

# Relationship between Nutritional Status and the Incidence of Anemia among Children Aged 6 Months - 3 Years

1<sup>st</sup> Retno Setyo Iswati  
PGRI Adi Buana University  
Surabaya, Indonesia  
retnosetyoiswati@gmail.com

2<sup>nd</sup> Desta Ayu Cahya Rosyida  
PGRI Adi Buana University  
Surabaya, Indonesia  
destaayucahyarosyida@yahoo.com

**Abstract**— Less nutritious foods that are and poor food variations can cause a lack of nutrients causing health problems, one of which is anemia. Anemia causes lack of oxygen intake to body tissues, especially brain tissue. Lack of oxygen to the brain tissue among under-five children can result in decreased cognitive function and it can inhibit growth and psychomotor development. Anemia in children can also interfere with the immune system so the children are susceptible to infectious diseases. To determine the relationship between nutritional status and the incidence of anemia among children aged 6 months - 3 years. This was an observational analytic study with cross sectional approach. The study population was children aged 6 months - 3 years amounting to 30 children. The sampling used total sampling technique. The variabel of age of nutritional status was divided into 2 groups, namely good nutrition and undernutrition. It was said to be good nutrition if the nutritional status was in  $-2SD$  up to  $2SD$  and undernutrition if the nutritional status was from  $-3SD$  to  $<-2SD$ . Furthermore, the variable of the incidence of anemia was divided into 2 groups, namely had anemia and did not have anemia. The child was said to had anemia if the hemoglobin level was  $<11$  gr% and the child was said to did not have anemia if the hemoglobin level was  $\geq 11$  gr%. The instrument used to determine the nutritional status was a Z-score table, while hemoglobin levels were measured using a haemometer using peripheral blood. Data analysis was performed using the Chi Square test. The results of analysis on the nutritional status showed that most of respondents namely 25 people (83.3%) had good nutritional status and 5 people had undernutrition status (16.7%), while the incidence of anemia showed that the majority of respondents were not anemic of 93.3% and 2 people were anemic (6.7%) Bivariate analysis showed that of all respondents with good nutritional status as many as 25 people, all were not anemic (83.3%); while of 5 people with undernutrition status, 3 people were not anemic (10%) and 2 people were anemic (6.7%),  $p=0.001 < \alpha=0.05$  which indicated that there was a significant relationship between nutritional status and the incidence of anemia. There was a relationship between nutritional status and the incidence of anemia.

**Keywords**— nutritional status, anemia, 6 months, 3 years

## I. INTRODUCTION

Nutrition plays a very important role in the cycle of human life from the womb until the elderly. Malnutrition in infants and under-five children can cause growth and development disorders that can continue into adulthood if not treated early. The results of the Basic Health Research conducted periodically provided a fluctuating picture of the prevalence of malnutrition among under-five children, namely from 18.4% in 2007 which decreased to 17.9% in 2010, and in 2013 the prevalence of malnutrition increased again to 19.6%, the latest data in 2018 showed that the

prevalence decreased to 16.8%. The proportion of malnutrition and undernutrition status in East Java in 2013 was 19.1% and it decreased to 16.78% in 2018, while in the city of Surabaya the proportion of malnutrition and undernutrition status in 2013 was 19.1% and it decreased to 12.5% in 2018 [1]. There are several factors that influence the occurrence of nutritional problems in children, including imbalance between nutrient intake and output, poor practice in choosing food ingredients, parenting style and children's health. An assessment of the nutritional status among under-five children can be done anthropometrically by using the Z-score table that is weight for age. The weight-for-age index is used to observe the short-term changes in nutritional status [2].

According to a survey report on micronutrient problems in 10 provinces in 2006 it was found that the prevalence of anemia in pre-school age children in Indonesia was 26.3% of all under-five children. Based on the results of Basic Health research, the prevalence of anemia in under-five children in Indonesia increased in 2013 to 28.1% [3]. In addition, the results of the South East Asian Nutritional Survey (SEANUTS) in 2011 found that the prevalence of anemia in Indonesia in children aged  $<2$  years was 55% [4].

Santos (2011) reports that anemia results in a lack of oxygen intake to body tissues especially brain tissue. In under-five children, the lack of oxygen to brain tissue can result in decreased cognitive function and it can also inhibit growth and psychomotor development [5]. This has also been proven by an experiment in experimental animals which showed that anemic animals had a decrease in spontaneous activity [6]. Anemia in children can also interfere with the immune system so the children are susceptible to infectious diseases [5]. Based on this background, researchers are interested in raising the topic of the Relationship Between Nutritional Status and the Incidence of Anemia among Children Aged 6 Months-3 Years.

## II. METHODS

This was an observational analytic study with cross sectional approach. The study population was children aged 6 months - 3 years amounting to 30 children. The sampling used total sampling technique. The variabel of age of nutritional status was divided into 2 groups, namely good nutrition and undernutrition. It was said to be good nutrition if the nutritional status was in  $-2SD$  up to  $2SD$  and undernutrition if the nutritional status was from  $-3SD$  to  $<-2SD$ . Furthermore, the variable of the incidence of anemia was divided into 2 groups, namely had anemia and did not have anemia. The child was said to had anemia if the hemoglobin level was  $<11$  gr% and the child was said to did

not have anemia if the hemoglobin level was  $\geq 11$  gr%. The instrument used to determine the nutritional status was a Z-score table, while hemoglobin levels were measured using a haemometer using peripheral blood. Data analysis was performed using the Chi Square test.

### III. RESULT

#### A. Study Results

Table 1. Frequency Distribution Based on Nutritional Status

Nutritional Status	F	%
Good Nutrition	25	83.3
Undernutrition	5	16.7
Total	30	100

The table above showed that of 30 respondents, 25 people had good nutritional status (83.3%), and 5 people had undernutrition status (16.7%)

Table 2. Frequency Distribution Based on the Incidence of Anemia

Incidence of Anemia	f	%
Not Anemic (Normal)	28	93.3
Anemic	2	6.7
Total	30	100

The table showed that of 30 respondents, 28 people were not anemic (93.3%), and 2 people were anemic (6.7%)

Table 3. Cross Tabulation between Nutritional Status and the Incidence of Anemia

Nutritional Status	Not Anemic		Anemic		Total	%
	f	%	f	%		
Good nutrition	25	83.3	0	0	25	83.3
Under nutrition	3	10	2	6.7	5	16.7
	28	93.3	2	6.7	30	100

From the table above it can be seen that of all respondents with good nutritional status as many as 25 people, all were not anemic (83.3%); while of 5 people with undernutrition status, 3 people were not anemic (10%) and 2 people were anemic (6.7%)

#### B. Discussion

##### a). Nutritional Status

Table 1 showed that of the 30 respondents, 25 people had good nutritional status (83.3%), and 5 people had undernutrition status (16.7%). Nutritional status is one of the parameters of child development. Nutritional status in society is influenced by many factors. Socio-economic condition is one of the important factors that influence nutritional status. If the socio-economic condition is good, nutritional status is expected to be better. The nutritional status of under-five children is closely related to the socio-economic condition of the family (parents) which involves parental education, parental occupation, number of children,

mother's knowledge and parenting style as well as the overall economic condition of parents. Poor food selection and processing practices are one of the factors which may cause undernutrition. Less nutritious foods that are and poor food variations can cause a lack of nutrients causing health problems, one of which is anemia.

##### b) Incidence of Anemia

Based on table 2, it was known that of 30 respondents, 28 children did not experience anemia (93.3%). 2 children were anemic (6.7%). During breastfeeding most of the nutritional needs of infants are obtained from breast milk, so the consumption of calories and nutrients for infants during breastfeeding is greatly influenced by the quality and quantity of breast milk consumed by infants. In normal term newborns, iron stores in the body are sufficient to maintain adequate iron for approximately 4 months postnatal growth. In premature babies, total body iron is lower than term babies, although the proportion of iron to body weight is the same. Post-natal growth in premature babies is faster than term babies, therefore if the food consumed by premature babies is not supplemented with iron, it will cause iron deficiency more quickly than term babies

Iron deficiency can cause cognitive impairment in children. Iron is an essential nutrient for children's growth and development. In the brain, iron participates in enzymatic activity including the cytochrome oxidase system, cytochrome is important for cellular function of nerve cells that shows adequate metabolic activity of nerve cells [7]. Iron is also involved in the synthesis and degradation of fatty acids and cholesterol which may play a role in myelogenesis and myelin maintenance. Myelin is very important for the speed of stimulation through nerve cells. Myelination occurs in several stages, namely the prenatal and post-natal stages. The myelination process is mostly completed at the age of 10 years. [8].

Iron deficiency can also cause a decrease in humoral immunity, mediated cell immunity and functional activity of phagocytic cells. Some studies reported that children suffering from iron deficiency caused the percentage of T lymphocytes to decrease and macrophage production to decrease. There would be a decrease in lymphocyte production in response to mitogen and ribonucleotide reductase was also decreased. All impairments can return to normal after being given iron supplements [9].

##### c) Relationship between nutritional status and the incidence of anemia

From the results of cross tabulation between nutritional status and the incidence of anemia, it can be seen that of all respondents with good nutritional status as many as 25 people, all were not anemic (83.3%); while of 5 people with undernutrition status, 3 people were not anemic (10%) and 2 people were anemic (6.7%). The results of the analysis between nutritional status data and the incidence of anemia using Chi Square obtained p value of 0.001 which meant that there was a significant relationship between nutritional status and the incidence of anemia.

Children's nutritional status is influenced by various factors, which are divided into direct and indirect causes. The immediate cause is the adequacy of food and the state of

children's health. Indirect causes are family food consumption, care for mothers and children, and environmental sanitation [10]. Less nutritious foods that are and poor food variations can cause a lack of nutrients causing health problems, one of which is anemia. A study conducted by Wahyuni also stated that there was a close relationship between nutritional deficiency anemia, especially iron and nutritional status [11]. In 2000, Allen and friends in their study reported that low hemoglobin levels were associated with chronic malnutrition and micronutrient deficiencies. In addition to lack of nutrient intake, anemia in children could be due to other things such as acute illnesses, chronic diseases or a failure of the bone marrow to produce red blood cells. [12].

#### IV. CONCLUSION

The results showed that there was a significant relationship between nutritional status and the incidence of anemia among children aged 6 months-3 years.

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