



## **THE EFFECT OF THE ANEMIA FREE CLUB MODEL IMPLEMENTATION AND IRON SUPPLEMENT ON THE TREATMENT OF ANEMIA IN ADOLESCENT GIRLS IN JUNIOR HIGH SCHOOL**

**Reni Zuraida<sup>1</sup> Susianti<sup>2</sup> Wuryaningsih Dwi Sayekti<sup>3</sup> Dian Isti Angraini<sup>4</sup> Bayu Anggileo  
Pramesona<sup>5</sup> Gemayangsuru<sup>6</sup> Anisa Nuraisa Jausal<sup>7</sup> Wido Gamani<sup>8</sup> Anita Kurnia<sup>9</sup>**

*Master of Public Health, Lampung University, Bandar Lampung, Indonesia*  
Email : zuraidareni@yahoo.com

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### **Abstract**

*Anemia requires serious treatment because it has long-term impact on pregnancy and childbirth. The cause of anemia in general is nutritional deficiency, especially iron deficiency. Efforts to reduce the prevalence of anemia in adolescent girls currently being carried out at the Public Health Center are only limited to the distribution of iron supplements. For this reason, the application of the Free Club Anemia model is needed in the school-based handling of anemia in adolescent girls, which is combined with the government program of providing iron supplements at the junior high school.*

*The authors conducted a quasi-experimental with one group pretest and posttest design. The number of samples in each group was 37 people. Statistical analysis used in this research is univariate analysis and normality test. Bivariate analysis on unpaired data was carried out by Independent Sample T-Test, two mean tests for paired data were performed with Paired T-Test for each groups. The implementation of this modul held after the teachers and mothers received the Training of Trainers (TOT), intervention and nutrition education were given for 6 weeks consisting of food supervision, nutrition education and iron tablets. The results obtained from this study showed an increase in knowledge score, attitude scores, iron intake, hemoglobin level in intervention group and significant difference between the intervention and control groups. With the results of this study, it is hoped that the Public Health Center can improve its performance in by providing periodic counseling in the context of anemia rates in their area.*

**Keywords:** *Adolescent Girl, Anemia, Free-Club Anemia Model, iron Supplement*

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### **Introduction**



Adolescent anemia is one of health problems. According to National Health Research (2013), the rate of anemia in women of childbearing age is 37.1% (Ministry of Health Republic of Indonesia, 2013). Several studies on anemia in adolescent girls in various areas in Lampung Province such as Metro (Martini, 2015), East Lampung (Astuti and Trisna, 2016), Tanggamus (Laksmi and Yenie, 2018), Central Lampung (Listiana, 2016) and Bandar Lampung (Zuraida R, 2020) shows that the prevalence is still high, in the range of 40% - 80.9%. This condition requires serious treatment because anemia in adolescents has a long-term impact on pregnancy and childbirth such as Retarded Fetal Growth during pregnancy, premature birth, low birth weight, neurocognitive developmental disorders, babies born with low iron (Fe) reserves. and the risk of neonatal and infant mortality (Ministry of Health Republic of Indonesia, 2018).

The cause of anemia in general is nutritional deficiency, especially iron deficiency (WHO, 2016). Nutrition education can be given to improve school-based iron intake behavior and is a strategic effort considering all young girls are of school age. The Anemia-Free Club model is a school-based intervention model for iron deficiency anemia in adolescent girls designed by researchers and has been tested in the handling of anemia in adolescent girls in high school in the city of Bandar Lampung (Zuraida, 2020a). The results of the Anemia-Free Club model trial at the high school level showed that there was a significant increase in knowledge, attitudes, dietary intake of iron sources and hb levels for adolescent girls (Zuraida et al., 2020a, Zuraida et al., 2020b).

Tanjung Sari Health Center is a health center located in Tanjung Sari District, South Lampung Regency. The results of screening hemoglobin (Hb) levels for junior high school girls in the Tanjung Sari Health Center work area in January 2022, it was found that the prevalence of anemia in adolescent girls was 49% (UPTD Puseksmas Tanjung Sari, 2022). Efforts to reduce the prevalence of anemia in adolescent girls currently being carried out at the Public Health Center (*Puskesmas*) are only limited to the distribution of iron supplements. To overcome this condition, a companion program is needed to improve the behavior of consuming iron sources. For this reason, the application of the CBA model is needed in the school-based handling of anemia in adolescent girls, which is combined with the government program of providing iron supplements at the junior high school.

### Methods

The type of research used was quasi-experimental with one group pretest and posttest design. The research location was Junior High School in Tanjung Sari District, South Lampung. This study started from May to October 2022. Considerations for the location of the study in the working area of the Tanjung Sari Health Center, Tanjung Sari District, South Lampung Regency, among others: 1) The results of screening Hb levels in junior high school girls in the working area of Tanjung Sari Health Center found the prevalence of anemia in adolescent girls was 49%; 2) The Public Health Center of Tanjung Sari has a work program for the Anemia-Free Adolescence Girls Post (Poetri Bisa) as a program that focuses on handling anemia in adolescence girls in the area as an effort to minimize the occurrence of stunting under five in the future. However, the existing program is only limited to distribution of iron supplements.

The research sample in this study was taken purposive sampling technique. The study population was all the female students of junior high school in Tanjung Sari District, South Lampung Regency in May - October 2022 with the research sample being 7th and 8th grade of female students with inclusion criteria, adolescence girls in Tanjung Sari District Junior High School, South Lampung Regency; willing to become research respondents; be at the place of research at the time of data collection; adolescence girls after menstruation; and parents signed the informed consent form.

There are four variables to be tested, knowledge, attitude, iron intake, and blood hemoglobin levels. The standard deviation and delta for the variables of knowledge, attitude and hemoglobin refer to previous research by Yusoof (2012), while iron intake refers to research by Sharma V, SingV (2017), with a test power of 90% and a confidence level of 95%. Then based on the above formula, the minimum number of samples for each variable is obtained:



Table 1. Minimum Sample Calculation of the Variables

Variabel	Z $\alpha$	Z $\beta$	Varians	$\mu 1-\mu 2$	n	+10%
Knowledge	1.96	1.28	24.45	15.17	27.27	30
Attitude	1.96	1.28	5.8	3.35	31.47	35
Iron intake	1.96	1.28	6.33	8	7	7
Hb	1.96	1.28	0.9	0.5	37	37

Based on the calculations above, to get the minimum sample requirements for all variables, the number of samples in each treatment group was 37 people.

The research instrument that was used by researchers was in the form of a questionnaire sheet, namely:

- a. The questionnaire containing the socio-eco-demographic data of the respondents includes the characteristics of the respondents (age, gender, nutritional status, history of disease, pocket money, history of taking supplements and multivitamins), family characteristics (parental education, parental income, parental occupation, family knowledge, family attitudes) and teacher characteristics (teacher knowledge and attitudes)
- b. Questionnaire about the consumption pattern of iron intake using Semi Quantitative Food Frequency Questionnaires (SQ-FFQ)
- c. Respondent's questionnaire on nutrition knowledge, and nutrition attitude

This study consisted of several stages, giving worm tablets containing Albendazole in the early weeks of the intervention, nutrition education for 6 weeks, with a frequency of 1 time per week, duration of  $\pm$  60 minutes, supervision of eating by parents at home every day, food supervision by teachers at school every day as well as giving iron supplements once in a week and every day during menstruation.

Statistical analysis used in this study was univariate analysis by cleaning the data and then knowing the normality distribution of the data using the Kolmogorov-Smirnov test and bivariate analysis on unpaired data by Independent Sample T-Test. In this case, the difference test between groups was treated at the beginning and end of the intervention, while the two-average test for paired data was carried out using the Paired T-Test, in this case the pretest-posttest difference test for each group was treated. This research has received ethical approval from the Health Research Ethics Commission, Faculty of Medicine, University of Lampung with Letter No: 771/ UN26.18/ PP.05.02.00/2022 on March 22<sup>nd</sup>, 2022.

## Results and Discussion

### Free-Club Anemia Model Preparation Stage

Prior to the intervention, a preparatory stage was carried out which included Training of Trainers (TOT) for parents and teachers. This activity was carried out once and the material was delivered directly by the researcher. The material given to parents and teachers is about anemia, balanced nutrition, how to calculate nutritional content, especially iron in food and how to prepare food. This activity is carried out using the lecture method and direct practice with previously prepared food ingredients.

This activity took place in the auditorium of Junior High School 1 Tanjung Sari which was attended by 5 teachers and 26 parents and lasted for 90 minutes. Training of trainers for parents who are unable to attend, carried out by picking up the ball, visiting parents from house to house. In the intervention preparation period, as many as 6 parents received TOT materials from home using video as the media for TOT.



### Characteristics of Adolescent Girls' Mothers

Some mothers in intervention and control junior high school have education and employment , as follows:

Table 2. Characteristics of Adolescence Girls' Mothers in Junior High School in Tanjung Sari

No	Variabel	Intervention		Control	
		n	%	n	%
1	Education Level:				
	Not Passed	7	18,4	0	0
	Elementary School	17	44,7	8	19.5
	Junior High School	12	31,6	21	51.2
	Senior High School	2	5,3	5	12.2
2	Occupation				
	Farmer	0	0	0	0
	Seller	1	2.4	1	2.4
	Farm labor	1	2.4	2	4.9
	Non farm labor	2	7.3	2	4.9
	Housewife	31	80.5	27	65.9
	Tenaga Kontrak	1	2.4	1	2
	Other	2	4.9	1	2.4

### Free-Club Anemia Model Implementation Phase

The adolescent girls' module was implemented after their teachers and mothers received the TOT and understood each other's assignments. This adolescence girls' education module was carried out for 6 weeks at the intervention junior high school. Meanwhile, in control junior high schools, the intervention was given in the form of nutrition counseling at the end of the program. The control junior high school also received the same nutrition education module as the intervention junior high school which was given at the end of the program. A total of 38 girls who participated in the entire program series were in the intervention junior high school and 34 students in the control junior high school.

### Characteristics of Adolescent Girls

Table 3. Characteristics of the Length of Menstruation Adolescent Girls in Junior High School in Tanjung Sari

Characteristic of Respondents	Intervention	Control
Menstruation (days)	7.0 (4.0 – 10.0)	7.0 (4.0 – 8.0)



Table 4. Socio-ecodemographic Characteristics of Adolescent Girls in Junior High School in Tanjung Sari

Characteristics of socio-ecodemographic	Intervention		Control	
	n	%	n	%
<b>Religion</b>				
Islam	36	94,7	33	97,1
Christian	2	5,3	0	0
Hindu	0	0	1	2,9
<b>Ethnic</b>				
Lampungnese	4	10,5	8	23,5
Javanese	32	84,2	23	67,6
Sundanese	1	2,6	1	2,9
Palembangnese	1	2,6	2	5,9
<b>Father's education level</b>				
Not Passed	9	23,7	1	2,9
Elementary School	16	42,1	8	23,5
Junior High School	11	28,9	10	29,4
Senior High School	2	5,3	13	38,2
College	0	0,0	2	5,9
<b>Mother's education level</b>				
Not Passed	7	18,4	0	0
Elementary School	17	44,7	8	23,5
Junior High School	12	31,6	21	61,8
Senior High School	2	5,3	5	14,7
College	0	0,0	0	0
<b>Father's occupation</b>				
Farmer	10	26,3	12	35,3
Seller	1	2,6	0	0
Farmer labor	5	13,2	2	5,9
Non farmer labor	7	18,4	10	29,4
Civil servant/soldier/police	1	2,6	0	0
Service provider	7	18,4	3	8,8
Contract Labor	5	13,2	4	11,8
Other	2	5,3	3	8,8



Mother's occupation				
Farmer	1	2,6	1	2.9
Seller	1	2,6	2	5.9
Farmer labor	2	5,3	2	5.9
Non farmer labor	30	78,9	27	79.4
Contract labor	1	2,6	1	2.9
Housewife	2	5,3	1	2.9
Other	1	2,6	1	2.9
<b>Family income</b>				
Under minimum wage (< Rp. 2.650.000)	29	76.3	17	50.0
Above minimum wage(≥ Rp.2.650.000)	9	23.7	17	50.0

Table 5. Characteristics of the Nutritional Status of Adolescent Girls in Junior High School in Tanjung Sari

Characteristic of Nutritional Status	Intervention		Control	
	n	%	n	%
<b>Nutritional Status (BMI)</b>				
Skinny	16	39.0	15	44.1
Normal	21	58.5	16	47.1
Overweight	1	2,4	2	5.9
Obesity	0	0	1	2.9
<b>Malnutrition Status</b>				
Calorie malnutrition	28	73.2	27	79.4
Normal	10	26.8	7	20.6
<b>Anemia Status</b>				
Moderate (Hb: 8.0 - 10.0 gr/dL)	3	9.8	4	11.8
Mild (Hb: 10.1 - 11.9 gr/dL)	35	90.2	30	88.2

### Free-Club Anemia Model Implementation Results

#### Adolescent Girls Nutrition Knowledge and Attitude Score

Before the intervention, there was a difference between the adolescent girl knowledge score between the intervention group and the control group (44.50 vs. 44.85). After 6 weeks of intervention, both treatment groups had an increase in scores, but the increase in scores was much greater in the intervention group than in the control group (71.93 vs. 57.72). If at the beginning of the intervention, the knowledge scores were not significantly different ( $p=0.928$ ), then after the intervention there was a significant difference in knowledge scores between the intervention and control groups (0.000).

Before the intervention, there was a difference between the adolescent girl nutrition attitude score between the intervention group and the control group (63.96 vs. 60.09). After 6 weeks of intervention, both treatment groups



experienced an increase in nutritional attitude scores, but the increase in attitude scores was much greater in the intervention group than the control group (72.13 vs 67.75). If at the beginning of the intervention, the attitude scores were not significantly different ( $p = 0.058$ ), then after the intervention there was a significant difference in attitude scores between the intervention and control groups (0.004).

Table 6. Results of Differences in Knowledge and Attitude Scores between Intervention and Control Groups Before and After Intervention of Adolescent Girl in Junior High School

Variabel	Score	Intervention	Control	p
Knowledge	<i>Pretest</i>	43,42	44,85	0,928
	<i>Posttest</i>	71,93	57,72	0,000
Attitude	<i>Pretest</i>	63,96	60,09	0,058
	<i>Posttest</i>	72,13	67,75	0,004

Table 7. Results of Pre-Post Test Differences in Knowledge and Attitude Scores Between Intervention and Control Groups

Variabel	Intervention				Control			
	Pre	Post	Diff	p	Pre	Post	Diff	p
<b>KNOWLEDGE</b>								
Average	43,42	71,93	28,51	0.000	44,85	57,72	12,87	0.000
Minimum	16,00	58,00			16,00	33,00		
Maximum	75,00	95,00			75,00	91,00		
<b>ATTITUDE</b>								
Average	63,96	73,13	9,17	0.000	60,09	67,75	7,66	0.000
Minimum	46,00	59,00			46,00	56,00		
Maximum	79,00	86,00			84,00	87,00		

The same results were also obtained from the research of Sari, et al (2018) which showed that there was an increase in knowledge scores in respondents who received nutritional interventions for 6 weeks with a  $p < 0.05$  value which means that statistically there was a significant change in knowledge scores before and after being given interventions for 6 weeks. This research is also in line with research conducted by Zuraida (2020) which states that there is an increase in the average attitude score in anemic adolescents who received nutritional interventions and statistically there are significant differences in attitude scores before and after being given nutritional interventions. Knowledge of nutrition can be used as a provision for adolescents to choose healthy foods and understand that food is closely related to nutrition and health. Some nutritional and health problems in adulthood can actually be corrected as teenagers through providing knowledge and awareness about healthy eating habits and lifestyles.

In this case, parents and people around play a role in shaping the child's knowledge that will shape the child's attitude. So in this study, respondents' mothers have been given knowledge and skills related to anemia. The teacher can influence the mindset, behavior, attitude of the child in shaping their personality. Teachers always provide encouragement and motivation to children's success in shaping children's personalities and attitudes. (Rusmanto, 2013 ; Rahmawati, 2019).

#### Adolescent Girls Eating Behavior

Calories (kcal)



Before the intervention calorie intake between the intervention group and the control group had a difference (1,676.6 kcal vs. 1,215.3 kcal). After 6 weeks of intervention, both treatment groups experienced an increase in caloric intake, but the increase in calorie intake was much greater in the control group than in the intervention group (232 kcal vs. 43 kcal). If at the beginning of the intervention, the calorie intake between the treatment groups was not significantly different ( $p=0.353$ ), then after the intervention there was a significant difference in calorie intake between the intervention and control groups ( $p=0.002$ ).

#### Iron (mg)

Before the intervention, the iron intake between the intervention group and the control group had a slight difference (9.94mg vs. 9.32mg). After 6 weeks of intervention, both treatment groups had an increase in iron intake, but the increase in iron intake was greater in the intervention group than in the control group (15.20mg vs. 13.17mg). If at the beginning of the intervention, the iron intake between the treatment groups was not significantly different ( $p=0.208$ ), then after the intervention there was a significant difference in iron intake between the intervention and control groups ( $p=0.004$ ).

#### Carbohydrates (grams)

Before the intervention, there was a difference in carbohydrate intake between the intervention group and the control group (210.68g vs. 207.44g). After 6 weeks of intervention, both treatment groups had an increase in carbohydrate intake, but the increase in carbohydrate intake was greater in the intervention group than in the control group (253.07g vs. 221.91g). If at the beginning of the intervention, carbohydrate intake between the treatment groups was not significantly different ( $p=0.864$ ), then after the intervention there was a significant difference in carbohydrate intake between the intervention and control groups ( $p=0.020$ ).

#### Protein (grams)

Before the intervention, the protein intake between the intervention group and the control group was different (58.55g vs. 51.15g). After 6 weeks of intervention, both treatment groups had an increase in protein intake, but the increase in protein intake was much greater in the intervention group than in the control group (71.91g vs. 57.72g). If at the beginning of the intervention, the protein intake between the treatment groups was not significantly different ( $p=0.102$ ), then after the intervention there was a significant difference in protein intake between the intervention and control groups ( $p=0.001$ ).

#### Fat (grams)

Before the intervention, there was a difference in fat intake between the intervention group and the control group (34.66mg vs. 34.91mg). After 6 weeks of intervention, both treatment groups had an increase in fat intake, but the increase in fat intake was greater in the intervention group than in the control group (49.38g vs. 45.24g). Both at the beginning of the intervention ( $p=0.935$ ) and at the end of the intervention ( $p=0.163$ ), the fat intake between the treatment groups was not significantly different.

Table 8. Results of Differences in Adolescent Girls' Eating Behaviors Between Control and Intervention Groups Before and After the Intervention

Daily intake		Intervention Group	Control Group	p
Calori (kcal)	<i>Pretest</i>	1.6766	1.2153	0.000
	<i>Posttest</i>	1.6809	1.4473	0.004
Iron (mg)	<i>Pretest</i>	9.94	9.32	0.208





	<i>Posttest</i>	15.20	13.17	0.004
Carbohydrate (gr)	<i>Pretest</i>	210.68	207.44	0.864
	<i>Posttest</i>	253.07	221.91	0.020
Protein (gr)	<i>Pretest</i>	58.55	51.15	0.102
	<i>Posttest</i>	71.91	57.72	0.001
Fat (gr)	<i>Pretest</i>	34.66	34.91	0.935
	<i>Posttest</i>	49.38	45.24	0.163

Table 9. Results of Pre-PostTest Differences in Eating Behavior Between Control and Intervention Groups

Variable	Intervention				Control			
	Pre	Post	Diff	p	Pre	Post	Diff	p
Calori (kcal)								
Average	1.6766	1.6809	43,0	0.960	1.2153	1.4473	232	0.006
Minimum	823.00	1031.00			75.00	1031.00		
Maximum	2707.00	2525.00			2501	1986.00		
Iron (mg)								
Average	9.94	15.20	5,26	0.000	9.32	13.17	3.8	0.000
Minimum	3.00	8.00			4.00	6.00		
Maximum	17.00	19.00			17.00	18.00		
Carbohydrate (gr)								
Average	210.68	253.07	42,3	0.004	207.44	221.91	14,47	0.466
Minimum	115.00	139.00			131.00	139.00		
Maximum	413.00	376.00			500.00	304.00		
Protein (gr)								
Average	58.55	71.91	13,36	0.001	51.15	57.72	6,57	0.150
Miminum	27.00	37.00			40.00	29.00		
Maximum	122.00	106.00			105.00	73.00		
Fat (gr)								
Average	34.66	49.38	14.72	0.002	34.91	45.24	10.33	0.001
Minimum	10.00	29.00			14.00	26.00		
Maximum	65.00	73.00			67.00	69.00		

Table 10. Adolescent Girls' Dietary Intake compared to Nutritional Adequacy Rates Before and After Intervention

Adolescen Girls' Intake		Intervention		Control	
		Intake	%AKG	Intake	%AKG
Calori (kcal)	<i>Pretest</i>	1.676,6	81,78	1.215,3	59,28
	<i>Posttest</i>	1.680,9	81,99	1.447,3	70,60
Iron (mg)	<i>Pretest</i>	9,94	68,6	9,32	62,13



	<i>Posttest</i>	15,20	101,3	13,17	87,80
Carbohidrat (gr)	<i>Pretest</i>	210,68	70,22	207,44	69,14
	<i>Posttest</i>	253,07	84,33	221,91	73,97
Protein (gr)	<i>Pretest</i>	58,55	81,13	51,15	78,69
	<i>Posttest</i>	71,91	110,63	57,72	88,80
Fat (gr)	<i>Pretest</i>	34,66	49,51	34,91	49,87
	<i>Posttest</i>	49,38	70,54	45,24	64,62

Similar results were also obtained from a study conducted by Zuraida R (2020) that there was a significant increase in iron intake of adolescent girl after being given nutritional interventions. Another research that is also supportive was carried out by Pibriyanti et al (2021) which stated that there was an increase in iron intake in adolescent girl after being given nutritional interventions in the form of iron supplementation.

#### Adolescent Girls' Hemoglobin Level

Before the intervention Hb levels between the intervention group and the control group had differences (10.87 g/dL vs 10.82/dL). After 6 weeks of intervention, both treatment groups had an increase in Hb levels, but the increase in Hb levels was much greater in the control group than in the intervention group (12.35g/dL vs 11.8/dL). If at the beginning of the intervention, the Hb levels between the treatment groups were not significantly different ( $p=0.509$ ), then after the intervention there was a significant difference in Hb levels between the intervention and control groups ( $p=0.000$ ).

Table 11. Results of Different Hb Levels (g/dL) Between Control and Intervention Groups Before and After Intervention

Variable	Scor	Intervention	Control	Nilai p
Hb (g/dL)	<i>Pretest</i>	10.40	9.98	0.509
	<i>Posttest</i>	12.35	11.80	0.000

Table 12. Different Test Results of Pre-PostTest Hemoglobin Levels (g/dL) between Control and Intervention Groups

Variable	Intervention				Control			
	Pre	Post	Beda	Nilai p	Pre	Post	Beda	Nilai p
Average	10.40	12.35	1.95	0.000	9.98	11.80	1.82	0.002
Minimum	9.0	8.70			10.00	8.90		
Maximum	11.90	15.40			11.90	14.70		

Another study showed the same results, it was found that there was an increase in hemoglobin levels in adolescent girl who received nutritional interventions for 6 minggu (Sari et al, 2018). Nutritional knowledge through education and counseling plays a role in providing how to choose food well so that it can achieve a state of adequate nutrition (Tirthawati et al, 2020). Comprehensive nutrition education interventions in children, parents and teachers play a role in increasing children's hemoglobin levels. comprehensive nutrition education interventions in children, parents and teachers play a role in increasing children's hemoglobin levels. In addition, supervision of food types and diet can also help prevent anemia (Sofianita et al, 2018).

#### Conclusion and Recommendation



Based on the results of research and discussion on changes in knowledge, attitudes, food intake and hemoglobin levels in adolescent girls with anemia at Junior High School 1 Tanjung Sari who received nutritional intervention, it can be concluded that after 6 weeks of implementing the Free-Club Anemia model as an anemia control intervention model School-based iron nutrition combined with iron supplements had a significant effect on nutritional knowledge of anemic adolescent girls in Junior High School, at the beginning of the intervention, the knowledge score was not significantly different ( $p = 0.928$ ), after the intervention there was a significant difference in knowledge scores between groups. intervention and control (0.000). The Free-Club Anemia model was able to increase the knowledge score of adolescent girls in the intervention group by 28.51 points, while in the control group there was only an increase of 12.87 points.

In attitude scores, after 6 weeks of applying the Free-Club Anemia model after the intervention, there was a significant difference in attitude scores between the intervention and control groups (0.004) and at the beginning of the intervention, the attitude scores were not significantly different ( $p=0.058$ ). This means that the CBA model is able to increase the attitude score of adolescent girls in the intervention group by 9.17 points, while in the control group there is an increase of 7.66 points.

The application of the CBA model after 6 weeks had a significant effect on the behavior of iron intake of anemic adolescent girls in Junior High School, where at the beginning of the intervention, iron intake between treatment groups was not significantly different ( $p=0.208$ ), then after the intervention there was a significant difference in iron intake between the intervention and control groups ( $p=0.004$ ). The CBA model was able to increase iron intake in the intervention group by 15.2mg, while in the control group by 13.17mg.

The same thing was also obtained from the value of Hb levels after applying the CBA model for 6 weeks, if at the beginning of the intervention, the Hb levels between the treatment groups were not significantly different ( $p=0.509$ ), then after the intervention there was a significant difference in protein intake between the intervention and control groups ( $p = 0.000$ ). The CBA model was able to increase the hemoglobin level of adolescent girls in the intervention group by 1.95 g/dL points, while in the control group there was an increase of 1.82 g/dL.

With the results of this study, it is hoped that the Public Health Center (*Puskesmas*) can improve its performance in sustainable health promotion programs by providing periodic counseling in the context of anemia rates in their area. In addition, adolescent girls are also expected to maintain healthy behaviors that have been implemented, especially for those who suffer from anemia to prevent complications.



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