Efforts To Prevent Anemia Through Education On Worms And Checking Hemoglobin (Hb) Levels Of Students At Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi City, West Java

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Abstract.

One of the risk factors for worm infections is low knowledge and environmental sanitation. Elementary school age children are a vulnerable group for experiencing this infection. The Cikiwul 1 Bantar Gebang public elementary school is located in the Bantar Gebang Bekasi waste dump area. Poor school environmental sanitation is a risk factor for the spread of worms and the incidence of nutritional deficiencies and absorption, so that students can suffer from anemia. This community service with the community partnership program (IPKM) science and technology scheme aims to prevent anemia through education about worms and hemoglobin examination of Cikiwul 1 public elementary school students. The target audience is 100 students in grades 5 and 6. The implementation method is through education, providing knowledge about worms, measuring the increase in knowledge through pre-test and post-test. Hemoglobin examination using the biosensor method using Point of Care Testing (POCT), based on the criteria of the World Health Organization, 2001) or clinical practice guiding anemia, 2005. The examination material used is the student's capillary blood. Implementation results were obtained from 100 students who took part in the education, 99 students took the initial knowledge measurement (pre-test), and the measurement of increasing knowledge (post-test). The pre-test result was 69.9, the post-test result was 85.1. There was an increase in knowledge of 15.2%. The results of increasing knowledge for the recognition of worm types were 63%, for the prevention of worms 80%, for the causes of worms 52.5%, for the effects of worms 28.3%, and for the detection of worms 11.1%. The overall prevalence of anemia is still relatively high (22%), with moderate anemia predominant (17%). Boys tend to experience anemia more than girls. Class 6 showed the highest proportion of moderate anemia (19.6%), indicating the potential for continued accumulation of nutritional deficiencies. There were no cases of severe anemia, but 1 in 5 children had Hb levels < 11.5 g/dL, which indicates the need for nutritional intervention and continued health monitoring.

Keywords: *Anemia; Hb level; Worms and Point of Care Testing (POCT).*

I. INTRODUCTION

The World Health Organization (WHO) in the Worldwide Prevalence of Anemia globally, the prevalence of anemia in school-age children in 2017 showed a high figure, namely 39.8%. Based on the results of Riskesdas in 2018, Indonesia recorded that 26.8% of children aged 5-14 years suffered from anemia and 32% aged 15-24 years. The prevalence of anemia at elementary school age is still quite high. Meanwhile, based on the 2023 Indonesian Health Survey (SKI), the prevalence of anemia in adolescents aged 15-24 years is 15.5%[1]. Anemia is a decrease in hemoglobin (Hb) levels < 12 g/dL for women and < 13 g/dL for men. Anemia can also be influenced by increased body needs, due to chronic disease, and parasitic (worm) infections, because it is estimated that worms suck 2-100 cc of blood every day. 1 The impact of anemia on elementary school students can cause physical growth and development disorders, low resistance to disease, reduced intelligence levels, and low learning achievement. Apart from that, anemia in students will have an impact on decreasing learning ability and concentration, disrupting the growth of both body cells and brain cells, causing symptoms of a pale face, tiredness, lethargy and getting tired quickly which can then reduce fitness and learning achievement [2].

The high anemia status of elementary school students is caused by several factors such as inadequate nutritional intake, unbalanced nutrition or the presence of worms which inhibit nutrient absorption and cause anemia. Chronic worms will cause a lack of carbohydrates, protein and blood loss which indirectly reduces productivity. Worms in students also reduce the body's immune

system, making them susceptible to other diseases. Worms in students inhibit growth and development and even become a risk factor for failure to thrive. Students will find it difficult to pursue their growth, especially in pursuit of height. Students who experience failure to thrive are more likely to be short, which makes it easier to become obese. Some worms can also cause anemia in sufferers [3].This worm infestation causes malnutrition in students. There is a relationship between students who suffer from worms having poor nutritional status compared to students who do not suffer from worms.

Worms will disrupt the function of food absorption so that less nutrients can be absorbed and inhibit nutrient absorption and cause anemia. Worms sufferers are prone to malnutrition and anemia. Generally they also face digestive problems, decreased endurance, decreased ability to learn and decreased work productivity[4]. Worms are a disease caused by worm infestation, but worms themselves receive less attention (neglected disease) because they are still considered a disease that does not cause outbreaks or deaths[5]. Worms are an endemic and chronic disease, although not fatal, this condition disrupts health and reduces students' learning abilities, disrupts nutrient absorption, causing anemia[6]. The low knowledge factor among elementary school students about worms and anemia can be improved by providing education. It is necessary to provide education to elementary school students early to remember the factors that cause worms and anemia. Apart from that, students can also prevent the behavior and habit of putting their hands in their mouths after playing[7]. And other efforts in community service activities are directed at improving the quality of human resources for elementary school students as the nation's next generation through checking students' Hb levels.

II. PRIORITY ISSUES

Bantar Gebang District is the location of the waste disposal site in the Bekasi Regency area. At the waste disposal location there is the Cikiwul 1 State Elementary School which is located at the Bantar Gebang Integrated Waste Management/Disposal site, Bekasi. This elementary school is located in a rubbish dump area. The road to school is crowded with garbage trucks every day. exact location at the second weighing post for Integrated Waste Management/Disposal waste trucks[8].Even though the Cikiwul 1 public elementary school is in the middle of the TPST area, dozens of students seem to be used to the strong smell of rubbish.They played and blended together even though the stench of rubbish was very strong all the way to school. The school is inhabited by children from lower middle class families and some parents work as scavengers in the area[9].

The way to educate elementary school students in this area has a different method compared to elementary schools in general, where they spend their break time playing rather than raiding the snack vendors around the school. There are still several traders outside the school area, but children prefer to play. Because the children don't have much pocket money. According to the Principal, the challenge for teachers is to deal with the unique characters of their students. Students grow up in a harsh environment which makes them more likely to get bored and lack concentration. Seeing these conditions, the presence of universities is needed to help develop the next generation into healthy Indonesian children. The role of universities in implementing the Tri Dharma is to carry out community service activities in the form of education to increase knowledge of worms and Hb examination as an effort to prevent anemia, especially in elementary school students.

III. METHODS

Community service through the Science and Technology Community Partnership Program (CPP) scheme. Activities include:

1. Measurement of the initial level of knowledge, and measurement of the increase in knowledge after education about worms was carried out among students at the Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi.
2. Community service was carried out by a team of lecturers and students from the Department of Medical Laboratory Technology, principals and class teachers at the Cikiwul1 state elementary school, and

officers from the Cikiwul sub-district health center. The targets for implementing the activities are 100 students in grades 4, 5 and 6 of the Cikiwul 1 public elementary school, Bantar Gebang, Bekasi.

3. Time and Place of Implementation, the activity of measuring students' initial level of knowledge (pre-test) and providing education followed by measurements after providing education (post-test) was carried out on Thursday, May 22 2025. Examination of hemoglobin levels using capillary blood which is read on a POCT device, carried out on Monday, May 26 2025. The activities were carried out at SDN Cikiwul 1, Jl. Yon Armed 7 No.53, RT.004/RW.006, Cikiwul, Bantar Gebang District, Bekasi City, West Java 17152
4. Measurement of increased knowledge using measuring instruments in the form of questionnaires by conducting *pre-tests* and *post-tests*. Fill in the questionnaire according to the material provided when providing education.
5. Educational material in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 15 of 2017 Concerning Overcoming Worms, which contains knowledge material about anemia, definition of anemia, symptoms of anemia, risk factors for anemia, risk factors for worms, introduction to types of worms that cause anemia, ways to prevent worms, causes and targets of worms, impact of worms, transmission/infestation of worms, symptoms/signs, impact of worms and detection of worms.
6. Data analysis to determine whether there was an increase in knowledge before and after education was carried out using the *McNemar test* using the SPSS for windows version 11.5 program. Analysis of data from examination of students' Hb levels using standard status criteria of the World Health Organization (WHO), 2001. Criteria for anemia are Hb < 11.5 g/dL for respondents aged between 10 - 11 years and Hb < 12.0 for respondents aged 12 years. Not anemia is Hb ≥ 11.5 g/dL for respondents aged between 10 - 11 years and Hb ≥ 12.0 gr/dL for respondents aged 12 years.

IV. RESULT AND DISCUSSION

Result

Results of measuring the characteristics of participants in education on worm prevention efforts for students at Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi, can be seen in table 1.

Table 1. Characteristics of Education Participants

Variable		Frequency	Percentage
Gender	Woman	61	61,6%
	Man	38	38,4%
Class	4	2	2,0%
	5	47	47,5%
	6	50	50,5%

Based on table 1, many students who take part in education are female more than 61 %.

Measuring the results of educational efforts to prevent worms for students at the Cikiwul 1 public elementary school, Bantar Gebang, Bekasi, was carried out through *pre-tests* and *post-tests*. The results of increasing student knowledge regarding worms in detail can be seen in table 2 – table 6

Table 2. Increasing Students' Knowledge Regarding to Types of Worms

Types of Knowledge	Test	Score	Frequency	Percentage
Worms Types (maximum score 3)	*Pre-test*	1	14	14,1%
		2	74	74,7%
		3	11	11,1%
	Post-test	0	1	1,0%
		1	1	1,0%
		2	23	23,2%
		3	74	74,7%

In table 2 there is an increase in students' knowledge about types of worms before and after providing education at score 3 from 11.1% to 74.7 % by 63.6 %.

Table 3. Increasing Students' Knowledge Regarding Worm Prevention

Types of Knowledge	Test	Score	Frequency	Percentage
Worm Prevention (maximum score 1)	*Pre-test*	0	20	20,2%
		1	79	79,8%
	Post-test	0	19	19,2%
		1	80	80,8%

Table 4. Increasing Students' Knowledge Regarding the Causes and Targets of Worms

Types of Knowledge	Test	Score	Frequency	Percentage
Causes and Targets of Worms (maximum score 3)	*Pre-test*	0	1	1,0%
		1	8	8,1%
		2	71	71,7%
		3	19	19,2%
	Post-test	1	1	1,0%
		2	27	27,3%
		3	71	71,7%

Table 5. Increasing Students' Knowledge Regarding the Impact of Worms

Types of Knowledge	Test	Score	Frequency	Percentage
Impact of Worms (maximum score 3)	*Pre-test*	0	1	1,0%
		1	22	22,2%
		2	51	51,5%
		3	25	25,3%
	Post-test	1	8	8,1%
		2	63	63,6%
		3	28	28,3%

Table 6. Increasing Students' Knowledge Regarding Worms Detection

Types of Knowledge	Test	Score	Frequency	Percentage
Worm Detection (maximum score 1)	*Pre-test*	0	18	18,2%
		1	81	81,8%
	Post-test	0	7	7,1%
		1	92	92,9%

Results of Increasing Knowledge of Worm Prevention Efforts of Students at Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi

Table 7. Recapitulation of Results of Increasing Student Knowledge Regarding Worms in Detail

Test		Mean ± SD	Median (minimum – maximum)
Pre-test	Total Score	8 ± 1	8 (4 – 10)
	Mark	69,9 ± 11,7	72,7 (36,4 – 90,9)
Post-test	Total Score	9 ± 1	10 (5 – 11)
	Mark	85,1 ± 11,4	90,9 (45,5 – 100)

Fig 1. *Pre-test* implementation

Fig 2. Implementation of *Post-Test*

Results of Hemoglobin Level Examination of Students at Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi

Table 8. Hemoglobin Level Examination Results

Variable		Mean ± SD	Median (Min-Max)	**Frequency**	**Percentage**
Hemoglobin Levels (g/dL)		12.6±1.7	12.8 (8.6-16.1)		
Hemoglobin Category	Normal			78	78 %
	Mild Anemia			5	5 %
	Moderate Anemia			17	17 %
	Severe Anemia			0	0.0 %

Results of Hemoglobin (Hb) Examination of Students at Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi Based on Gender

Table 9. Hemoglobin Categories Based on Gender

Gender		Hemoglobin Category				Amount
		Normal	Mild Anemia	Moderate Anemia	Severe Anemia	
Woman	n	50	2	9	0	61
	%	82.0 %	3.3 %	14.8 %	0 %	100 %
Man	n	28	3	8	0	39
	%	71.8 %	7.7 %	20.5 %	0 %	100 %
Amount	n	78	5	17	0	100
	%	78.0 %	5.0 %	17.0 %	0 %	100 %

Results of Hemoglobin (Hb) Examination of Students at Cikiwul 1 State Elementary School, Bantar Gebang, Bekasi Based on Class

Results of Hemoglobin Level Examination of Cikiwul 1 Elementary School Students, Bantar Gebang, Bekasi, to determine the anemia category based on the cut-off determined by WHO in the Guideline on Hemoglobin Cutoffs to Define Anaemia in Individuals and Populations. In the group of children aged 5 to 11 years, both boys and girls, Hb levels are considered normal if they are ≥ 11.5 g/dL. Meanwhile, the anemia categories are: mild anemia (11-11.4 g/dL), moderate anemia (8-10.9 g/dL), and severe anemia < 8 g/dL (World Health Organization, 2024).

Table 10. Hemoglobin Categories Based on Class

Class		Hemoglobin Category				Amount
		Normal	Mild Anemia	Moderate Anemia	Severe Anemia	
4	n	1	0	1	0	2
	%	50.0 %	0.0 %	50.0 %	0 %	100 %
5	n	38	3	6	0	47
	%	80.9 %	6.4 %	12.8 %	0 %	100 %
6	n	39	2	10	0	51
	%	76.5 %	3.9 %	19.6 %	0 %	100 %
Amount		78	5	17	0	99
		78 %	5 %	17 %	0 %	100 %

Fig 3. Taking Capillary Blood Samples and Checking Hemoglobin Levels

Fig 4. Check Hb levels using the Essy Touch Rapid Diagnostic Test (RDT).

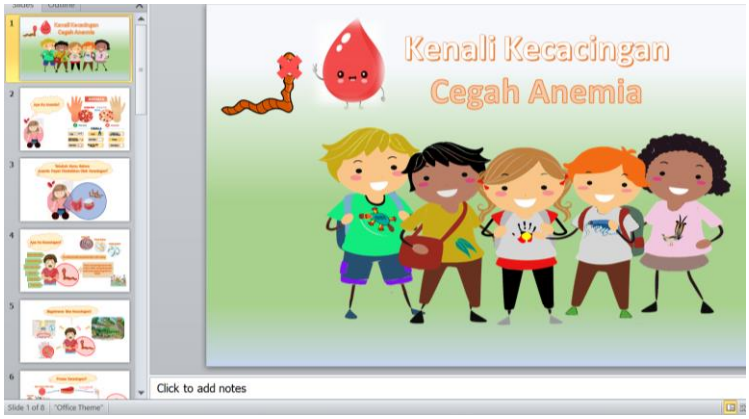

Fig 5. Providing education using booklets and videos

Discussion

Efforts to overcome the incidence of worms are not enough just to carry out treatment. The more important program starting from upstream is prevention efforts through increasing knowledge. This program is cheaper, besides that it also makes participants understand how to live a clean and healthy lifestyle. Clean and healthy living behavior is the second largest factor after environmental factors that influence the health of individuals, groups or communities. This behavior involves knowledge of the importance of personal hygiene, attitudes in responding to illness and actions taken in dealing with an illness or other health problem[10]. Programs to prevent anemia due to worms can be carried out by increasing knowledge, one of which is through providing education. *Pre-test* and *post-test* activities for the community, an important target for elementary school students is to determine changes in knowledge before and after being given the material. Apart from that, it will also measure the success of the resource person in providing an understanding of community service material. The overall results of the average pre-test and post-test scores of 100 students in community service activities at Cikiwul 1 Bantar Gebang, Bekasi increased sequentially from 72.7% to 90.9% with a percentage increase in knowledge about worms of 18.2%[11]. If we look closely, this worm infection is trivial, but its effects can be very disturbing, especially in children who are growing up.

A mild infection causes anemia with various clinical manifestations, both visible and invisible[12,13]. Moderate to severe cases of infection can result in impaired absorption in the intestines and disruption of several internal organ functions. If this happens during childhood, especially at school, it will really disrupt the teaching and learning process, in fact the child can experience a decline in achievement, which whether they realize it or not, this affects their future[10]. This phenomenon of worm infection is like an iceberg, which appears on a small surface, but in fact there are many cases and incidents of worm infection that are not exposed. We as members of the health community who know about this should ideally contribute to improving the level of health, in this case by reducing the incidence of worm infections. This frequently occurring disease really disrupts children's growth and development. In general, nutritional disorders or anemia can occur in sufferers. This will indirectly result in intelligence disorders in children. If there are no prevention efforts, worms can have an impact on reducing the absorption of nutrients such as carbohydrates and protein and causing blood loss. Meanwhile, nutrition is considered important as one of the factors that children need to support brain growth or intelligence as well as optimal growth/development[11].

IV. CONCLUSION

The student participants showed good interest, were active, and had great curiosity in efforts to prevent worms that cause anemia. 100 students took part in activities to prevent anemia through education, but only 99 students took part in measuring initial knowledge (pre-test) and measuring increasing knowledge (post-test).Obtained a Pre-test Result of 69.9 and a Post-test Result of 85.1, there was an increase in knowledge of 15.2%. Results Increased knowledge for recognition of types of worms 63%, for prevention of worms 80%, for causes of worms 52.5%, for impacts of worms 28.3%, and for detection of worms 11.1% The overall prevalence of anemia is still relatively high (22%), with moderate anemia predominant (17%). Boys tend to experience anemia more than girls. Class 6 showed the highest proportion of moderate anemia (19.6%), indicating the potential for continued accumulation of nutritional deficiencies.There were no cases of severe anemia, but 1 in 5 children had Hb levels < 11.5 g/dL, which indicates the need for nutritional intervention and continued health monitoring.

V. ACKNOWLEDGMENTS

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