

ANEMIA, MOTOR, LANGUAGE, SOCIAL PERSONAL DEVELOPMENTS AMONG CHILDREN UNDER TWO YEARS OLD IN RURAL AREAS, WONOSOBO, CENTRAL JAVA, INDONESIA

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ABSTRACT

Background: Anemia is a condition where the hemoglobin level in the blood is lower than normal, which can be caused by malnutrition of micronutrients. Several studies that examine anemia among children under two years old, allegedly showed a negative impact on child development. This study aimed to determine the relationship between anemia and developmental status among children under two years old.

Subjects and Method: This was a cross-sectional study conducted in Wonosobo Regency, Central Java, in 2019. A total of 290 children under two years old was selected for this study. The dependent variables were motor development, language development, and social personal development. The independent variable was anemia. The data of anemia was based on the results of hemoglobin levels examination using the Hemocue technique. The measurement of developmental status was measured using Developmental Milestone Checklist II. The data were analyzed using Chi-square test.

Results: Most of the children under two years old had anemia (69.3%), experienced motor development problems (27.6%); language development barrier (11.0%), and experiencing barriers to personal social development (68.3%). This study showed that anemia was not related with motor development, language development, and social personal development, and there were not statistically significant.

Conclusion: There is no relationship between anemia among children under two years old and the three aspects of child development in Wonosobo Regency, Central Java, Indonesia

Keywords: anemia, development, children, children under two years old

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BACKGROUND

Anemia is a condition in which the hemoglobin level is below average, and it is caused by a lack of one or more vital nutrients, including iron, folic acid, vitamins A, B12, C, and copper (Wolinsky and Hickson, 2000). There are several types of anemia depending on the factors causing it. Anemia in general is a manifestation of iron deficiency, from mild to severe, which causes impaired tissue function. Symptoms that appear are based on severity, such as a pale face, weakness, lack of energy, and susceptibility to infectious diseases. At the age of children under two years old the impact is more serious, related to gro-

wth and development, both now and in the future (Su et al., 2016).

Anemia is a public health nutrition problem, especially for vulnerable groups, namely children under five and pregnant women. Efforts made are not only handling what has happened, but prevention is more important by looking at the factors that influence it. Khan in his study results said that anemia in children under five is associated with chronic malnutrition, clean water, socio-economic and geographic (Khan et al., 2016).

The prevalence of anemia is still very high. WHO launched, the prevalence rate of anemia in the world shows 43.0% (WHO,

2011). The high rate of anemia mainly occurs in poor and developing countries, such as in India and Southeast Asia (Kotecha, 2011). In Indonesia, the results of the National Institute of Health Study and Development survey in 2013 showed the prevalence of anemia in children aged 12 to 59 months was 28.1% (National Institute of Health Study and Development, 2013). WHO recommends that anemia in children under-fives threatens future generations of people. Treatment of anemia must be done immediately, if the prevalence rate of anemia is more than 40%, special intervention with universal iron supplementation is needed (WHO, 2011).

Several studies on anemia in early childhood, suggest that anemia in early life has a negative impact on growth and development. Walker et al said, there are four main factors that influence child development, one of which is anemia in infants. Apart from iodine deficiency anemia, stunting and parenting patterns also affect the growth and development of children (Walker et al., 2011).

A study says that anemia in children, if not treated seriously, will affect health, cognitive development, school performance and work performance (Alemayehu et al., 2019). Treatment of anemia caused by iron deficiency is related to lack of nutritional intake due to poverty, parenting and disease, which will interfere with growth and development (Ashar et al., 2016). In this connection, anemia management must pay attention to the factors that cause it and be carried out effectively and efficiently (Ewusie et al., 2014).

Developmental status is a condition of child development, referring to developmental tasks according to age. Data on child development in Indonesia is still very limited, which makes it difficult to describe the status of child development in detail. The results of a cohort study in Bogor in 2017, said that as many as 65.8% of children under two years old experienced developmental disorders.

The results of other study on clinical nutrition, multi centers in four countries including Indonesia, the proportion of developmental deviations in infants (0.5 to 0.9 years) in Indonesia is 45.8% (Budiman et al., 2013).

The proportion of anemia and developmental disorders in children in Indonesia is still high. In this regard, this study aims to determine the relationship between anemia and developmental status among children under two years old, which includes aspects of motor, language, and social personal developments.

SUBJECTS AND METHOD

1. Study Design

A cross-sectional study was carried out in Wonosobo, Central Java, Indonesia.

2. Population and Sample

This study was conducted with a population of children under 6 to 20 months of age in one selected sub-district in Wonosobo, Central Java, Indonesia. The sample was selected purposively with the criteria of easy access to health services and geographic convenience. A total of 290 children under two years old were selected in this study.

3. Study Variables

The anemia status among children under two years old with anemia and non-anemia criteria as independent variables. While the dependent variable was the developmental status of children under two years old which includes motor, language, and social personal developments.

4. Study Instruments

The data were obtained using individual and family questionnaires. Measurement of anemia status data was carried out by taking blood specimen by health analysts on children under two years old's fingers to measure hemoglobin levels using the HemoCue device. Measurement of developmental status was carried out by a psychologist using the Developmental Milestone Checklist II, cover-

ing three aspects of development, namely: motor, language, and social personal developments. Assessment of development status with three criteria, namely: below average, normal, and above average.

5. Data Analysis

Analysis was performed to assess hemoglobin levels. Anemia was indicated if the hemoglobin value is less than 11 g / dl; and declared not anemia if the hemoglobin value was equal

to or more than 11 g / dl. Descriptive analysis was carried out for the characteristics of the family and regression analysis was conducted to determine the relationship between the independent and the dependent variables.

RESULTS

The study subject characteristic was presented in Table 1.

Table 1. The characteristic of family and children under two years old

Characteristic	Category	n	%
Father's education	Not attend school	1	0.3
	Not complete primary school	12	4.1
	Primary school	103	35.5
	Junior high school	97	33.4
	High school	59	20.3
	College	18	6.2
Mother's education	Not attend school	0	0.0
	Not complete primary school	9	3.1
	Primary school	80	27.6
	Junior high school	123	42.4
	High school	61	21.0
	College	17	5.8
Father's occupation	Jobless	3	1.0
	Farmer	80	27.6
	Private sector/entrepreneur	138	47.6
	Civil servant/police	8	2.8
	Other	61	21.0
	Jobless	169	58.2
Mother's occupation	Farmer	8	2.8
	Private sector/entrepreneur	28	9.6
	Civil servant/police	5	1.7
	Other	80	27.6
	Quintile 1	60	20.7
	Quintile 2	63	21.7
Social economy	Quintile 3	51	17.6
	Quintile 4	58	20.0
	Quintile 5	58	20.0
Child's Age	6 – 11 months	151	52.1
	12 - 20 months	139	47.9

Table 1 shows that the family characteristics seen from the education of fathers and mothers almost three quarters of them had basic education, i.e., not going to school, completing primary school and completing

junior high school, only about one third were highly educated (high school or university). In terms of father's occupation, the average private worker / self-employed worker, while the mother's employment status was not

working. Family socioeconomic status was 60% in middle to lower economic status, and

only 40% in middle and upper economic status.

Table 2. Anemia and developmental status among children under two years old

Variable	Category	n	%
Anemia	Normal	89	30.7
	Mild	150	51.7
	Moderate	50	17.2
	Severe	1	0.3
Motoric	Below average	80	27.6
	Normal	150	51.7
	Above average	60	20.7
Language	Below average	32	11.0
	Normal	183	63.1
	Above average	75	25.9
Social personal	Below Average	198	68.3
	Normal	90	31.0
	Above the average	2	0.7

Table 2 shows that the average of children under two years old had anemia (mild, moderate and severe) 69.3%. Only about a third who do not experience anemia. Nearly three quarters of children under two years

old's development status experienced social personal development below the average and only 0.7% which was above the average.

Table 3. Results of logistic regression analysis for anemia with motor development

Variable	Motor Development		OR	95% CI	p
	Below Average n (%)	Normal n (%)			
Anemia	57 (28.4)	144 (71.6)	1.13	0.73 to 2.38	0.659
Not anemia	23 (25.8)	66 (74.2)			

Table 4. Results of logistic regression analysis for anemia among children under two years old with language development

Variable	Language development		OR	95% CI	p
	Below average n (%)	Normal n (%)			
Anemia	21 (10.4)	180 (89.6)	0.82	0.37 to 1.82	0.632
Not anemia	11 (12.4)	78 (87.6)			

Table 5. Results of the logistic regression analysis for anemia among children under two years old with social personal development

Variable	Personal Social Development		OR	95% CI	p
	Below average n (%)	Normal n (%)			
Anemia	135 (67.2)	66 (32.8)	0.84	0.43 to 1.33	0.541
Not anemia	63 (70.8)	26 (29.2)			

The results of logistic regression test for anemia status on the development of children under two years old did not find a significant relationship in the three aspects of development, both motor, language, and personal social developments.

DISCUSSION

This study found that family characteristics seen from the education of fathers and mothers almost three-quarters of them have basic education, only about one third are highly educated. In terms of father's occupation, the average private worker/ self-employed worker, while the mother's employment status is not working. The family socio-economy is 60% in the middle to lower economic category (quintile 1, quintile 2, and quintile 3), and only 40% is in the middle and upper economic status (quintile 4 and quintile 5).

The problem of family characteristics in rural areas is a classic and very basic problem. This condition has the potential to cause other problems, so that the burden of problems in rural areas becomes more complex. Low education and knowledge have an impact on the difficulty of getting a job, and work status will have an impact on the socio-economic status of the family. Low education, inadequate knowledge, and weak socio-economic status will affect the nutritional status of the family, especially family members who are prone to malnutrition, namely the children under two years old group. Parents' education level and socioeconomic factors are related to the prevalence of anemia (Onyemaobi and Onimawo, 2011).

Table 2 in this article shows that the average children under two years old has anemia of 69.3%, only about a third of children under two years old who are not anemic. The proportion of anemia in children under two years old is still high, and has become a national problem, even a problem that is

being faced by the world, especially in poor countries and developing countries. Several studies show that anemia is more prevalent in rural areas although it also occurs in urban areas (Onyemaobi and Onimawo, 2011).

More than 25% of children under five in the world are anemic, where more than 50% suffer from iron deficiency anemia (Pivina et al., 2019). The results of a similar study of children aged 6 to 60 months in nine regions in Nigeria found that 70.5% of children under five suffer from anemia and 48.1% due to iron deficiency. In addition to iron deficiency, these children are also deficient in vitamin C (Onyemaobi and Onimawo, 2011). Similar results from study in a hospital, showed that children treated with a diagnosis of anemia of 57.1% had low iron status (Widiaskara et al., 2016).

Anemia in children under two years old that occurs on average is due to malnutrition, namely anemia due to iron deficiency which is the raw material that will be converted into hemoglobin (Wang, 2016). The treatment of anemia is based on recommendations from the World Health Organization (WHO), iron fortification programs and iron supplementation iron can be considered very effective in most countries of the world (WHO, 2011). Several countries have done this, giving iron supplementation in addition to providing additional foods that contain high iron. This intervention is also a strategy to improve the development status and morbidity of children (Campbell et al., 2017). Treatment of anemia with iron intervention in children aged 6-59 months for 1 month shows an increase in hemoglobin (Hb) 1 g% and hematocrit (HCT) 2.8% (Widiaskara et al., 2016).

Development is an increase in the ability to structure and function of the body which is more complex according to the stage growth. The status of development that stands out in this finding is social personal

development, almost three quarters of the poor, their social personal development is below the average and only 0.7% is above the average.

This study resulted in logistic regression test of anemia status on the development of children under two years old did not find a significant relationship, both motor, language, and social developments. This result is similar to the study of Zulaekah et al. (2014), which stated that there was no significant difference in growth and development status between anemic and non-anemic children. While other studies say, children under-fives with or without anemia have balanced development, but children under-fives who are given stimulation tend to develop normally (Astuti et al., 2016). Astuti in her study also said that the majority of children under-fives who have anemia still have normal development.

Several other studies have shown different things. A study conducted by Kusmiyati on sixth grade elementary school children said that there was a relationship between hemoglobin levels and intellectual intelligence of sixth grade elementary school children with a value of $p = 0.002$ (Kusmiyati et al., 2013). Other studies in children aged under five also show similar things, that iron deficiency has a negative impact with cognitive development (Jauregui-Lobera, 2014), and related with the changes of neurobehavioral (Fuglestad et al., 2013).

This causal relationship may be caused by external variables such as education, knowledge, attitude, behavior, and socioeconomic status. More study is needed on other factors that influence child development and the severity of anemia.

The cases of anemia and barriers to social personal development in the study location are still quite high. There is no relationship between anemia in children under two years old and the three aspects of child deve-

lopment in rural areas in Wonosobo, Central Java, Indonesia.

Further study is needed on other factors that influence child development according to the severity of anemia.

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