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Instant drink of tamarillo as a supplementation for reducing anemia in teenage girl

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ABSTRACT

Background

Anemia in teenage girl is a condition when the hemoglobin level less than 12 gr / dl. One causes of anemia in teenage girls is iron deficiency due to rapid growth in adolescents which causes an increase in nutrient requirements to compensate for their needs. One of the government programs to overcome anemia is by giving Blood Add Tablet (TTD) and food supplementation. The nutritional content of iron-dried tamarillo is 23.603 mg, vitamin C 611.407 mg, vitamin A 1,549 mg per 100 grams of dried tamarillo. Instant drink of tamarillo is a practical product that has the same taste as the fresh fruit, the storage is more durable than the fresh fruit.

Objective

To prove the Instant drink of tamarillo as supplementation for anemic teenage girls.

Methods

Quasy Eksperimental with nonrandomized pretest posttest with control group design. The research subjects were anemic teenage girls, HB 8-11.9 gr / dl, 36 respondents divided into 2 intervention groups 16 respondents and controls 16 respondents. The intervention group was given an Instant drink of tamarillo of 44 gr and fe tablet 1x a day for 14 days while the control group was given tablet fe 1x per day for 14 days. HB, measured by Hematology Analizer. Wilcoxon Rank paired T test and Mann Whitney U Test.

Results

There were significant differences in hemoglobin levels before and after being given 44gr and tablet fe instant drinks before the average treatment of 11.21 gr / dl and after treatment 12.24 gr / dl with a difference of 1.03 gr / dl, p value 0.001. There was a significant difference in mean hemoglobin levels before and after the fe tablet was given in the control group ie 11.17 gr / dl after the average treatment of 11.72 gr / dl with a difference of 0.55 gr / dl, p value 0.001. There were significant differences in hemoglobin levels between groups where the hemoglobin level of the intervention group 12.24 gr / dl was higher than the control group 11.72 gr / dl with a difference of 0.52 gr / dl with p value 0.022.

Conclusion

Instant drink of tamarillo 44 gr and Fe tablets 1x / day for 14 days increased hemoglobin, hematocrit and erythrocyte levels in anemic adolescents.

Suggestion

Instant drink of tamarillo can be used as supplementation to overcome anemia.

Keywords: Instant drink of tamarillo, Anemia, Teenage girl

PRELIMINARY

Anemia is still a matter of the highest in the world, the prevalence of anemia in developing countries an estimated 27% and 6% in developed countries. Anemia is prevalent in society, especially in adolescents and pregnant women, according to data from the World Health Organization (WHO) showed patients with anemia in the world by 40% -88% experienced by girls. The WHO said if cases of anemia more than 40% then included anemia bad category in suatau State, there are 9 out of 10 people suffering from anemia in developing countries. [1]

According to WHO (2011) anemia is a condition in hemoglobin concentration was below the normal value and the hemoglobin is an indicator of anemia, for children and pregnant women <11 g / dl, non-pregnant women <12 g / dl, severe anemia <7 g / dl in children and pregnant women while the woman is not pregnant <8 g / dl.[5]Anemia that much happened in some cases that is iron-deficiency anemia, an anemia caused by deficiency of iron intake in the body that plays an important role in the formation of hemoglobin. When the hemoglobin concentration decreases the capacity of the blood that carry oxygen below normal, it causes the body easily tired, tired, pale face, decreased concentration, physical activity was not optimal, and others. Iron loss also occurs in adolescents who are in a diet program by restricting food intake for the sake of an ideal body weight, but every day people experience loss of as much as 0.6 mg of iron through feces and menses.[6] [7]Iron deficiency anemia is considered as a major role in disease problems in the world, especially common in women and pediatric population.

Girls are more at risk of anemia due to rapid growth in teenagers, will result in increased nutrient requirements for growth offset. But the fact that the intake of food consumed by young women is still lacking, so it does not meet the nutritional needs should be. The need for iron in girls increased when they are menstruating, if the amount of blood that comes out pretty much the amount of iron in the body is also experiencing loss is large enough, it will lead to anemia. At the time of a woman's menstrual iron will lose around 1,25mg per day. [8]

Anemia in adolescents will have an impact on health include: lowering the concentrations studied, interfere with growth, lower physical ability, fatigue, decreased appetite, dizziness and face became pale. [9, 10] Anemia in girls is when the hemoglobin level in the blood of less than 12 g%. (Aris-man 2010). If it is not treated immediately it will be bad for the health and the quality of the next generation in the future. Lack of iron in adolescence without balanced with adequate iron intake during pregnancy will impact the future that will lead to optimal fetal growth, low birth weight, the risk of bleeding during childbirth and increases the risk of maternal and infant mortality.

Therefore, the Indonesian government since 1996 has run a program of prevention and control of nutritional anemia in women of reproductive age (WUS) to improve early intervention WUS ie since his teens. The program aims to support the reduction in the risk of bleeding due to anemia in pregnant women. Program supplementation of iron or iron tablet (TTD) on girls are expected to contribute to lower malnutrition between generations. TTD Award in girls is 1 tablet per week and 1 tablet per day for 10 days when menstruation. [11, 12]

A healthy diet and recommended is with four of five perfectly healthy menu which includes varieties of fruit. One source of iron from the fruit, ie fruit Dutch eggplant, the content of fruit Dutch eggplant has many benefits for the body because it contains important nutrients such as: high in

antioxidants, vitamins, minerals, calcium, iron, fiber, flavonoids function as an antioxidant with other benefits, namely to protect the cell structure, improve the effectiveness of vitamin C, anti-inflammatory and antibiotic. Effect on the quality of red blood cells., vitamin C helps increase iron absorption up to fourfold. Therefore, the content of vitamin C can prevent anemia and useful as antioxidants that neutralize free radicals. The content of vitamin C in 100 gram Dutch eggplant is 42 grams, 0.9 mg of iron and vitamin A for the 5600 SI where vitamin A helps the formation of hemoglobin for iron and vitamin A in food is very good for maintaining the health of epithelial tissue and formed erythrocytes. [13, 14] While the content of Dutch eggplant fruit in the form of higher dry as high as 611.407 mg Vitamin C, Vitamin A and Iron 1,549 23.603 mg per 100 grams of dry powder Dutch eggplant. Therefore Dutch eggplant will be processed into dry products, namely instant drinks Dutch eggplant where the drink is a powder / powder that is in use is easily soluble in water and ready for consumption, this drink has the same taste with fresh fruit and have a shelf life of more durable than with fresh fruit. Dutch eggplant fruit commonly consumed in the community in the form of juices, syrup, juice, candy, viscous extract (jam), dry extract. And not infrequently in some restaurants provide a variety of processed Dutch eggplant is quite popular today, namely juice and desert. [15, 16]

RESEARCH PURPOSES

General purpose

Dutch eggplant prove instant drinks as supplementation in reducing anemia in girls.

Special purpose

a. Knowing the differences in levels of hemoglobin, before and after giving instant drinks and tablets 44gr Dutch eggplant fe 1x / day for 14 days in the intervention group.
b. Knowing the differences in hemoglobin levels before and after administration of tablets fe in the control group.
c. Knowing the differences in hemoglobin of girls who get instant drinks 44gr Dutch eggplant 1x / day for 14 days and tablet Fe compared to getting a tablet Fe

RESEARCH RESULT

Table 1. Characteristics of Respondents by Age and Nutrition

Characteristics	The intervention group (n = 18)	Control group (n = 18)	*p value*
Age			
Mean ± SD	13.33 ± 1.029	12.83 ± 0.707	0.140
Min-Max	11-15	12-14	
Iron			
Mean ± SD	5.93 ± 1.29	5.78 ± 1.84	0.578
Min = Max	4.2 to 9.7	0 to 9.0	
vitamin A			
Mean ± SD	250.2 ± 106.16	224.7 ± 36.95	0.640
Min-Max	172.8 ± 623.6	185.2 ± 302.5	
Vitamin C			
Mean ± SD	15.89 ± 7.26	15.22 ± 6.01	0.578
Min = Max	7.8 ± 32.3	8.7 ± 30.1	

The frequency distribution of respondents by age in the intervention group with a mean age of 13.33 (1.029), in the control group mean age 12.83 (0.707) there minimium age of 11 years and maximum age of 15 years in the intervention group, while the minimum age in the control group 12 years and a maximum of 14 years with the p value 0.140, it indicates that the two groups are different but not significantly.

The data collection characteristics of the subjects based on the diet in terms of intake of iron, vitamin A, vitamin C. According to the table of frequency distribution characteristics of respondents above, the iron intake intervention group had a mean of 5.93 (1.29) 5.78 mean dick group (1.84) of vitamin A in the intervention group had a mean of 250.2 (106.16), while the control group mean of 224.7 (36.95), the value of vitamin C in the intervention group mean of 15.89 (15.89) and the 15.22 average control group (6.01).

Homogeneity test results of all these variables shows that the p value> 0.05, which means that two different groups but not significantly, and nutritional variables same age (not different) so it does not affect the relationship between the provision of intervention or treatment is given to the levels of hemoglobin, hematocrit, and erythrocytes of respondents either treatment group or a control group.

Bivariate analysis

Table 2 Table test normalidas Hemoglobin Before and After Treatment On The intervention group and control group.

variables	Group	before treatment (N = 18) Mean (SD)	after treatment (N = 18) Mean (SD)	p value
Hemoglobin	Intervention	11.21 ± 0.38	12.24 ± 0.82	0,005
	Control	11.17 ± 0.38	11.72 ± 0.39	0.267

*****Shapiro Wilk

Data hemoglobin levels in the intervention group and the control group with a total of 36 respondents, the data is numeric, and less than 50, using Shapiro Wilk normality test that showed abnormal distribution data using a non-parametric statistical test of Wilcoxon.

Hemoglobin levels before treatment in the intervention group showed a mean 11.21 g / dL (0.38) after being given treatment the mean of 12.24 g / dl (0.82) p value 0.005, in the control group before treatment the mean value of 11.17 g / dl (0.38) after the treatment given average 11.72 g / dl (0.39) p value 0.267.

Hemoglobin Levels Before and After Treatment On Intervention and Control Groups

Table 3. Differences in levels of hemoglobin, before and after treatment in the intervention group.

Variables	before treatment	after treatment	*p value*
Hemoglobin			
Mean ± SD	11.21 ± 0.38	12.24 ± 0.82	0,001

- *Wilcoxon*

Hemoglobin values showed significant differences in groups of twos where hemoglobin values after treatment is higher than the value given treatment hemoglobin before 11.21 g / dl (0.38) after treatment of 12.24 g / dl (0.82) by a margin increase of 1, 03 g / dl. It can be concluded granting instant drinks and tablets fe Dutch eggplant can increase hemoglobin levels in the control group

Table 4. Differences in levels of hemoglobin, before and after treatment in the control group.

Variables	before treatment	after treatment	*p value*
Hemoglobin			
Mean±SD	11,21±0,38	12,24±0,82	0,001
Min-MaX	10,50-11,80	10,20-11,80	

*****Wilcoxon

Values above shows that there are significant differences in hemoglobin levels higher after treatment than before treatment mean of 11.17 g / dl (0.38) after treatment average of 11.72 g / dl (0.39) by a margin increase of 0.55 g / dl, it can be concluded that administration fe tablet can increase hemoglobin levels in the control group.

On the Bede Test Hemoglobin Values Intervention Group and Control Group Using the Mann Whitney Test Considerations Non-Parametric Data Distribution**.**

Table 5. Differential test Hemoglobin in the intervention and control.

Variables	Group		*p Value*
	Intervention	**Control**	
Hemoglobin	12.24 ± 0.82	11.72 ± 0.39	0,022
mean Delta	0.52		

The above results show a significant difference in hemoglobin levels between the intervention and control groups with p value <0.05 where the results of the intervention group was higher than the control group with mean delta of 0.52. It can be concluded that the provision of instant drinks and tablets fe Dutch eggplant showed a significant difference in improving hemoglobin in the intervention group than in the control group who only get fe tablet only.

Table 6. Relative Risk Reduction (RRR), Absolute Risk Reduction (ARR) and Number Of Needed (NNT) in the intervention and control groups

Hemoglobin	Group				Total	ARR value	RRR		NNT
	Intervention	**%**	**Control**	**%**			**Intervention**	**Control**	
Anemia	5	27.8	13	72.2	18				
not Anemia	13	72.2	5	27.8	18	0.148	0.385	2,600	6.7
Total	18	100	18	100	36				

The test results ARR (Absolute Risk Reduction) in hemoglobin levels with p value 0.148 shows that there are 14.8% of the 36 respondents ie 5.32 or rounded to 5 respondents certainly not affected by anemia. Based on the RRR (Relative Risk Reduction) value of 0.385 indicates that the intervention group had a 0.385-fold risk of developing anemia compared to a control group that showed the value of 2.6 times at risk of anemia. Value NNT (Number of Needed) with 6.7 results are rounded to 7 that by giving the Dutch eggplant isntan drinks at 7 respondents could prevent one respondent from anemia. It can be concluded that the intervention group who get instant drinks and tablets fe Dutch eggplant has a small risk of anemic compared with the control group who received only a fe tablet has a greater risk of anemia.

DISCUSSION

This study begins with the initial measurement (screening) by taking venous blood then examined levels of hemoglobin <12 g / dl were divided into 2 groups: intervention with therapeutic instant drinks Dutch eggplant 44 grams and tablet fe for 14 days,

while the control group was only given fe tablet alone for 14 days. Then do the post-test to check the hemoglobin value after intervention on day 15.

Characteristics of respondents

Age

The results of research related to the age of the intervention group and the control group showed a variant of data homogeneous or equal equality test (p = 0.140), suggesting that age does not affect the results. In Table 4.1 in the intervention group and the control group was obtained that can didimpulkan half of the respondents in the intervention group was 13 years old and more than half those in the control group was 13 years old.

Nutrition

The data collection characteristics of the subjects based on the diet in terms of intake of iron, vitamin A, vitamin C. According to the table of frequency distribution characteristics of respondents in Table 4.1, the iron intake of the intervention and the control group p value 0.578, vitamin A in the intervention and control groups showed results p value 0.640, the value of Vitamin C in the intervention and control groups with p value 0.578. It mnunjukkan that the data homogeneous and has no effect on the results.

Differences in Hemoglobin levels before and after treatment in the intervention group

Dutch eggplant instant drink 44 grams and tablet fe increase hemoglobin levels after treatment, the mean hemoglobin higher after treatment than before treatment the mean hemoglobin 11.21 g / dl (0.38) after treatment increased to 12.24 g / dl (0, 82) by a margin increase of 1.03 g / dl. The results of this study are consistent with previous studies in 2012 which proved the effect of fruit Dutch eggplant (Solanum Betaceum) to the number of erythrocytes and hemoglobin concentration in male mice, anemia Strain DDW through the induction of Sodium Nitrite (NaNO2), with research showing fruit juice Dutch eggplant effect to increase hemoglobin levels in male mice. [13] Another study by Sofia M 2018, Increased levels of HB in the incidence of anemia by administering syrup kalakai in young women showing the results p value of 0.001, that the hemoglobin level students who are anemic after kalakai given syrup higher than the hemoglobin level before being granted kalakai syrup. [58]

This is consistent with the hypothesis that the first minor Dutch eggplant giving instant drinks and tablets fe increase hemoglobin levels before and after treatment in the intervention group.

Iron is microelements that are essential for the body, especially needed in haematopoiesis (blood formation) at the time of synthesizing hemoglobin, the microelements mineral found in all cells of the body and blood that served as a carrier of oxygen needed cells and carbon dioxide from the cells to the lungs. Iron is non-protein component of hemoglobin, mioglobulin, and cytochromes, iron deficiency causes a failure of heme synthesis. Iron absorption in the gut will be more easily absorbed in the form of ferro, this absorption is regulated by levels of ferritin contained in the cells of the intestinal mucosa, iron will be released first of ionic organic such as proteins before they are absorbed in the stomach and iron in ferric reduced to ferrous form that occurs because the acid in the stomach suasanan for their HCL and vitamin C contained in the food.

Instant drinks Dutch eggplant fruit contains compounds that can increase iron levels in the blood include: iron, vitamin A, vitamin C. In the increase of iron in girls is not only influenced by Fe supplements alone but is supported by the nutrients needed in synthesize hemoglobin.

Iron content contained in instant drinks Dutch eggplant function in iron absorption that occurs in the duodenum and proximal jejenum next to synthesize proteins in plasma will reduce ferric iron (Fe^{3+}) Into ferro (Fe^{2+}) And binds to transferrin to get bone marrow to form hemoglobin. The iron will soon be joined in the blood plasma beta-globulin is apotransferin transferrin which will be then be transported into the plasma. This iron in transferrin binds loose lead can be released to every right in the body, in the cytoplasm of cells, iron is joined by proteins, namely apoferitin to form ferritin.

The content of vitamin A in instant drinks Dutch eggplant helps in the process of erythropoiesis is the process of formation of red blood cells through the interaction with the mobilization of iron to be entered into and transporting oxygen and assist in synthesising

proteins that would affect the growth of bone cells in which the bone marrow is where the formation of erythrocytes will affect hemoglobin levels.

The content of vitamin C in instant drinks Dutch eggplant serves to accelerate the absorption of Fe in the intestinal mucosa so that blood flow to the bone marrow to form hemoglobin which is influenced by vitamin C can increase the acidity in the stomach so that it can increase iron absorption by 30%.

Therefore, instant drink fruit Dutch eggplant contains vitamin C is high so that the provision of iron tablets along with Micronutrients such as vitamin C is recommended because it is more easily absorbed and able to last longer in the body and is more effective in increasing the absorption of iron non-heme in the body up to four times more than that of Fe tablets alone without the support of vitamin C.

Differences in Hemoglobin Levels Before and After Treatment In Control Group

Giving tablet Fe increases hemoglobin levels after treatment after treatment the mean hemoglobin levels higher than before the treatment, the mean hemoglobin 11.17 g / dl (0.38) after treatment average of 11.72 g / dl (0.39) by a margin of improvement 0 , 55 g / dl. The results of this study are consistent with previous studies conducted by Sri Wulandari in 2017 on the effectiveness of consumption of iron tablet during menstruation to increase hemoglobin levels in co-ed D-III Midwifery University of Sand Pengaraian with p value <0.005 that there is a relationship of consumption tablet fe during menstruation to increase hemoglobin levels. The increase in Hb levels after consumption of iron tablet is also in line with research conducted in 2016 Giyanti about the rise in hemoglobin levels in anemic girls at SMK Negeri 1 Ponjong Gunung Kidul. The statistical results obtained value of p = 0.001 (p <0.005) shows the influence of the rising levels of hemoglobin with fe tablet administration. [64]

Both received minor hypothesis that administration of a tablet fe increase hemoglobin levels before and after treatment in the control group.

Fe supplementation is one of the strategies to increase the intake of fesuccessful only if people abide by the rules of consumption. Iron is a mineral needed to form red blood cells, but it also serves as the mineral components to form mioglobulin (the protein that carries oksien to muscles), which is an important element in the process of formation of red blood cells is iron. Lack of iron in the daily diet can lead to iron deficiency.[65]

If the body lacks iron will inhibit the formation of hemoglobin, resulting in the formation of red blood cells is inhibited, resulting in anemia. To mitigate BSI deficiency in the body by taking iron preparations and need to consume foodstuffs good source of iron heme and non-heme. [66]

Differences Hemoglobin In intervention group and control group using the Mann Whitney test

Results showed no significant difference in hemoglobin levels between the intervention and control group with p value <0.05 where the results of the intervention group was higher than the control group mean delta of 0.52. It can be concluded that the provision of instant drinks and tablets fe Dutch eggplant in the intervention group increases hemoglobin levels compared with the control group who received only tablet fe. These results indicate that all three received minor hypothesis that instant drinks and tablets fe Dutch eggplant increase hemoglobin levels compared to girls who get fe tablet only.

Instant drinks Dutch eggplant contains several vitamins and minerals needed by the body such as iron, vitamin C, vitamin A and Other important substances needed by the body, especially in the formation of red blood cells which can be used as a supplement for the girls were anemia, vitamin C content in instant drinks Dutch eggplant accelerate the absorption of iron by up to 4x over, vitamin A content in instant drinks Dutch eggplant helps in the process of erythropoiesis is the process of formation of red blood cells to form hemoglobin. Food products in powder form that is in use is easily soluble in cold water and hot and ready to be consumed is an appropriate alternative to providing healthy beverages and practical. Drinks isntan has the advantage of more economical and more durable storage than fresh fruit.

In the control group who only get iron tablets alone without the support of other nutritional substances it will affect the absorption of iron so biovabilitasnya lower than that of iron tablet along

with instant beverage Dutch eggplant in the intervention group.

This study is in line with research by Zulfiana Goddess of 2018, granting snack bar increase hemoglobin levels in young women with a gift by the snack bar combination tablet fe increase hemoglobin levels compared to girls who get a tablet fe result p value <0.05. [67] Another study conducted by Andiyani Nurul Putri, et al, Effect of juice guava to changes in hemoglobin levels third trimester pregnant women who consume iron tablet in the clinic Pakualaman Yogyakarta shows the results of the increased difference in hemoglobin level of the treatment group and the control group with p value 0,026 <(0, 05) No effect of guava juice to changes in hemoglobin levels in women who consume tablets hamiltrimester III fe compared with the control group, who ate fe tablet.

Relative Risk Reduction (RRR), Absolute Risk Reduction (ARR) and Number of Needed (NNT) in the intervention and control groups.

Results showed that the intervention group who were classified anemia 5 respondents (27.8%) were not anemic 13 respondents (72.2%) while the control group were anemic 13 respondents (72.2%) were not anemic 5 respondents (27.8%) 0.148% ARR values show that 14.8% of the 36 respondents, 5 respondents were certainly not affected by anemia. Based on the RRR in the intervention group had a 0.385-fold risk of anemia, the control group had a 2.6-fold risk of anemia terkana. Value NNT (Number of Needed) with 6.7 results are rounded to 7 that by giving the Dutch eggplant isntan drinks at 7 respondents could prevent one respondent from anemia. Based on these results that the major hypothesis is accepted that the instant beverage Dutch eggplant as supplementation in reducing anemia in girls. With the result there is an increase hemoglobin levels higher in the intervention group who received instant drink which respondents were mostly mild anemic become anemic, while respondents who experienced anemia was becoming mild anemia.

Contributions Findings Against Anemia in Midwifery Service

Based on the results of the study, showed that introducing instant drinks Dutch eggplant increase hemoglobin levels in girls at junior Husnul Khatimah. When linked with the principle of participation of midwifery services in the field of health care facilities may be organized adolescent health through the provision of alternative means of instant drinks Dutch eggplant supplementation for 14 days in teenage anemia. The treatment aims to cure anemia, reduction in patients with anemia, anemia control so that the quality of the patient can be maintained as optimally as possible.

Anemic girls are advised to consume 1x Dutch eggplant instant drinks as much as 44 grams per day, while taking iron tablets (fe) has been given a health worker. These findings can be applied by health workers to teenage anemia. The increase in hemoglobin levels before and after treatment in the intervention group a significant effect, this shows that the administration of Dutch eggplant instant drinks containing iron, vitamin C and vitamin A serves to increase the absorption of iron can improve hemoglobin levels. Provision of standard therapy accompanied by the provision of instant drinks Dutch eggplant is better than any tablet fe.

CONCLUSION

a. Instant drinks Dutch eggplant can be used as supplementation in reducing anemia girls.
b. Hemoglobin levels in the intervention group who get instant drinks and tablets 44gr Dutch eggplant fe 1x per day for 14 days can increase hemoglobin levels (on average before treatment 11.21 g / dL after treatment became 12.24 g / dL) by a margin increase of 1, 03 g / dl.
c. Hemoglobin levels in the control group who received only tablet fe increase hemoglobin levels (mean before treatment 11.17 g / dlsetelah treatment mean 11.72 g / dL) by a margin increase of 0.55 g / dl.
d. Hemoglobin level higher intervention group 12.24 g / dl hemoglobin level while the control group of 11.72 g / dl with a difference of 0.52 g / dl.

SUGGESTION

Health services

Can provide additional information on alternative treatments as supplementation in improving the status of girls anemia anemia by providing instant beverage Dutch eggplant.

For further research

There needs to be more research about menstruation experienced by girls, placebo in the control group to avoid the placebo effect that can affect an increase in hemoglobin, the measurement of nutritional status, more specifically related to nutrition affecting the increase in hemoglobin in girls.

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