

Differences In Nutritional Intake And Consumption Of Fe Tablets On The Incidence Of Anemia In Adolescent Girls In Urban And Rural Areas

ABSTRACT

Backgrounds

Iron nutritional anemia is anemia that arises due to empty iron reserves in the body so that the formation of hemoglobin is disrupted. Hemoglobin is part of red blood cells used to determine anemia status. Decreased iron intake can reduce hemoglobin levels in the body.

Aim

The purpose of the study was to determine food intake and consumption of blood supplement tablets (Fe) on the incidence of anemia among adolescent girls in Urban and Rural areas.

Study design.

This type of research is Experimental Research using Quasi Experimental design

Place and duration of study.

This research was carried out at SMP Negeri 3 Manado and SMP Kristen Koha after obtaining approval from the ethics commission in August – September 2023

Methods

The population in this study were adolescent girls in SMP Negeri 3 Manado and SMP Kristen Koha. The sample in this study was obtained from the Estimating the difference between two population proportions with absolute precision formula totaling 88 students divided into 44 adolescent girls in urban areas and 44 adolescent girls in rural areas.

Results

This study indicates that there is a difference in the average hemoglobin levels of adolescent girls in State Junior High School 3 Manado and Kristen Koha with a value of $p < 0.005$, there is a difference in the average food intake (energy) of adolescent girls State Junior High School 3 Manado and Kristen Koha with a value of $p < 0.005$, there is a difference in the average consumption of Fe tablets of adolescent girls in State Junior High School 3 Manado and Kristen Koha with a value of $p < 0.005$.

Conclusion

The conclusion of this study is that there is a difference in the average hemoglobin levels of urban and rural adolescent girls with $p < 0.005$, there is a difference in the average food intake (energy) of urban and rural adolescent girls $p < 0.001$, and there is a difference in the average consumption of Fe tablets of urban and rural adolescent girls with $p < 0.004$.

Keywords: Nutrition Intake, Fe Tablet, Hemoglobin, urban, rural

INTRODUCTION

Anemia is a condition where the number of red blood cells decreases, which is manifested by a decrease in hemoglobin levels, hematocrit, and the number of red blood cells. Hemoglobin synthesis requires sufficient iron and protein in the body. This protein plays a role in transporting iron to the bone marrow to form new hemoglobin molecules¹. Anemia is directly affected by the daily intake of iron-free foods. In general, food consumption is closely related to nutritional status. Universally, Iron Deficiency Anemia (IDA) is the most common nutritional problem, affecting approximately 2 billion people worldwide, the majority (89%) of whom live in developing countries. IDA affects approximately 300 million children worldwide, ranging in age from 6 months to 5 years. In developing countries, IDA is a common health problem affecting infants, preschoolers,

and school children due to rapid growth coupled with depleting iron stores, poor living conditions, and inadequate diets.²

The long-term impact of anemia in the future due to iron deficiency when a young woman is married and pregnant means she is unable to meet the needs of herself and the fetus in her womb so that bleeding will occur during childbirth and after birth, in babies, namely low birth weight (LBW), even premature babies.³

The relationships between teenagers in cities and villages are very different, but as time goes by, not all residents in rural areas are left behind by the progress of the times. There are villages that follow technological advances and the progress of the times. Even though they keep up with current developments and follow technology, they still filter the information that enters their minds. People who live in villages are usually more independent and productive compared to people in cities who rarely practice farming and gardening. Apart from the lack of farming land, people in urban areas don't want to get tired and are used to the instant life of everything in the city.⁴

Iron needs are influenced by the body's physiological conditions such as pregnancy, menstruation, growth and breastfeeding. Teenagers need quite a lot of iron because during adolescence there is rapid growth. The insufficient amount of iron in food occurs because Indonesian people's consumption patterns are still dominated by vegetables, which are non-heme iron.⁵

Globally, around 600 million preschool and school-aged children suffer from anemia. China has experienced a rapid economic transition over the past few decades, children's diet and nutritional status have improved rapidly and the prevalence of anemia among school-age children has decreased from 18.8% in 1995 to 9.9% in 2010.⁶ Results of Riskesdas 2018, with the proportion of anemia in the age group 15-24 years and 25-34 years.⁷ (Ministry of Health, 2018). The National Health Survey also shows that the prevalence of anemia in suburban areas is higher than in urban areas (Purba et al, 2021). The problem of anemia in young women will result in stunted motoric, mental and intelligence development, decreased learning achievement, decreased fitness levels, and not achieving maximum height.⁸

Based on data related to giving Fe tablets to young women in the Tateli Health Center area, Mandolang District, Minahasa Regency in 2018, there were 400 young women and in 2019 there were 380 young women. Meanwhile, Tuminting data related to giving Fe tablets to young women in the Tuminting Health Center area, Tuminting District, Manado City in 2018 was 680 young women and in 2019 there were 410 young women.

Several studies have explained the relationship between iron intake and the incidence of anemia, including research conducted by Purba, et al in 2021, it was found that there was a relationship between food intake and the incidence of anemia in young women at SMP Negeri 3 Hiliserangkai. In addition, research conducted by⁹Pou, et al in 2015 showed that there was a significant relationship between iron intake and the incidence of anemia in female students at SMP Negeri 10 Manado with a prevalence of 10.2%. The results of research by Assa, et al 2016 at SMP Negeri 5 Manado City showed that there was a relationship between iron intake and the incidence of anemia in female students of SMP Negeri 5 Manado City.

METHOD

This type of research is experimental research using a quasi-experimental design. The population in this research is young women at SMP Negeri 3 Manado and SMP Kristen Koha. The sample in this research was obtained from the sample size formula Estimating the difference between two populations proportion with absolute precision totaling 88 students divided of 44 young women in urban areas and 44 young women in rural areas.

Univariate analysis was carried out by describing each variable in the study including age, nutritional intake, consumption of Fe tablets, and hemoglobin levels. Bivariate analysis was carried out to analyze differences between research variables. The analysis in this study was carried out using the Independent t-test to analyze differences in nutritional intake and consumption of Fe tablets on the incidence of anemia in urban and rural adolescent girls with the criterion of $p < 0.05$.

This research has received approval from the Health Polytechnic Ethics Commission of the Ministry of Health Manado Number: KEPK /01/ 07/095/2023. July 24, 2023

RESULTS

a) Respondent Characteristics

From the results of research conducted on young women in urban and rural areas, there were 88 respondents with details of 44 respondents in urban areas and 44 respondents in rural areas. The characteristics of each teenager are almost the same, namely in terms of age the respondents are 13 - 15 years old, with female gender. Another supporting characteristic is a description of the state of hemoglobin levels for urban and rural teenagers, which can be described as follows: in urban areas, there are 20 young

women with hemoglobin levels >12 g/dl, while there are 24 young women with hemoglobin levels <12 g/dl, while in rural areas there are 24 young women with hemoglobin levels <12 g/dl. There were 33 people with hemoglobin >12 g/dl, while hemoglobin levels <12 g/dl were 11 people.

b) Results of Examination of Hemoglobin Levels for Young Women in Urban and Rural Areas

Table 1. Examination of Hemoglobin Levels of Adolescent Girls in Urban and Rural Areas

Hemoglobin Levels in Adolescent Girls	Urban		Rural		Amount	
	n	%	n	%	n	%
Good >12 g/dl	20	45.5	33	75	53	60.7
Less <12 g/dl	24	54.5	11	25	35	39.3
Amount	44	100	44	100	88	100

Based on the table above, it can be seen that the results of examination of hemoglobin levels in urban and rural teenage girls were mostly found in rural teenage girls with hemoglobin levels > 12 g/dl (good category), totaling 33 people with a percentage of 75%.

c) Energy Intake of Young Women in Urban and Rural Areas

Table 2. Energy Intake of Young Women in Urban and Rural Areas

Energy Intake of Young Women	Urban		Rural		Amount	
	n	%	n	%	n	%
Normal	20	45.5	33	75	53	60.7
Deficit	24	54.5	11	25	35	39.3
Amount	44	100	44	100	88	100

Based on the table above, it can be seen that the energy intake of young women in urban and rural areas is mostly found in young women in rural areas with a normal energy intake category of 33 people with a percentage of 75%.

d) Consumption of Fe Tablets for Young Women in Urban and Rural Areas

Table 3. Consumption of Fe Tablets for Young Women in Urban and Rural Areas

Consumption of Fe Tablets for Young Women	Urban		Rural		Amount	
	n	%	n	%	n	%
Consume >1 Tablet per Month	20	45.5	33	75	53	60.7
Never	24	54.5	11	25	35	39.3
Amount	44	100	44	100	88	100

Based on the table above, it can be seen that the consumption of Fe tablets among young women in urban and rural areas is mostly found among young women in rural areas with the category of consuming >1 tablet per month totaling 33 people with a percentage of 75%.

Data analysis of differences in nutritional intake and consumption of Fe tablets on the incidence of anemia in young women in urban and rural areas using the Independent t-test

a) Differences in Energy Intake and Hemoglobin Levels of Young Women in Urban Areas

Table 4. Differences in Energy Intake and Hemoglobin Levels of Young Women in Urban Areas

Intake	Consumption of Fe Tablets for Young Women in Urban Areas	n	Mean	Difference	elementary school	Sig
Energy Intake	>1 time/month	20	1,973	0.32	0.0742	0.001
	<Never	24	1,651		0.1015	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the result was $p < 0.05$, so H_1 was accepted, which means there is a difference between energy intake and consumption of Fe tablets for young women in urban areas with $p < 0.001$.

b) Differences in Energy Intake and Fe Tablet Consumption of Young Women in Rural Areas

Table 5. Differences in Energy Intake and Hemoglobin Levels of Adolescent Girls in Rural Areas

Intake	Hb Levels of Young Women in Rural Areas	n	Mean	Difference	elementary school	Sig
Energy Intake	>12 g/dl	33	1,987	0.23	0.0619	0.001
	<12 g/dl	11	1,750		0.0521	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the result was $p < 0.05$, so H1 was accepted, which means there is a difference between energy intake and hemoglobin levels of young women in rural areas with $p < 0.001$.

c) Differences in Energy Intake and Consumption of Fe Tablets for Young Women in Urban Areas

Table 6. Differences in Energy Intake and Fe Tablets for Young Women in Urban Areas

Intake	HB Levels of Young Women in Rural Areas	n	Mean	Difference	elementary school	Sig
Energy Intake	>1 time/month	20	1,973	0.32	0.074	0.001
	<Never	24	1,651		0.1016	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the result was $p < 0.05$, so H1 was accepted, which means there is a difference between energy intake and consumption of Fe tablets for young women in urban areas with $p < 0.001$.

d) Differences in Energy Intake and Fe Tablet Consumption of Young Women in Rural Areas

Table 7. Differences in Energy Intake and Fe Tablets for Young Women in Rural Areas

Intake	HB Levels of Young Women in Rural Areas	n	Mean	Difference	elementary school	Sig
Energy Intake	>1 time/month	33	1,988	0.23	0.0619	0.001
	<Never	11	1,750		0.0520	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the result was $p < 0.05$, so H1 was accepted, which means there is a difference between energy intake and consumption of Fe tablets for young women in rural areas with $p < 0.001$.

e) Differences in Average Energy Intake of Young Women in Urban and Rural Areas

Table 8. Differences in Average Energy Intake of Young Women in Urban and Rural Areas

Intake	Young Women in Rural Urban Areas	n	Mean	Difference	elementary school	Sig
Energy Intake	Urban	44	1,798	0.13	0.185	0.001
	Rural	44	1,928		0.120	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the results were $p < 0.05$, so H1 was accepted, which means there is a difference in the average energy intake of urban and rural adolescent girls with $p < 0.001$.

f) Differences in Average Consumption of Fe Tablets for Young Women in Urban and Rural Areas

Table 9. Differences in Average Consumption of Fe Tablets for Young Women in Urban and Rural Areas

Consumption	Young Women in Rural Urban Areas	n	Mean	Difference	elementary school	Sig
Consumption of Fe Tablets	Urban	44	0.45	0.3	0.504	0.004
	Rural	44	0.75		0.438	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the results were $p < 0.05$, so H1 was accepted, which means there is a difference in the average consumption of Fe tablets for urban and rural female teenagers with $p < 0.004$.

g) Differences in Average Hemoglobin Levels of Adolescent Girls in Urban and Rural Areas

Table 10. Differences in Average Hemoglobin Levels of Adolescent Girls in Urban and Rural Areas

Hb level	Young Women in Rural Urban Areas	n	Mean	Difference	elementary school	Sig
Urban and Rural Teenagers	Urban	44	12,314	1.2	2,150	0.005
	Rural	44	13,525		1,818	

Based on the table above, you can see the results of bivariate analysis using the independent t-test, the results were $p < 0.05$, so H_1 was accepted, which means there is a difference in the average hemoglobin levels of urban and rural adolescent girls with $p < 0.005$.

DISCUSSION

School-age children are human resources who are still in the growth and development stage. It is hoped that the growth and development of school-age children can run optimally so that they can become high-quality successors to the nation. However, as they grow and develop, school-aged children may be at risk of developing health problems¹⁰.

The difference in the average energy intake of young women in urban and rural areas using the independent t-test resulted in $p < 0.01$, so there is a difference in the average energy intake of young women in urban and rural areas. The description of the energy intake of young women in urban areas is that most of the energy intake is in the deficit category, while the energy intake of young women in rural areas is mostly in the normal category with a difference from the average intake of 0.13. This is in line with the results of research conducted by¹¹, namely regarding the level of nutritional intake of teenagers, most of them are still categorized as unbalanced, with a deficit in the level of energy adequacy, this also occurs in the level of adequacy of carbohydrates, protein and fat. Another factor that influences nutritional intake is the lack of food availability at the family level, causing teenagers to have an intake level that just satisfies hunger. The results of Zahroh's research suggest the need to increase food security at the family level and provide education to teenagers about balanced food intake and healthy eating patterns for their future. This is also in line with research conducted by¹², namely, the average energy intake of subjects in the city (2363kcal) was higher when compared with subjects in the village (1887kcal). The energy intake of teenagers in the city was 44.9% still in the deficient category, 38.8% of subjects' intake was excessive and 16.3% of subjects' intake was normal. The data obtained for subject intake for the village area was that 60% of the subject's energy intake was still in the deficient category, 24.5% of the subject's intake was excessive and around 13.3% of the subject's intake was in the normal intake category.

The difference in the average consumption of Fe tablets for young women in urban and rural areas using the independent t-test resulted in $p < 0.04$, so there is a difference in the average consumption of Fe tablets for urban and rural young women with a difference in the average consumption of Fe tablets, namely 0.3. These results are supported by research conducted by¹³, through experimental research with treatment for one month giving Fe tablets to 38 young women, it was found that the average value of Hb levels of female students who were anemic showed that the mean difference between before and after giving Fe tablets was 1.550 with a standard deviation of 0.9051. p value = 0.000, and it was concluded that there was a significant effect between giving Fe tablets on the increase in Hb levels of class X female students who were anemic. In line with research conducted by¹⁴, stated that there is a relationship between knowledge and iron consumption in rural adolescents in Ghana. Apart from that, there is also research conducted by¹⁵, found a relationship between knowledge and compliance with taking Fe tablets in young women at Vocational High School (SMK) level.

The difference in the average hemoglobin levels of young women in urban and rural areas, through the results of bivariate analysis using the independent t-test, the result was $p = 0.05$, so the results obtained were that there was a difference in the average hemoglobin levels of urban and rural young women with the mean for urban young women. 12,314 and rural adolescent girls 13,525 with a difference of 1.2. These results are different from research conducted by¹⁶, namely, the average hemoglobin level in adolescents who received Fe supplementation was 11.5 (1.79) gr/dl, with a value range of 7.6-14.5. Meanwhile, the average hemoglobin level in adolescents who did not receive Fe supplementation was 11.7(1.84) gr/dl, with a value range of 7.8-15.3. Based on this, on average both groups were still anemic.

CONCLUSION

The results of the examination of hemoglobin levels > 12 g/dl (good category) were 33 students (75%) in young women in rural areas. Energy intake in the good category was mostly found among young women in rural areas with 33 students (75%). The frequency of consumption of Fe tablets > 1 tablet per month was 33 people (75%) found among young women in rural areas.

There is a difference in the average hemoglobin levels of urban and rural adolescent girls with $p < 0.005$. There is a difference in the average energy intake of urban and rural adolescent girls with $p < 0.001$. There is a difference in the average consumption of Fe tablets for urban and rural female teenagers with $p < 0.004$.

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