

## Relationship of Nutritional Status, Anemia with Helminthiasis in Adolescents in Manado City

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### Abstract

### Original Research Article

**Background:** Infectious diseases in Indonesia in general are still quite high. One of the diseases whose incidence is still high is worm infection, which is intestinal worms that are transmitted through the infected soil. Helminthiasis is one of the 10 largest children's diseases in Indonesia, with a prevalence of 22.6% in 2013[1] The impact of helminthiasis can interfere with health and nutritional status. Anemia is a medical condition in which the number of red blood cells or hemoglobin is less than normal. One of the causes of low Hemoglobin is inadequate nutrition and infectious diseases. **Objectives:** This study aims to determine the relationship between nutritional status, anemia and helminthiasis in adolescents. **Method:** This study was an observational study with a cross-sectional design conducted on high school students in the city of Manado. Collection of primary data and secondary data used interview techniques, measurement techniques and observation. Anthropometric measurements of a total of 1256 students were taken to determine nutritional status. Then 100 students were selected to be tested for hemoglobin and stool examination. All subjects were asked to collect feces samples when going to school to be examined in the laboratory to assess the status of helminthiasis. Statistic analyzed used Chi-Square and Fisher's Exact Test. **Results:** The result of this study indicates that there were 56 female students (56%) more than male students. There were 9 students with under nutrition status and 91 normal students. Students who have anemia are as many as 7 people (7%). Based on the results of stool examinations conducted on 100 students there were 3 children (3%) positive infected with helminthiasis and 97 children (97%) were negative. Worm infection occurred in subjects are relatively mild. Statistical analysis shows that there is no relationship between helminthiasis with nutritional status ( $p=1.01$ ) and there is no relationship between helminthiasis with hemoglobin levels ( $p=0.43$ ). **Conclusion:** There is no relationship between helminthiasis with nutritional status and anemia in adolescents in Manado city.

**Keywords:** Nutritional status, anemia, helminthiasis, adolescents.

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## INTRODUCTION

Anemia is a medical condition where the number of red blood cells or hemoglobin is less than normal. Normal Hb levels in adolescent girls are 12 gr / dl or more. Adolescent girls are said to be anemic if Hb levels <12 gr / dl [1]. Based on the 1995 Household Health Survey (SKRT), shows that nationally the prevalence of anemia in adolescent girls is still high, at 57.1% [2]. The prevalence of anemia in urban areas according to Basic Health Research (Riskesdas) 2007 was highest in the female group at 19.7%, followed by the adult male group 12.1% [3]. In children the prevalence reaches 9.8%. WHO Guidelines state that if the prevalence of anemia in a population is more than 15%, it is already a national health problem [4]. The cause of iron anemia, among others, is caused by increased iron needs, reduced iron intake, increased iron

loss, and reduced iron absorption [5, 6]. The interaction between helminthiasis and nutritional anemia has been revealed by various studies that have been conducted. Each contributes to each other in pain. If observed in terms of hematology, biochemistry, symptoms, and treatment, the anemia caused by *Ancylostoma duodenale* and *Necator americanus* is classified as iron deficiency anemia [7]. Research conducted in 2016 showed that the prevalence of intestinal helminth infections in Wori District of North Minahasa Regency was hookworm infection of 4.7%, *Entamoeba coli* 3.9%, *Chilomastix mesnili* 3.1%, *Blastocystis hominis* 3.1%, *Giardia lamblia* 9% and 1.5% mixed infections. The high number of helminthiasis and the high incidence of anemia in adolescents nationally are closely related because helminthiasis is one of the causes of anemia [8]. Based on this, research needs to

be done to analyze the relationship of nutritional status, anemia with helminthiasis infections in adolescents in the Manado city.

## MATERIALS AND METHODS

This study uses a cross sectional design that will be carried out in high schools and vocational high schools in the city of Manado, North Sulawesi Province. The study was conducted for 6 months from April to October 2019.

### The stages of research are carried out as follows

- Request permission for research as well as requests for Ethical Clearance to the Research Ethical Committee of the Faculty of Medicine, Sam Ratulangi University, Manado
- Request permission from the school through the Department of Education in North Sulawesi Province.
- Dissemination to students in schools regarding the purpose of this study.
- Interviews to prospective subjects to get willingness to be the subject of this study by reading and signing informed consent.
- Perform physical examinations such as weight, height, waist circumference and blood pressure measurement.
- Perform blood sampling for further analysis in the clinical laboratory.

The target population of this study is adolescents aged 13-18 years. Research subjects are

**Table-1: General description**

analysis description				
Variabel	n	Minimum	Maximum	Average $\pm$ SB
Age(year)	100	13	18	16,04 $\pm$ 1, 207
BMI (cm)	100	16	30	24 $\pm$ 5,053
Hb level	100	10	19,8	1,4 $\pm$ 1,14

Table 1 shows that for samples aged 13-18 years, BMI varied greatly (16-30), Hb levels vary greatly (10 - 19.8 mg / dL).

**Table-2: Distribution of samples by sex, nutritional status, hemoglobin level and helminthiasis infection**

Variable	criteria	(n)	Prosentase (%)
Gender	Boy	44	44 %
	Girl	56	54 %
Nutritional status	underweight	9	9 %
	$\geq$ Normal	91	91 %
Hb level	Normal	93	93 %
	Anemia	7	7 %
Helminthiasis	Yes	3	3 %
	No	97	97 %

Table 2 shows that there were 56 female students (56%) more than male students. Underweight of 9 students and 91 normal students. Students who experience Hb levels less than normal are 7 people (7%). Based on the results of stool examinations

affordable populations that meet the following research inclusion criteria: high school students, aged between 13-18, willing to be a research participant by signing an agreement on the basis of volunteerism (informed consent). Exclusion Criteria: Students who are menstruating, students who have a history of menstruation  $>7$  days for at least 3 months in a row, students who suffer from blood disorders such as leukemia, aplastic anemia, thalassemia, ITP, bleeding disorders, as well as being sick with diarrhea, tuberculosis, and others, and not willing to do blood sampling. Collection of primary data and secondary data used interview techniques, measurement techniques and observation. Interview techniques were carried out to determine the characteristics of workers with the help of questionnaires. Height, weight and hemoglobin levels were measured. Height and weight were measured to determine nutritional status. Nutritional status categories based on BMI according to the Republic of Indonesia Ministry of Health 2011 which are thin ( $<18.4$  kg / m<sup>2</sup>), normal (18.5-25.0 kg / m<sup>2</sup>), obese (25.1-27.0 kg / m<sup>2</sup>) and very obese ( $\geq 27.1$  kg / m<sup>2</sup>)[9].

## RESULTS AND DISCUSSION

A total of 100 students were randomly drawn from 2 schools anthropometric measurements in the form of height and weight to assess nutritional status and examination of hemoglobin levels and stool examination.

conducted on 100 students there were 3 children (3%) positive infected with helminthiasis and 97 children (97%) were negative. Worm infection infection results are relatively mild that occur in the subject.

**Table-3: Relationship between helminthiasis with Nutrition Status and Hemoglobin level**

Variabel	Nutrition status		Hb level	
	Underweight	Normal	Anemia	Normal
Helminthiasis	2	1	2	0
Non Helminthiasis	7	90	5	93
<i>p value</i>	1,01		0,43	

*Uji Fisher Exact*

Based on statistical tests show that there is no relationship between helminthiasis with nutritional

status ( $p = 1.01$ ) and there is no relationship between helminthiasis with Hb levels ( $p=0.43$ ).

**Table-4: Relationship of Nutritional Status and Hemoglobin Levels**

Variabel	Anemia		Hb normal		<i>p</i>
	n	%	n	%	
Nutrition status					
Underweight	7	7%	5	5%	0,406 *
Normal	1	1%	87	87%	

\* = *p value*      \**Uji Chi Square*

Table 4 shows that no significant relationship between nutritional status and hemoglobin levels  $p = 0.406$  in adolescents in the city of Manado.

allegedly due to nutritional consumption factors that also affect anemia. Someone will suffer from anemia if the level of consumption of nutrients that facilitate iron absorption is still lacking [18, 19].

## DISCUSSION

Based on the results of stool examinations conducted on 100 students, the proportion of helminthiasis students showed that 3 students (3%) were positively infected by helminths and 97 children (97%) were not infected with helminths. This figure is lower than the national rate of helminthiasis that is 10%. This study shows that helminthiasis is caused by *Trichuris trichiura*. Worm infections in each individual can be influenced by several factors such as personal hygiene behavior (PHBS), water sources, defecation behavior, and environmental sanitation [10, 11]. Clean and healthy life behavior in the community has begun to increase, namely bowel habit is not just anywhere. Defecation behavior in any place will cause soil/environmental pollution by faeces containing worm eggs [12]. The results of this study are lower than the national figures, it shows the success of the national health program namely *GERMAS* (Clean and Healthy Life Community Movement). Based on statistical tests show that there is no relationship between helminthiasis with nutritional status ( $p = 1.01$ ). This study is in line with research conducted by Hendrawan and Kamila which shows there is no relationship between helminthiasis and nutritional status [13, 14] A total of 87 students (87%) had normal nutritional status. Good nutrition makes normal weight so it is not easily affected by infectious diseases [15].

Based on the results of statistical tests showed  $p = 0.474$  which means there is no relationship between nutritional status with the incidence of anemia in adolescents. This is in line with research conducted by Handayani [17] and Indriani [18] which states that there is no relationship between nutritional status with the incidence of anemia in adolescent girls [16, 17]. This is

## CONCLUSION

There is no relationship between helminthiasis with nutritional status and anemia in adolescents in Manado city.

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