant factor of nutrition and immunization status toward ARI to the toddlers. The population of this research was all toddlers who went to Poly MTBS Hospital Cangkuang Bandung in 2017 with the total of 1.696 respondents. The research sample that was used in this research was based on formula of Sugiono[9] and it was obtained 94 respondents by using incidental sampling technique. Observation forms which were used as the instrument of this research, after being tested its validity, were used to collect data based on its variable. Descriptive analysis was conducted in this research in order to know the description of nutrition and immunization status as determinant factor of ARI on toddlers which was followed by observation Chi-square test. This research was conducted at Poly MBTS Cangkuang Hospital, Bandung in 2017.

RESULTS

The frequency distribution of ARI case toward 93 toddlers is explained in the table below.

Table 1. The distribution of ARI on toddlers (1-4 years old)

The Incidence of Pneumonia	Total of Toddlers	Percentage
Not infected by ARI	27	28.7
Infected by ARI	67	71.3
Total	94	100

Source: Secondary data at Poly MTBS Cangkuang Hospital, Bandung, 2017

Based on table 1, 67 toddlers (71.3%) among 94 toddlers (1-4 years old) were infected ARI, 7 toddlers (28.7%) were not infected ARI.

The frequency distribution of nutrition status is explained in the table below.

Table 2. The data of frequency distribution of nutrient status among toddlers (1-4 years old)

Nutrition Status	Frequency	Percentage
Malnutrition	0	0
Poor Nutrition	31	33.0
Good Nutrition	60	63.8
Over Nutrition	3	3.2
Total	94	100

Based on table 2, 60 toddlers (63.8%) among 94 toddlers who were observed were considered in good nutrition, 31 toddlers (33.0%) were considered in poor nutrition, and 3 toddlers (3.2%) was considered in over nutrition, while no toddler (0%) was considered in malnutrition.

The frequency distribution of immunization status on toddlers (1-4 years old) was explained in the table below.

Table 3. The distribution of immunization status on toddlers (1-4 years old)

Immunization Status	Frequency	Percentage
Incomplete Immunization	24	25.5
Complete Immunization	70	74.5
Total	94	100

Based on the univariate analysis in table 3, there were 94 toddlers had immunization, which the 70 toddlers (73.5%) had complete immunization and the 24 toddlers (25.5%) did not have complete immunization.

Based on the correlation between nutrition status and the incidence of Acute Respiratory Infection on toddlers that had been observed by using bivariate analysis to obtain percentage of frequency distribution, which was expained in the table 4 below.

Table 4. The correlation between nutrition status and incidence of acute respiratory infection on toddlers (1-4 years old)

Nutrition Status	The incidence of ARI				Total		P-value
	Not ARI		ARI				
	f	%	f	%	n	%	
Poor Nutrition	4	12.9	27	87.1	31	100	0.029
Good Nutrition	21	35.0	39	65.0	60	100	
Over Nutrition	2	66.7	1	33.3	3	100	
Total	27	28.7	67	71.3	94	100	

Based on the bivariate observation that was given in table 4, it could be seen the correlation between nutrition status and the incidence of Acute Respiratory Infection on toddlers (1-4 years old). There were 2 toddlers (66.7%) who were considered in over nutrition and they had not suffered ARI, 4 toddlers (12.9%) with poor nutrition and had suffered ARI, and 21 toddlers (35.0%) with good nutrition and had not suffered Acute Respiratory Infection of pneumonia. Moreover, there was 1 toddler (33%) with over nutrition and had suffered ARI, 27 toddlers (87.1%) with poor nutrition and had suffered ARI, and 39 toddlers (65.0%) with good nutrition and had suffered ARI.

Based on Chi square observation that was conducted in this research was obtained the table 3x2 with expected value 2 cells (33.3%), thus, Pearson Chi-Spuare observation was conducted with the result of p-value = 0.029 (<0.05) or $x^2_{counted}$ (7.054) > x^2_{table} (5.991) Df = (3-1)x(2-1) = 2 with significant degree 5%, hence, H_o was rejected. It meant that there was a significant correlation between nutrition status and the incidence of Acute Respiratory Infection on toddlers (1-4 years old).

The result of research showed the correlation between immunization and the incidence of Acute Respiratory Infection on toddlers that was explained in the table 5 below.

Table 5. The correlation between immunization status and incidence of acute respiratory infection on toddlers (1-4 years old)

Immunization	The Incidence of ARI				Total		P-Value
	Not ARI		ARI				
	f	%	f	%	n	%	
Incomplete	1	4.2	23	95.8	24	100	0.005
Complete	26	37.1	44	62.9	70	100	
Total	27	28.7	67	71.3	94	100	

Based on the data shown above in table 5, it could be seen that there was a correlation between immunization and the incidence of Acute Respiratory Infection on toddlers (1-4 years old). Among 94 respondents, 1 toddler (4.2%) did not have any complete immunization and had not suffered ARI, 26 toddlers (37.1%) were given complete immunization and had not suffered ARI. Moreover, 23 toddlers (95.8%) were given complete immunization and had suffered ARI, and 44 toddlers (62.9%) were given compete immunization and had suffered ARI.

Based on Chi square observation that was conducted in his research, it was obtained table 2x2 with no expected value, thus, continuity correction was conducted with the result of p value 0.005 (<0.05) or $x^2_{counting}$

(7.951) > x^2_{table} (3.841) based on Df = (2-1)x(2-1) = 1 with significance 5%. Hence, H_o was rejected. It meant that there was a significant correlation between immunization and the incidence of Acute Respiratory Infection on toddlers (1-4 years old).

DISCUSSION

Based on the results of this study, there were two determinant factors of incidence of Acute Respiratory Infection on toddlers (1-4 years old), namely nutrition and immunization status. The risk factor of ARI was more vulnerable for toddlers with poor nutrition rather than toddlers who suffered ARI with over nutrition[10]. It was also similar that the risk factor of ARI on toddlers who did not have any immunization was higher rather than those who did not have any complete immunization. While, among 1,696 respondents who went to Poly MTBS in Cangkuang Hospital Bandung, there were 4 toddlers (12.9%) with poor nutrition. It could show that the incidence of ARI on toddlers from year to year had increased more. The similar thing was reported by database of health in each province in Indonesia[5], it had been reported that toddlers who suffered ARI were 197.654 (24.73%). In 2012, the total of ARI incidence in East Java was estimated about 20.687. Bandung District was in the highest position for the prevalence of ARI, which was estimated about 320 thousands of toddlers, from 3.2 million civilians in each year, were infected. It was also reported in 2010, Health Office of Bandung District found 21.929 cases with two death reported, in 2011 there were 22.371 cases with two death reported, in 2012 about 183.640 cases, and in 2013 with 144.366 cases. It was reported by database of health in each province in Indonesia that ARI on toddlers from year to year had increased[11].

Besides, the finding of ARI case on toddlers in 1-4 years old underwent immune reducing or imperfect, thus, they were vulnerable to be infected by infectious disease, such as ARI case. Moreover, it was in line with Irianto's[12] who stated that younger children had bigger chance to be infected by ARI rather than older children. It was because they had weak immune. Meanwhile, according to Alsagaff [13], age gave more important influence toward ARI on toddlers and babies which they would give worse clinic image rather than the older one.

The factor determined to ARI case was the nutrition status. Nutrition was classified into 4 categories, which were malnutrition, poor nutrition, good nutrition, and over nutrition. This was derived from toddlers with good nutrition (63.8%), compared to toddlers with bad nutrition (33.0%), and toddlers with over nutrition (3.2%), and there was no toddler (0%) with malnutrition.

This showed that high rate for toddlers who had good nutrition was caused by the toddlers had good nutrition intake, thus, nutrition was fulfilled optimally based on the needs and the nutrients which were consumed was processed well by the body. This was in accordance with Almatsier's statement[14] that good nutrition or optimal nutrition was occurred if the body that gained nutrients which were used efficiently. Hence, it enabled physical growth, brain development, work ability, and general health.

According to research result that was obtained that low rate of toddlers who had poor nutrition were 31 toddlers with the percentage of 33,0%, even there was no toddler who was malnutrition and it was because the toddler did not consume food well, thus, the nutrition was not fulfilled optimally. This was in accordance with Almatsier's statement (2010) that nutrition status was occurred if the body had deficiency one or more essential nutrients, such as carbohydrate, protein, fat, vitamin, and mineral. Moreover, this theory was also in accordance with Arisman's opinion[14]. He stated that poor nutrition status reflected bad eating habits, thus, it was occurred lack of weight.

Lack of weight could influence health for toddlers who were developing because during the time, the toddlers needed good nutrition intake for supporting their needs. Hence, it was not occurred anything that could disrupt their health. The impact of poor nutrition according to Mitayani and Wiwi[15] that it caused disturbance of growth process, energy production, body defense, brain structure, brain function, and behavior.

The factor that influenced nutrition status for infants and toddlers that made their nutrition less was caused by low economic status. Thus, it influenced poor food supply and could influence nutrition intake that entered into the body. Less nutrition status was also influenced by lack of knowledge and poor behavior. Hence, it was occurred wrong dietary habit, did not control toddler's growth and development well, and did not control nutrition status continuously and also other factors, such as social factor, infection, health, and other factors.

This was supported by Mitayani and Wiwi's opinion[15] who stated that primary factor that influenced malnutrition/ poor nutrition was if person's food structure was either wrong quantity or wrong quality that was caused by lack of food supply, poor food distribution, poverty, ignorance, wrong dietary habis, and many more. Meanwhile, secondary factor involved all of the factors that caused the nutrients did not enter into body cells after the food was consumed.

Data regarding nutrition was obtained more information that there were 3 toddlers (3.2%) who had over nutrition and this was caused by the toddler consumed food in excess amount, thus, it was occurred fat accumulation in the body. However, this was appropriate with Supariasa, et.al's opinion[16] that over nutrition status was occurred if the body acquired excess nutrients.

Other risks as the cause of Acute Respiratory Infection (ISPA- Infeksi Saluran Pernafasan Akut) on the toddlers was immunization variable. Immunization was grouped into 2 categories, which were complete immunization and incomplete immunization. The result of this research showed that 70 toddlers were given immunization completely with percentage of 74.5%, meanwhile, 24 toddlers were not given immunization completely with percentage of 26,6%. This immunization was given to 0 month old until 9 months old infants that included HBO, BCG, DPT/HB1, DPT/HB2, DPT/HB3, polio 0, polio 1, polio 2, polio 3, polio 4, and last, measles.

Therefore, it showed that the toddlers who were given immunization completely were higher rather than the toddlers who were not given immunization completely. However, that was caused by giving immunization for toddlers aimed to give good immunity, hence, they would not be easier to be infected by certain disease and it could prevent morbidity rate, death, and disability which were caused by preventable diseases through immunization. Moreover, this was supported by Tanto et al's who stated that giving immunization was an artificial process of immunity induction, either vaccination or providing antibody that aimed at preventing disease.

Besides, the role of parents was very important in providing immunization because parents were the closest person and had responsibility to bring their children to health facility for being given immunization. This showed that knowledge and awareness for giving basic immunization in Public Health Center area of Cangkuang, Bandung District had been good enough. The parents realized that their children would get protection against diseases, such as Pulmonary tuberculosis, diphtheria, pertussis, tetanus, polio, hepatitis B and measles.

Furthermore, this result was in accordance with conducted research by Lisdianti, et.al that being given immunization was for giving immunity for infants or toddlers that was caused by disease that was often infected. Thus, it could reduce either morbility or mortality and could reduce disability that was as an impact of preventable disease through immunization (PD3I).

Giving immunization was also influenced by health worker's performance who gave immunization appropriate with the scope of complete immunization for creating welfare at Public Health Center area of Cangkuang, Bandung District, thus, it was not occurred something after immunization. This was in accordance with the goal of giving immunization based on Indonesian Ministry of Health, which was in order to reduce morbidity rate, death, and disability which were caused by preventable diseases through immunization (PD3I).

According to analysis result of contingency coefficient, it was obtained that the result was 0.264, which meant that the correlation between nutrition status and the incidence of Acute Respiratory Infection had medium level of close correlation. Besides, there was also negative correlation and it was assumed that there was confounding factor against the correlation between nutrition status and the incidence of pneumonia that caused the closeness between medium variable. However, this was appropriate with the data analysis on table 4.4 and it was also obtained that the toddlers who had good nutrition and suffered Acute Respiratory Infection resulted higher rather than toddlers who had poor nutrition and suffered Acute Respiratory Infection. Actually, toddlers who had good nutrition should not suffer Acute Respiratory Infection (ARI) because if toddler had good nutrition, the toddlers had immunity against infectious disease. This was inversely with the reality in the field. It was assumed that there were other factors that could make toddlers who had good nutrition suffered pneumonia. The other factors were host factor (age, sex, being given vitamin A capsule, being given exclusive breast milk), environment (house, dense occupancy, family member who had smoked cigarrette, forest fire smoke, domestic smoke), behavior factor, education factor (parents' education level), and economy factor.

However, there was a significant correlation with this research because among 31 toddlers who had poor nutrition mostly suffered ARI rather than they who did not suffer ARI. This was caused by the toddlers who had poor nutrition caused the body balance disturbed and it could trigger infection because when the person's body defense deceased, it impacted for the stronger pathogen growth. Furthermore, this was supported by Mitayani[15] who stated that the impact of malnutrition/ poor nutrition against body process depended on less nutrient. Malnutrition/ poor nutrition generally (less food in quantity and quality) caused a disturbance in the process of growth, energy production, body defense, brain function, and behavior.

This research result was in accordance with conducted research by Rahayu, et.al[17] that poor nutrition was as a risk factor that could cause infectious disease. This research result was in concurrence with conducted research by Sukmawati and Sri[18] who stated that there was a significant correlation between nutrition status and the incidence of Acute Respiratory Infection (ARI) to the toddlers. This research result showed that the handling of Acute Respiratory Infection was not only able to be done through medical treatment, but also it needed to be improved more and more regarding promotive and preventive efforts concerning with the importance of giving good nutrition for being reached good nutrition status[19].

CONCLUSION

The incidence of Acute Respiratory Infection (ARI) on toddlers based on secondary data that was obtained on health worker was 71.3%. According to the result of bivariate analysis test and Chi-Square, factor of nutrition status and immunization influenced against the incidence of Acute Respiratory Infection on the toddlers who suffered Acute Respiratory Infection.

In order to be able to control the incidence of Acute Respiratory Infection (ARI) on toddlers, the prevention and control of ARI could be done by fulfilling nutrients and giving immunization continuously in certain period.

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