DifIronrencesIn Nutritional Intake And Consumption Of IronTablets 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 (Iron) 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 difIronrence 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 difIronrence 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 difIronrence 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 difIronrence in the average consumption of Iron 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 difIronrence in the average hemoglobin levels of urban and rural adolescent girls with $p<0.005$, there is a difIronrence in the average food intake (energy) of urban and rural adolescent girls $p<0.001$, and there is a difIronrence in the average consumption of Iron tablets of urban and rural adolescent girls with $p<0.004$.

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

INTRODUCTION

Anemia is a condition where the number of red blood cells decreases, which is maniIronsted 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 molecules[1]. Anemia is directly afIroncted 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, afIroncting approximately 2 billion people worldwide, the majority (89%) of whom live in developing countries. IDA afIroncts approximately 300 million children worldwide, ranging in age from 6 months to 5 years. In developing countries, IDA is a common health problem afIroncting 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 Irontus in her womb so that bleeding will occur during childbirth and after birth, in babies, namely low birth weight (LBW), even premature babies.[3].

One of the changes associated with sexual and reproductive maturation in adolescent girls is menstruation. Menstruation is the periodic discharge of blood from the uterus or womb. Teenagers often experience pain before and during menstruation which is called dysmenorrhoea[4]. Symptoms of dysmenorrhoea include cramps in the lower abdomen and lower back, such as heartburn, tingling, diarrhoea, and even unconsciousness before or during menstruation[5].

Dysmenorrhoea is also associated with inadequate nutrient intake. Research on adolescent girls found that the incidence of dysmenorrhoea was related to iron intake. Almost half of adolescent girls experience mild dysmenorrhoea and have insufficient iron (Fe) intake. Lack of iron intake can cause interference in the formation of haemoglobin. A low amount of haemoglobin in red blood cells will contribute to anaemia. Haemoglobin binds oxygen to be circulated throughout the body. If haemoglobin is reduced, the amount of oxygen that will be bound and circulated throughout the body will be less. As a result of this condition, the blood vessels in the narrowed reproductive organs do not receive enough oxygen, causing pain[6].

The relationships between teenagers in cities and villages are very difIronrent, 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 liIron of everything in the city[7].

Iron needs are influenced by the body's physiological conditions such as pregnancy, menstruation, growth and breastIroneding. 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[8].

Globally, around 600 million preschool and school-aged children sufIronr from anemia. China has experienced a rapid economic transition over the past Ironw 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[9].Results of Riskesdas 2018, with the proportion of anemia in the age group 15-24 years and 25-34 years[10]. (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.[11, 20-23].

Based on data related to giving Iron 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 Iron 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 by[12]Pou, et al in 2015 showed that there was a significant relationship between iron intake and the incidence of anemia in Ironmale 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 Ironmale 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 difIronrence between two populations proportionwith absolute precision totaling 88 students divided of 44 young women in urban areas and 44 young women in rural areas.Food intake data was collected by interview using a 24-hour recall questionnaire, Fe tablet consumption data using a questionnaire, and haemoglobin data was obtained by measuring haemoglobin levels using the Nesco NW-01 Kit (HB) for HB examination using a Hematology Analyzer.

Univariate analysis was carried out by describing each variable in the study including age, nutritional intake, consumption of Iron tablets, and hemoglobin levels. Bivariate analysis was carried out to analyze difIronrences between research variables. The analysis in this study was carried out using the Independent t-test to analyze difIronrences in nutritional intake and consumption of Iron 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 Ironmale 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 Iron Tablets for Young Women in Urban and Rural Areas

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

Consumption of Iron 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 Iron 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 difIronrences in nutritional intake and consumption of Iron tablets on the incidence of anemia in young women in urban and rural areas using the Independent t-test

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

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

Intake	Consumption of Iron Tablets for Young Women in Urban Areas	n	Mean	DifIronrence	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 H1 was accepted, which means there is a difIronrence between energy intake and consumption of Iron tablets for young women in urban areas with p<0.001.

b) DifIronrences in Energy Intake and Iron Tablet Consumption of Young Women in Rural Areas

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

Intake	Hb Levels of Young Women in Rural Areas	n	Mean	DifIronrence	elementary school	Sig
Energy	>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 difIronrence between energy intake and hemoglobin levels of young women in rural areas with p<0.001.

c) DifIronrences in Energy Intake and Consumption of Iron Tablets for Young Women in Urban Areas

Table 6. DifIronrences in Energy Intake and Iron Tablets for Young Women in Urban Areas

Intake	HB Levels of Young Women in Rural Areas	n	Mean	DifIronrence	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 difIronrence between energy intake and consumption of Iron tablets for young women in urban areas with p<0.001.

d) DifIronrences in Energy Intake and Iron Tablet Consumption of Young Women in Rural Areas

Table 7. DifIronrences in Energy Intake and Iron Tablets for Young Women in Rural Areas

Intake	HB Levels of Young Women in Rural Areas	n	Mean	DifIronrence	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 difIronrence between energy intake and consumption of Iron tablets for young women in rural areas with p<0.001.

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

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

Intake	Young Women in Rural Urban Areas	n	Mean	DifIronrence	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 difIronrence in the average energy intake of urban and rural adolescent girls with p<0.001.

f) DifIronrences in Average Consumption of Iron Tablets for Young Women in Urban and Rural Areas

Table 9. DifIronrences in Average Consumption of Iron Tablets for Young Women in Urban and Rural Areas

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

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 difIronrence in the average consumption of Iron tablets for urban and rural Ironmale teenagers with p<0.004.

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

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

Hb level	Young Women in Rural Urban Areas	n	Mean	DifIronrence	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 H1 was accepted, which means there is a difIronrence 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 problems[13].

The difIronrence 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 difIronrence 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 difIronrence from the average intake of 0.13. This is in line with the results of research conducted by[14], 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 by[15],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 difIronrence in the average consumption of Iron tablets for young women in urban and rural areas using the independent t-test resulted in p<0.04, so there is a difIronrence in the average consumption of Iron tablets for urban and rural young women with a difIronrence in the average consumption of Iron tablets, namely 0.3. These results are supported by research conducted by[16], through experimental research with treatment for one month giving Iron tablets to 38 young women, it was found that the average value of

Hb levels of Ironmale students who were anemic showed that the mean difIronrence between before and after giving Irontablets was 1.550 with a standard deviation of 0.9051. p value = 0.000, and it was concluded that there was a significant efIronct between giving Iron tablets on the increase in Hb levels of class X Ironmale students who were anemic. In line with research conducted by[17],stated that there is a relationship between knowledge and iron consumption in rural adolescents in Ghana. Apart from that, there is also research conducted by[18],found a relationship between knowledge and compliance with taking Iron tablets in young women at Vocational High School (SMK) level.

The difIronrence 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 difIronrence 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 difIronrence of 1.2. These results are difIronrent from research conducted by[19],namely, the average hemoglobin level in adolescents who received Iron 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 Iron 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 Iron tablets >1 tablet per month was 33 people (75%) found among young women in rural areas.

There is a difIronrence in the average hemoglobin levels of urban and rural adolescent girls with p<0.005. There is a difIronrence in the average energy intake of urban and rural adolescent girls with p<0.001. There is a difIronrence in the average consumption of Iron tablets for urban and rural Ironmale teenagers with p<0.004.

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