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Tomato Fruit Extract Improves the Levels of Hemoglobin (HB) in Pregnant Women the Anaemia who Get Fe Supplementation

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Abstract: ***Background: The prevalence of anemia in the world ranged from 40-88%, 29% not pregnant women and pregnant women aged 15-49 years 38%, government programs in the prevention of anemia with granting Fe, however, the results achieved are not yet optimal. It takes a vitamin c in accelerating the process of absorption of iron. Tomatoes contain vitamin c which can be used as a therapy of non-pharmacological in fixing the status of anemia. Research method: This type of research Experiment, pretest-posttest Quasy with control group design. The total sample of 26 pregnant women anemia trimester II who received supplementation of Fe tablets. Data analysis using Independent test and paired t-test. Results: The awarding of the tomato fruit extracts 660 mg for 10 days can increase the levels of hemoglobin in pregnant women anemia II trimester get tablet supplementation with p-values of Fe value 0.021 (p > 0.005). Conclusion: 660 mg of tomato Extract for 10 days to increased levels of hemoglobin in pregnant women anemia trimester II who received supplementation of Fe tablets.***

Keywords: Tomato Extract, levels of hemoglobin, an anemic pregnant women

1. Introduction

Anemia in pregnant women is a serious problem associated with maternal and infant mortality and morbidity. Complications that can be caused are fetal oxygen requirements are not fulfilled, fetal growth restriction, abortion, length of labor, infection, premature, low birth weight(BBLR), and bleeding.[1]Research that has been done says that the risk factors for BBLR occurrence one of them are anemia in pregnancy.[2]Other studies say that the incidence of anemia in pregnant women affects the incidence of preterm labor.[3]

2. Literature Survey

Anemia affects 29% of non-pregnant women and 38% of pregnant women aged 15-49 years.[4]Anemia prevalence of pregnant women in Asian countries is Myanmar as much as 33.3%, Philippines 32.3%, Thailand 30%, Indonesia 29.6%, Singapore 28.5%, Brunei Darussalam 28.0%, Malaysia 26.6%, and Vietnam at 23.5%.[5]Nationally, anemia prevalence of Indonesian population reaches 21.14%, the biggest prevalence is pregnant women (31.14%) with almost the same prevalence in urban areas (36.4%) and rural areas (37.8%).[6]

Anemia in the majority of pregnant women is caused by iron deficiency because iron requirements in pregnancy increase for the formation of the placenta and red blood cells and preparation of blood that will be lost during childbirth, this increase in iron requirements can reach 100-300%.[7]The government has implemented programs to prevent and overcome anemia in pregnant women with iron (Fe) tablets, but the results have not been optimal, as evidenced by the high prevalence of anemia in pregnant women. Central Java the incidence of anemia for pregnant women is 43.1%.[8] Based on data from the Semarang City Health Profile, coverage of Fe 30 tablets for pregnant women in 2016 was 97.91%, this figure has decreased compared to the 2015 achievement of 98.99%. The decrease in the rate of Fe 30 tablet coverage is because not all pregnant women have their pregnancies checked at a health center in the area where they live.[9]

Increased iron intake (Fe) can be affected by driving and inhibiting factors, absorption of vitamin C is needed to help reduce Ferri to Ferro in the intestine which facilitates the absorption process. The reduction will be greater if the pH in the stomach becomes more acidic, vitamin C can increase acidity which can increase Fe by 30%.[10]According to research conducted in India that the administration of Fe tablets plus vitamin C showed significant changes in hematological parameters compared to the administration of Fe tablets only.[11]

Tomato is a fruit that is rich in vitamin C as much as 40 mg and contains Fe which can function for the formation of red blood cells. The content of vitamin C and Fe in tomatoes can help the mother and baby stay healthy, and help the formation of fetal bones and teeth.[12]Previous research explains that combination therapy of spinach and tomato juice is effective against increasing hemoglobin levels in pregnant women.[13]Eating strawberry juice and tomato juice can also increase hemoglobin levels. But giving tomato juice is more effective than strawberry juice.[14]

Tomatoes also contain lycopene as an antioxidant that functions against the effects of free radicals that cause cell membrane lipid peroxidation and damage the organization of cell membranes. Lipid peroxidation of cell membranes

allows erythrocyte cells to experience hemolysis, which causes hemoglobin to release and cause hemoglobin levels to decrease.[15]Tomatoes can be used as one of the non-pharmacological treatments for improving anemia status in pregnant women.

3. Methods/Approach

The type of Quasy Experiment study with pretest-posttest with control group design, with the independent variable, was the administration of tomato fruit extract with a dose of 660 mg and Fe tablet and the dependent variable was hemoglobin level.The sampling technique used purposive sampling, the number of samples was 26 respondents of II trimester anemia pregnant women who received Fe tablet supplementation which was divided into control groups (administration of Fe tablets) and treatment groups (giving tomato fruit extracts and Fe tablets) conducted for 10 days on May to July 2018.In this study, research ethics included informed consent, anonymity, confidentiality, and truth [11]. Ethical approval was obtained from the Health Polytechnic Semarang Health Research Ethics Committee.

4. Results

Table 1: Descriptioncharacteristics of respondents based on education, employment, and nutritional status

Variable	Group				Total		p-value***
	Treatment		Control				
	n	%	n	%	N	%	
Education							
Low	5	38.5	4	30.8	9	34.6	**0.402**
High	8	61.5	9	69.2	17	65.4	
Job							
Work	4	30.8	3	23.1	7	26.9	**0,443**
Does not work	9	69.2	10	76.9	19	73.1	
Nutritional status							
KEK	3	23.1	2	15.4	5	19.2	**0.341**
Not KEK	1	76.9	11	84.6	21	80.8	

Table 1 shows the results of the homogeneity statistical test there was no significant difference in the characteristics of education, work, and nutritional status in the treatment and control groups (p-value> 0.05), it shows that the researchers managed to control the characteristics of respondents as confounding variables and did not give a bias effect on the results of the analysis.

Table 2: Analysis of the difference in levels of Hemoglobin before and after interventions on Treatment and Control Group

Variable	Group				*p-value*
	Treatment (n=13)		Control (n=13)		
	Mean	±SD	Mean	±SD	
The levels of Hemoglobin					
Pre	9,300	±0,637	9,515	±0,904	0,001
Post	10,961	±0,553	10,253	±0,875	

Table 2 shows the difference in the levels of hemoglobin before and after Interventional treatment and control group with the result that the treatment group at the levels of hemoglobin before intervention average 9.300 gr/dl and after intervention 10.961 gr/dl occurs an increase of 1.661 gr/dl, whereas in the control group averaged – averaged before the intervention 9.515 gr/dl and after intervention of 10.253 gr/dl and experiencing an increase of 0.738 gr/dl, with a value of p-value 0.005 < which means that there is a difference between the levels of hemoglobin before and after given a tomato fruit extracts 660 mg and Fe tablet for 10 days.

Table 3: The difference in levels of Haemoglobin after Intervention between the Treatment and Control

Variable	Mean	±SD	Mean Difference	*p-value*
Level of Hemoglobin				
Control	10,253	0,875	-0,707	0,021
Treantment	10,961	0,553		

Table 3 shows the results that the average hemoglobin levels after the intervention group were given preferential treatment by 10, 961gr/dl and on average control group 10, 253gr/dl with the average difference -0.707 gr/dl, and the p-value value = 0.021 which means that there is a difference of hemoglobin levels in the treatment and control groups after the given intervention.

5. Discussion

The results showed that the administration of Fe tablets together with tomato extract 660 mg for 10 days regularly significantly affected changes in hemoglobin levels 10.961 higher than the control group 10.253.The results above can be explained that giving tomato fruit extract to pregnant women with anemia can increase hemoglobin levels, this is because tomato extract contains iron and vitamin C which is high enough to help the absorption of iron in the body.The role of vitamin C in the process of absorption of iron by the reduction of iron (Fe3 +) Ferri became Ferro (Fe2 +) in the intestine so easily absorbs, the process of the reduction will be even greater when the pH in the stomach is getting sour.Vitamin C can make acid in the stomach increase so that it can increase iron absorption by up to 30%.Vitamin C inhibits the formation of hemosiderin which is difficult to mobilize to free iron when needed. Whereas iron absorption inhibitors are ingredients that come from nature. The strongest inhibitors are food ingredients that contain polyphenol compounds such as tannin contained in tea which can reduce up to 80%.[16]

The research that has been done in India that granting Fe tablet plus vitamin C showed significantly Hematology parameter changes compared to the granting of Fe tablets only.[11]in other studies also explained that the combination therapy spinach and tomato juice effective against elevated levels of hemoglobin in pregnant women Consume.[13]juice strawberries and tomato juice can also increase the levels of hemoglobin. But the granting of tomato juice is more effective than in juices Strawberry.[14]Besides juice, tomato purée is also proven to give significant effects against albino rats hematology.[17]

The results of research conducted by S Mehnaz, et al with the title research on Iron, Folate and Vitamin C supplementation on the prevalence of iron deficiency anemia in non-pregnant females of peri-urban areas of Aligarh obtained results that women who are not pregnant the anemic, when given Vitamin C, folic acid, and iron, showed increased iron.[18]63and also with research conducted by

Krisnapilai Madhavan Nair, Ginnela n. v. Brahmam with the result that the absorption of iron non-heme is significantly greater in the Group consuming iron tablets plus a guava fruit to consume because vitamin C is found in guava which can help the absorption of iron properly.[19]

Tomatoes also contain lycopene as an antioxidant that functions to fight the effects of free radicals and prevent or delay unwanted oxidation or damage to DNA, protein, and fat. In conditions of oxidative stress, free radicals cause lipid peroxidation of cell membranes and damage the organization of cell membranes. Lipid peroxidation of cell membranes allows erythrocyte cells to experience hemolysis, which causes hemoglobin to free and eventually cause a decrease in hemoglobin levels. With the intake of these antioxidant compounds, the attack of free radicals on red blood cells can be minimized and the process of blood cell formation can increase, so that hemoglobin levels can be maintained.[15] Previous studies have shown that lycopene is an antioxidant and has a significant effect on hematological parameters and improves the toxicity of cadmium-induced blood profiles in albino rats.[20]Other studies have shown that guava extract (Psidii folium) has a significant effect on changes in blood profile, in which guava extract has the activity of antioxidant compounds (flavonoids) which will oxidize and bind free radicals and become more stable compounds that reduce oxidation numbers in the blood and the process of blood cell formation can increase, so that hemoglobin levels are maintained.[21]

6. Conclusion

The awarding of the tomato fruit extracts on pregnant women anemia that supplementation with Fe tablet gets a dose of 660 mg/capsules for 10 days to repair the status of anemia, indicated by the presence of elevated levels of hemoglobin.

7. Future Scope

The test was not performed in its entirety the content of tomato fruit extract, in addition to vitamin c and antioxidants.

8. Other Recommendations

Further research needs to be researched more about the substances contained in the tomato extract in addition to vitamin c and antioxidants and other factors that can increase the levels of hemoglobin.

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