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Analysis of Vitamin C and Iron (Fe) Content in Moringa Leaf *Jelly*

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ABSTRACT

***Abstract**. Vitamin C deficiency can trigger iron deficiency and these nutritional problems can contribute to an increase in the number of malnutrition cases and malnutrition. In response to the problem of iron deficiency, the government of East Nusa Tenggara runs various programs, including the provision of supplements in the form of iron tablets. Another effort is to carry out the Supplemental Feeding Program (SFP). The standard formula given by the World Health Organization (WHO) consists of milk, oil, powdered sugar, and water. The modification formula that is quite dense energy and protein consists of materials that are easily available in society at an affordable price. In the international world, the cultivation of moringa leaves is a program that is being promoted, including the province of NTT, one of them. With the processing of moringa leaves into a snack food that is liked by all circles, it will increase the utilization of moringa leaves in society so that the nutritional content of moringa leaves can be absorbed by the body. Jelly drink is expected to be an alternative to fruit juice drink that can improve the stability of fruit juice because this drink has a gel consistency so it can avoid deposition, but easy to drink. This study is a Quasi Experiment using Complete Randomized Design (CRD) which intentionally adds moringa flour to existing making recipes jelly with 3 different concentrations. Data analysis used One-Way Anova Test to see the difference in Vitamin c and Iron levels at each concentration jelly. The results of the One-Way ANOVA test showed that there was an average difference in the concentration of iron and Vitamin C in the jelly with the addition of moringa flour in the composition of 50%, 40%, and 30% (sig = 0.00 <pvalue 0.05).*

Keywords: Vitamin C; Iron; Moringa; Jelly

ABSTRAK

Abstrak. Kekurangan vitamin C dapat memicu kekurangan zat besi dan masalah gizi tersebut dapat menjadi penyumbang dalam penigkatan angka kasus gizi kurang dan gizi buruk. Menanggapi masalah kekurangan zat gizi besi tersebut, pemerintah Nusa Tenggara Timur menjalankan berbagai program, antara lain pemberian suplemen dalam bentuk tablet besi. Usaha lain yang dilakukan adalah dengan menjalankan Program Pemberian Makanan Tambahan (PMT). Formula standar yang diberikan oleh *World Health Organization* (WHO) yaitu terdiri dari susu, minyak, gula tepung dan air. Adapun formula modifikasi yang cukup padat energi dan protein terdiri dari bahan yang mudah diperoleh di masyarakat dengaan harga terjangkau. Di dunia internasional budidaya daun kelor merupakan suatu program yang sedang digalakan, termasuk provinsi NTT salah satunya. Dengan diolahnya daun kelor menjadi makanan kudapan yang disukai oleh semua kalangan, maka akan meningkatkan pemanfaatan daun kelor di masyarakat sehingga kandungan gizi pada daun kelor dapat diserap tubuh. Minuman jeli diharapkan menjadi alternatif minuman sari buah yang dapat mengatasi kestabilan sari buah karena minuman ini memiliki konsistensi gel sehingga dapat menghindari pengendapan, tetapi mudah diminum. Penelitian ini merupakan *Quasi Eksperimen* menggunakan Rancangan acak Lengkap (RAL) yang mana secara sengaja menambahakan tepung kelor kedalam resep pembuatan *jelly* yang sudah ada dengan 3 konsentrasi yang berbeda. Analisis data menggunakan Uji Anova Satu Arah untuk melihat perbedaan kadar Vitamin c dan Zat Besi pada masing- masing konsentrasi *jelly*.Hasil uji ANOVA Satu Arah menunjukkan terdapat perbedaan rata-rata konsentrasi Zat Besi dan Vitamin C dalam jeli kelor dengan penambahan tepung kelor pada komposisi 50%, 40% dan 30% (*sig=0,00<pvalue 0,05*).

Kata Kunci : Vitamin C; Zat besi; Kelor; Jeli

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INTRODUCTION

Nutrition is an issue that is still talked about in many developed countries and developing countries, do not miss the turn of Indonesia is one of them. Talking about nutrition is not regardless of the food problem. Food is the right of every individual to obtain it insufficient and safe and affordable quantities, if its fulfillment is not sufficient needs then it can cause various nutritional problems. [i] Four predominant nutritional problems in Indonesia related to food deficiency, namely: Low Protein Energy (LPE), Iron Nutrition Anemia (INA), Iodium Deficiency Disorders (IDD), and Vitamin A Deficiency (VAD).[ii]

According to the World Health Organization (WHO), one of the ten most serious health problems faced is anemia, both in pregnant women and adolescents. Anemia is a condition in which the amount of red blood (Hb) and oxygen capacity in the body is insufficient. The main cause of anemia is iron deficiency. [iii] Iron plays an important role in the management of anemia which affects the emergence of LBB cases in which the function of iron in the body is as a means of transporting oxygen from the lungs throughout the body, as an electron transport to cells, and as an integrated part various enzyme reactions in body tissues. [iv]

The absorption of iron in the body is influenced by various factors, one of which is the amount of vitamin C content that plays a role in the absorption of non-hem iron by four times. Therefore vitamin C deficiency can trigger iron deficiency and these nutritional problems can contribute to an increase in the number of malnutrition cases and malnutrition. Inadequate iron nutrient intake in pregnant women during pregnancy can reduce the health of pregnant women and especially affect the fetal growth is not optimal where the blood supply that delivers oxygen and food to the fetus will be inhibited and the fetus will experience growth and development disorders that can trigger weight gain Lower Birth Body (LBB) in newborns.[i] As for the number of LBBs in East Nusa Tenggara province according to Basic Health Researh data in 2018 is 8.2%.[v] In response to the problem of iron deficiency, the government of East Nusa Tenggara runs various programs, including the provision of supplements in the form of iron tablets. Based on the data coverage of iron tablet (Fe) services by the government to solve the problem of anemia in the province of East Nusa Tenggara is still less optimal at 89.03%, so it is necessary to run other programs to help solve the problem of anemia.[vi] Another effort made is to carry out the Supplementary Feeding Program (SFP). The standard formula given by the World Health Organization (WHO) consists of milk, oil, powdered sugar, and water. The modification formula that is quite dense energy and protein consists of materials that are easily available in society at an affordable price.[vii]

In the international world, the cultivation of moringa leaves is a program that is being promoted, including the province of East Nusa Tenggara, one of them. Today, moringa powder has undergone many processing innovations in the form of cake, chocolate, and tea.[viii] With the processing of moringa leaves into a snack food liked by all circles, it will increase the utilization of moringa leaves in society that nutritional content of Moringa leaves can be absorbed by the body.[ix]

Jelly drink is expected to be an alternative to fruit juice drink that can improve the stability of fruit juice because this drink has a gel consistency so it can avoid deposition, but easy to drink. The advantage of the jelly drink is that it is not just a drink, but can also be used to delay hunger. Another advantage of jelly beverage products is the presence of natural vitamins and fiber that are useful for the body's metabolism. Jelly drink is suitable to be used to increase the added value of moringa leaves because it is a soft drink that is popular with the public, easy to carry or send, and also has a low manufacturing cost, both on a small scale and in industry.[x] Therefore, researchers are interested in conducting a research entitled "Analysis of Fe Content and Vitamin C *Jelly* Moringa" as one of the innovative PMT processing efforts with local food ingredients that are clearly known for their nutritional content and can be utilized by the community.

Preliminary research has been done to see the level of elasticity of jelly with the addition of moringa powder. In this preliminary study, the researcher uses a subjective assessment to determine the specific concentration interval that will be used in determining the concentration that will be used in further research. Researchers gave different treatments to the sample by adding moringa powder with a concentration of 10-100%. From the results of the preliminary research conducted obtained the level of elasticity level jelly with a concentration of 60-100% produces jelly with a bad elasticity level (not chewy), so from the existing results by considering the level of elasticity jelly and presumption of

nutrient content the researcher decided to use a concentration of 50%, 40% and 30% for further research which measures the level of Vitamin C and Iron contained in it.

Objectives this generally want to know the content of Vitamin C and Iron in Jelly Leaf Moringa in comparison composition 50%, 40% and 30% ".

METHOD

Type of research used is a quasi-experiment using a Complete Random Plan. This research is a study that intentionally adds moringa powder to existing jelly making recipes. Next, the researchers analyzed the content of micronutrients (Fe and Vitamin C) from the jelly made by adding moringa powder. This design is given 3 different comparisons of jelly to be measured. The treatment applied in the addition of moringa powder can be seen in Table 1.

Table 1. Moringa Powder Giving Design

No.	Type of *Jelly*	Description
1.	P0	Without Treatment
2.	P1	Moringa Flour 50%
3.	P2	Moringa Flour 40%
4.	P3	Moringa Flour 30%

Distribution of beverage jelly (P)based on the addition of powder with a concentration of 50% (50 grams of 100 grams of solvent), 40 % (40 grams of 100 grams of solvent), and 30% (30 grams of 100 grams of solvent). Research conducted in accordance with the specific purpose to be achieved is to know the content of micronutrients in jelly in the ratio of the concentration of 50%, 40%, and 30%, then the measurement that will be done is the content of micronutrients in jelly with the content tested in the laboratory that is test content of Vitamin C and Iron (Fe). Laboratory test data analysis was analyzed using one way ANOVA test (One Way Anova) with application SPSS. The research was conducted in September-October 2020. The research was conducted at the Kupang State Agricultural Polytechnic Laboratory to test the content of Vitamin C and Iron in jelly. The samples examined were in the form of jelly moringa leaf made and tested in the laboratory of the Kupang State Agricultural Polytechnic.

Working Procedures

***1) Procedures for Adding Seed Flour to* Jelly**

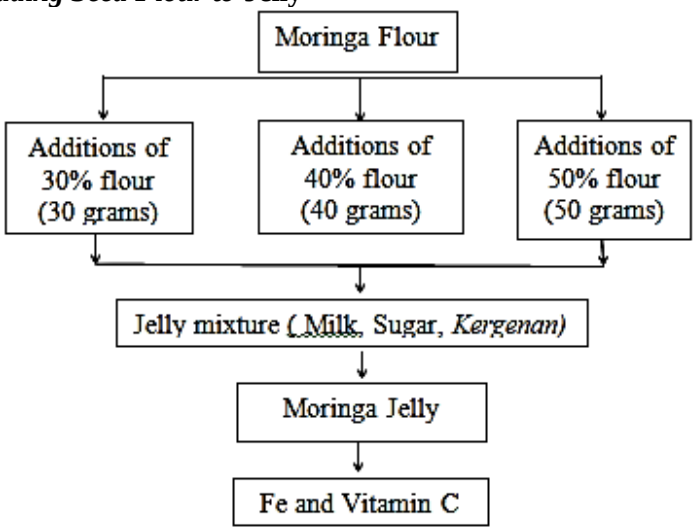

Figure 1. Procedures for Adding Seed Flour
(Modified from Rika, 2008 in Ressa 2018)

2) Beverage Making Process Moringa *Jelly*

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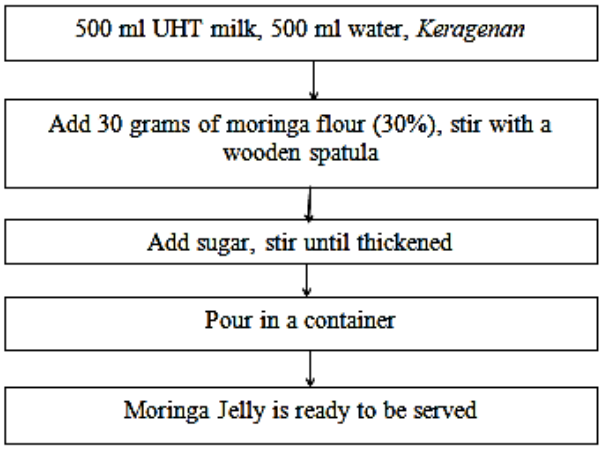

Figure 2. Procedure for making Moringa Jelly with the addition of 30% moringa flour (30% of 100 grams) (Modified by Ressa Yowinda, 2018)

RESULTS AND DISCUSSION

The following is a table of the measurement result of the Vitamin C levels in Moringa Jelly using visible ultraviolet method.

Table 2. Vitamin C levels in Moringa Jelly using UV-Visible Spectrophotometry Method

Sample Code	Y (Absorption Sample)	A (Sample)	X (concentration Sample(mg/ L)	B (Intersept)
P1.1	1,110	0.1043	10,84	0,021
P1.2	1,110	0.1043	10,66	0,021
P1.3	1,150	0.1043	11,04	0,021
P2.1	0,690	0.1043	6,63	0,021
P2.2	0,0714	0.1043	6,86	0,021
P2.3	0,702	0.1043	6,74	0,021
P3.1	0,185	0.1043	1,79	0,021
P3.2	0,190	0.1043	1,84	0,021
P3.3	0,192	0.1043	1,85	0,021

Based on table 2, Vitamin C concentration can be seen with sample code P1 (50% moringa powder), P2 (40% moringa powder), and P3 (30% moringa powder) 3 times repeated showed a direct decrease in yield with the Vitamin C content contained in it, with the largest concentration being in jelly with code P1 sample (50% of flour) with an average total of 10.85 mg / L.

Table 3. Iron (Fe) levels in Moringa jelly by Redox Titration method

Sample Code	Sample Volume (mL)	Molar $KMNO_4$ (mol/L)	Volume Used $KMNO_4$ (mL)	Iron (Fe) (%)
P1.1	10	0.098	25,5	6,97
P1.2	10	0.098	24,9	6,81
P1.3	10	0.098	24,2	6,62
P2.1	10	0.098	12,9	3,53
P2.2	10	0.098	12,4	3,39
P2.3	10	0.098	11,8	3,23
P3.1	10	0.098	4,8	1,31
P3.2	10	0.098	4,2	1,15
P3.3	10	0.098	4,7	1,29

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Table 3 shows the decrease in Iron content along with the smaller amount of moringa powder added to the jelly. The largest Iron content is found in jellies with a concentration of 50% (P1) with an average total for three distillations of 24.87%.

ANOVA Test

1) Normality Test

Results of the normality test of vitamin c and iron content data also stated that the distribution of data is normally distributed and has a significant level of homogeneity. The results of the normality test and homogenous test can be seen in the following:

Table 4.Normality test

NORMALITY TEST			
Nutrient	**Supplement (%)**	***Sig.***	**Conclusion**
	(%)		
Iron (Fe)	50	0,926	Normal
	40	0,927	Normal
	30	0,220	Normal
	0 (Kontrol)	0,780	Normal
Vitamin C	50	0.942	Normal
	40	0,952	Normal
	30	0,298	Normal
	0 (Kontrol)	0,298	Normal

HOMOGENEITY TEST		
Nutrition	***Sig.***	**Conclusion**
Iron (Fe)	0,257	Homogeneous
Vitamin C	0,204	Homogeneous
One Way ANOVA		
Nutrition	***Sig.***	**Conclusion**
Iron (Fe	0,00	Different
Vitamin C	0,00	Different

Table 4 shows data distribution normal with the significant Iron and vitamin C> *p* (0.05) *value a*nd show that data have a level of similarity or homogeneity with significant values of Iron and vitamin C> *p* (0.05) *value.* Table 4 also shows significant values of Iron and Vitamin C < *p-value* (0.05*)*, which means the data have different average values.

DISCUSSION

This research is one example of the application of food technology that utilizes the potential local food of the NTT region, especially Moringa leaves. This jelly is expected to be a snack food that is liked by all people, so that it will increase the utilization of Moringa leaves in the community and the nutritional content of Moringa leaves can be absorbed by the body.[ix] Vitamin C is a micronutrient that plays an important role for humans, such as collagen production. and carnitine which contributes to enhancement and immune defense. Even Vitamin C acts as an antimicrobial agent that can fight various microorganisms that cause infection.[xi] Vitamin C also plays a role in the formation of erythrocytes in the body which functions as a carrier for oxygen and red blood cells for the body. According to the Indonesian Minister of Health Regulation Number 75 of 2013 concerning the Recommended Nutritional Adequacy Rate for the Indonesian Nation, the average RDA for vitamin C nutrition for toddlers is 45 mg per person per day and an additional 10 mg of normal needs according to age per person per day for mothers. pregnant. Iron is needed by the body around 150-300 mg / day.[xii]

Iron (Fe) is an important component in the body, especially hemoglobin synthesis and oxygen transport throughout the body.[xiii] Average RDA for iron nutrients for toddlers it is 26.5 mg per person

per day and the average RDA for iron for pregnant women is an additional 5 mg according to the mother's age at pregnancy per person per day.[xii] Measurement of Vitamin C levels by UV-Vis Spectrophotometry is a method that can be used to determine samples in the form of solutions, gases or vapors. The quantitative test of Vitamin C was carried out by determining the levels of Vitamin C by UV-Vis spectrophotometry at a wavelength of 570 nm using ammonium molybdate as a compound capable of giving color to Vitamin C so that its absorbance can be measured in the visible area. In this test, Vitamin C (standard ascorbic acid) was used in the standard cuvette and moringa jelly extract on the sample cuvette.

From the results of this study, it can be said that there is a difference in the average content of Vitamin C between Moringa jelly at a ratio of 50%, 40% and 30%. The content of Vitamin C and Iron contained in the jelly is certainly influenced by processing and analysis which is related to hygiene and food sanitation, such as the results of Adu (2020) research on microbial contamination in *laru* affected by *hygiene* and food and beverage sanitation which is efforts to control the factors of food, people, places, and equipment that may or may not cause health problems or disorders. Therefore requirements hygiene are technical requirements set for products, cookshops, and restaurants, personnel, and equipment that include requirements bacterial, chemical, and physical.[xiv]

This study shows that there is a difference in the average content of Iron (Fe) and Vitamin C in Jelly Moringa Leaf with a comparison of concentrations of 50%, 40%, and 30%.

CONFLICT OF INTEREST

The manuscript of this arcticle is written based on the result of research that has passed the ethical test conducted by the Ethich Committee of the Public Health faculty, university of Nusa Cendana Kupang the year 2020.

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