

## Tuna, Moringa And Tempe As A High Energy, High Protein Gimhap Bite For Pregnant Women With Chronic Energy Deficiency

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**Abstract:** The problem with nutrition that occurs in mothers pregnant is Chronic Energy Deficiency (KEK). Intake of energy and protein in the mother pregnant classified low below 70% figure adequacy amounting to 52.6% and 52.2%. Treatment to overcome Chronic Energy Deficiency in Pregnant Women by giving additions food made from local tuna, moringa, and tempeh. Obtain formulation tuna, moringa and tempeh as gimhap bite for pregnant women with chronic energy deficiency. This study used type study experiment with design study design random complete (RAL) with treatment formulation of tuna, moringa and tempeh. Experiments carried out consist of three levels of treatment (50:30:20), (45:25:30), and (40:20:40). Amino Acid score was more than 100 and the NPU and VC values were  $\geq 70$ . Data on organoleptic properties were collected by organoleptic test using hedonic method and statistically analyzed using Friedman at the 95% confidence level ( $p=0,05$ ). Gimhap tuna, moringa, and tempeh in 100 grams own content energy 190.4-192,6 kcal, protein 6.9-7.1 grams, fat 6.1-6.4 grams and carbohydrates 27.2-27,4 grams. Gimhap tuna, moringa, and tempeh were not difference significant color, aroma, taste, and texture ( $p>0,05$ ). Gimhap with the proportion of tuna 45: Moringa 25: tempeh 35 contains 370,7 kcal, 13.4 grams of protein, 12.3 grams of fat, and 51.9 grams of carbohydrates meets 15,2% of the needs for energy and 21,9% of maternal protein requirements for pregnant women.

**Keywords:** Pregnant Women; Tuna; Moringa; Tempeh

### INTRODUCTION

One of problems of nutrition that occurs in mothers pregnant is a Lack Energy Chronic (KEK). Intake of energy and protein in the mother pregnant classified as low at 52.6% and 52.2% below The minimum requirement is 70% of the figure sufficiency. Problem chronic energy deficiency occurs consequence of deficit intake (energy and protein) during pregnancy experience enhancement need substance nutrition. Chronic energy deficiency in pregnant women is influenced by various factors ie deficit intake, disease infection chronic, low knowledge, and level of the economy. Pregnant women who experience chronic energy deficiency during pregnancy can risk miscarriage, low birth weight, and premature.

Treatment for pregnant women with chronic energy deficiency can one of them did with increased intake of energy and protein in the form of food possibly additions made as

gimhap for pregnant women. Food ingredients used contain foods high in energy and high in protein as well as substance nutrition others who support it. In research, this development food addition with made from local tuna, moringa, and tempeh. Food materials are locally chosen because it is rich in substances nutrition macro and micro to fulfill the needs of pregnant women, availability of easy ingredients obtained as well as an affordable price.

Tuna contains protein omega 3 fatty acids *eicosapentaenoic acid* (EPA) and *docosahexaenoic acid* (DHA). Apart from that, tuna has a high protein content that works to support the growth fetus and can improve the nutritional status of pregnant women (Roifah et al, 2019). Moringa leaves contain vitamin A, vitamin B, vitamin C, and minerals (substances iron, potassium, and calcium). Tempeh contains protein, essential and nonessential amino acids free fatty acids,

vitamins, and minerals. (Harahap, Lubis, & Kaban, 2018). Research purposes This is to get formulation tuna, moringa and tempeh as gimbap bite pregnant women with chronic energy deficiency.

**METHODS**

This study uses a type study experiment with design study design random complete (RAL) with treatment formulation of tuna, moringa, and tempeh. *This study uses three trials ie P1 (Tuna Fish 50: Moringa 30: Tempeh 20), P2 (Tuna Fish 45: Moringa 25: Tempeh 30), and P3 (Tuna Fish 40: Moringa 20: Tempeh 40).* The study was implemented in July 2023 and will be implemented in the sub-district Kedungkendo City of Sidoarjo and Surabaya. Panelists study a total of 25 panelists rather trained ie Woman aged 22-27 years. This study uses method analysis of quality organoleptic, value nutrition, protein quality and determination level treatment best.

**RESULTS AND DISCUSSION**

**Nutrient Content**

**Table 1. Nutritional Value of Gimbap Tuna, Moringa And Tempeh of 100 Gram**

Nurients	P1 (50:30:20)	P2 (45:25:30)	P3 (40:20:40)
Energy (kcal)	190,4	195,1	192,6
Protein (gram)	6,9	7	7,1
Lemak (gram)	6,1	6,5	6,4
Carbohydrate s (gram)	27,4	27,3	27,2

**Protein Quality**

**Table 2. Protein Quality Analysis**

Taraf Perlakuan	Mutu Cerna Teoritis	SAA	NPU	BV
P1 (50:30:20)	92,5	139,0	92,5	100
P2 (45:25:30)	92,3	131,5	92,3	100
P3 (40:20:40)	92,2	122,8	92,2	100

**Organoleptic Descriptive Test**



**Figure 1. Descriptive Test**

Parameter	Treatment			p
	P1 (50:30:20)	P2 (45:25:30)	P3 (40:20:40)	
Color	3,28	3,20	3,40	0.24
Aroma	2,56	2,80	2,60	0.44
Flavor	3,00	2,92	2,96	0.83
Texture	3,36	3,32	3,32	0.97

**Treatment Best**

The results of the organoleptic parameters were obtained treatment best from Gimbap tuna, moringa, and tempeh use method *de Garmo* which is presented in the table below:

**Table 4. Determination Treatment Best**

Treatment	Number of NPs
P1 (50:30:20)	0,33
P2 (45:25:30)	0,73
P3 (40:20:40)	0,50

Based on table 4, it can be seen that level treatment best ie Gimbap on the level treatment 2 is 0,73 Treatment level 2 with proportions (Tuna 45: Moringa 25: Tempeh 30). The most important parameter based on ranking is energy. Gimbap tuna, moringa and tempeh, energy value is a vluе that needs to be considered.

**Serving Size**

Serving size is the amount of available food consumed in one meal. Serving the size of gimbap tuna, moringa, and tempeh aims to increase intake energy and matter nutrition macro, especially the protein provided as a bite for pregnant women in accordance need amounting to 15% of total needs. Information nutrition facts of gimbap tuna, moringa, and, tempeh each serve presented in the table below:

**Table 5. Information On Nutritional Value Serving**

INFORMATION ON NUTRITIONAL VALUE/ NUTRITION FACT		
Dose serve	190g	
Amount servings per package	1	
Serving Weight	190g	
<b>AMOUNT PER SERVING</b>	<b>%RDA*</b>	
Total Energy	370,7 kcal	15,2
Proteins	13,4 g	21,9
Fat	12,3 g	17,3
Carbohydrate	51,9 g	

## DISCUSSION

### 1. Protein

The protein content of tuna, moringa, and tempeh fish formulations ranges from 6.9 to 7.1 grams/100 grams. Formulation protein content experienced improvement, the formulation with the highest protein content is P3, namely 7.1 grams/ 100 grams, and the lowest level P1 treatment was 6.9 grams/100 grams. This matter shows that if tempeh soya bean is in more amounts lots so protein content in tuna, moringa, and tempeh formulations the more increases. This matters because the tempeh protein content of soya bean in 100 grams amounting to more than 20.8 grams tall compared to the protein content in tuna fish is amounts to 13.7 grams per 100 grams. However, tuna is one of the animal proteins that have a bioavailability taller compared to vegetable protein (Chairunnisa et al, 2019). Because of that pregnant women are recommended to consume sourced protein from animals compared to from vegetables. Protein absorption in pregnant women is important for noticing because protein functions to support the growth fetus.

Tuna contains essential amino acids and nonessential amino acids among them namely threonine, methionine, valine, lysine, leucine, arginine, acid arpartate, glutamic acid, serine, glycine, alanine and tyrosine. One of the highest amino acids found in tuna is lysine. Consumption of lysine in the mother pregnant works to support the growth fetus. Lysine does not generate itself by the body man. Lysine can obtained from food consumed (Amahorseja and Erin, 2019). Tempeh contains the amino acids arginine, glycine, histidine, threonine, tyrosine, methionine, valine, lysine, tryptophan and alanine. Moringa leaves contain essential amino acids highest in leucine, meanwhile nonessential

amino acids ie aspartic acid, glutamine and glycine (Rimbawanto et al, 2022).

Formulation with modified tuna, moringa, and tempeh own acceptable protein levels amounting to 15.6% of need pregnant women. Consumption of snacks high in essential protein for pregnant women aims For the growth fetus as well as preventing the child from experiencing stunting later day. Deficit protein consumption in pregnant women results limited supply of amino acids to the placenta so insufficiency placenta can result in *Intrauterine Growth Restriction* (IUGR). Deficit intake of protein in pregnant women is linked with restrictions on growth intrauterine (UGR) as well decline in growth post childbirth and can bother the continuity of life and growth fetus (Yun Ji, 2017).

### 2. Fat

The average fat content in the formulation is 6.1-6.5 grams/100 grams. On the third level treatment shows that a larger proportion of tempeh so will own more fat content. Highest average fat at level treatment two. This matter is due to level 3 tempeh treatments being used of 30 grams. That matter caused the fat content in tempeh more big compared to material other ie amounting to 8.8 grams/100 grams. Gimbap tuna, moringa, and tempeh can fulfill the fat intake of 14.5% of pregnant women. Tuna contains omega 3 fatty acids and omega 6 fatty acids which types of fatty acids very needed during pregnancy for the growth and development brain in the fetus (Amahoseja, 2018). Tempeh contains nonessential fatty acids nor essential ( Astawan et al, 2017). In tempeh composition highest Fatty acids are dominated by acids linoleic, acid oleic, and acid linolenic acid (Milinda et al, 2021). Study Setyarahma (2019) stated maternal fat intake works as a protector placenta and supports breast milk production.

### 3. Carbohydrate

Based on table 1, it can be seen that the average level of carbohydrates in tuna, moringa, and tempeh formulations ie amounting to 27.2-27.4 grams/100 grams. The content of carbohydrates highest namely at level treatment 1 namely 27.4 grams carbohydrate in 100 grams and the content lowest carbohydrate at level treatment 3, namely 27.2 grams in 100 grams. Apart from sourced from source rice carbohydrate others in the formulation originate from tempeh. So

that gimbap with tempeh more Lots own rate carbohydrate taller. This matters because of tempeh soya bean in 100 grams contains 13.5 grams of carbohydrates. Gimbap tuna fish, moringa, and tempeh can fulfill the intake of carbohydrates by 15% of pregnant women. Carbohydrates are a source of energy for the body. In pregnancy in the third-trimester carbohydrate, pregnant as a source of energy (Ningsih *et al*, 2021).

#### 4. Energy

Based on table 1, it can be seen that the average value energy in the formulation ie amounting to 190.4 kcal-195.1 kcal. Energy value in third-level treatment experience enhancement. The energy value highest namely at level treatment 2 was 195.1 kcal in 100 grams. This matters because mark energy from tempeh in 100 grams tempeh contain amounting to 201 kcal and tuna contains 100 kcal. Gimbap tuna fish, moringa, and tempeh can amount to 17% of pregnant women. The energy value of the formulation is also influenced by the content of substance fat nutrition in the ingredients standard. This matters because fat is the source of densest energy compared to carbohydrates and proteins. Formulation with the highest fat content produces mark more energy than formulation with the lowest fat content. Deficit intake on term a long time will result body using reserve originating energy from the breakdown of fats and proteins. If will lasts a long time impact on additional weight during pregnancy cannot be achieved.

#### Protein Quality

The protein quality in tuna fish gimbap, moringa and tempeh consists of amino acid score (SAA), Digestibility Quality, NPU and BV. Based on Table 2, the amino acid score calculation obtained is more than 100, so the SAA value for each treatment is expressed as 100. In the calculation of Net Protein Utilization (NPU) and Biological Value (BV) it is obtained above 70. Foods that have NPU and BV values  $\geq 70$  are considered can support growth if eaten in sufficient quantities and with sufficient energy consumption (Putri, 2021).

#### Organoleptic

##### 1. Descriptive Test

In Figure 1, the aroma attributes produced in gimbap include tempeh aroma, moringa aroma and fish aroma. In each treatment, the tempeh aroma attribute averaged 4.7. Fish aroma attribute with an average of 4.6. Moringa aroma attribute with an average value of 5.0. This is because in

treatment 1 to treatment 3 the gimbap product does not cause a unpleasant aroma in the tempeh and moringa which are used as gimbap filling. However, based on the results of interviews with panelists, the fish smells like there is a slight fishy aroma in the fish.

The taste attributes of the gimbap products that were assessed were the moringa taste and overall taste attributes. The moringa taste attribute in the three treatments received an average score of 5.0, which means that gimbap moringa leaves do not have a bitter taste. The overall taste of gimbap is savory. The overall taste attribute was most preferred in treatment 1 and treatment 2 with an average of 3.6. The desired overall taste of gimbap is savory

The average value of the gimbap inner color attribute ranged from 4.3 to 4.7. This shows the inner color of the gimbap at a very good grade. The average gimbap color was highest in treatment 1 with the color in the gimbap being dark green. The color in the gimbap comes from Moringa leaves. The addition of Moringa results in a bright greenish color due to the chlorophyll content in Moringa.

The results of the average value of gimbap texture attributes are displayed in the form of a spider web. The texture attribute has an average value of 4.3. The texture of the gimbap comes from the gimbap filling, namely tuna, moringa, and tempeh, and rice as the outer dressing for the gimbap. The texture attributes of gimbap are dominated by the textures of tempeh and moringa leaves.

##### 2. Hedonic Level

###### a) Color

Based on the results of Friedman test analysis at the level of favorite color obtained no there is a difference significant ( $p > 0.05$ ). The average level favorite highest color in treatment 3 was 3.40 and the lowest average at level favorite to color obtained in treatment 2 was 3.20. This matter shows a panelist-like appearance gimbap with leaf least moringa. This matters because the more lots proportion leaf moringa is added to the gimbap will give the color green. Stuffing gimbap dominated color greenish caused exists addition of leaf Moringa in the formulation. The green color on the leaves of moringa caused chlorophyll contained in the leaf.

**b) Aroma**

The Friedman test analysis on aroma parameters showed  $p > 0.05$ . This matter shows that there is a difference significant in tuna fish gimbap, moringa, and tempeh. In Table 2, it can be seen highest average grade on the level favorite to aroma by panleis namely in treatment 2 was 2.80 whereas the lowest average value namely in treatment 1 was 2.56. The aroma of the gimbap that arises namely the unpleasant aroma from Moringa and tempeh. According to Rosyidah (2018) that it is in the leaves moringa have a pleasant aroma caused by leaves Moringa contain the enzyme Lipoxidase and oil essential. Enzyme Lipoxidase if not processed in the correct way will give off a pleasant aroma. In tempeh, there is a pleasant aroma caused by the mold *Rhizopus oligosporus* which plays a role as well as in the fermentation process of tempeh.

**c) Flavor**

Based on table 2, it can be seen that Friedman test analysis states no There is difference ( $p > 0.05$ ). The highest average rating on gimbap on taste, namely in treatment 1 was 3.00, and the lowest average value namely in treatment 2 was 2.92. According to Assyariah (2020), this true addition of leaf moringa in large amounts \_ will give the impression of a sharp taste in food. Addition leaf Moringa can influence the taste of food. This matter due to leaves Moringa contain tannin, tannin causes a feeling of astringency at times when consumed leaf Moringa (Satriya, 2019).

**d) Texture**

The results of the Friedman test analysis are in table 2 levels favorite texture tuna fish gimbap, moringa, and tempeh state No there is the difference ( $p > 0.05$ ). The highest average value in treatment 1 was 3.36 and for lowest average value was obtained by treatment 3. Texture from formulation ie the texture of the rice is not sticky Because only seasoned with oil sesame. For the texture of tuna and tempeh own soft texture. Besides that, there is a piece vegetable moringa in it with a slice.

**CONCLUSIONS**

Treatment best in research This is treatment 2 with proportion of tuna 45: Moringa 25: tempeh 30 with NP value 0,73 and has content substance Nutrition per 190 grams is 370.7 kcal, protein 13.4 grams, fat 12.3 grams and carbohydrates 51.9 grams. Content energy and substances nutrition in treatment 2 can meet 15.2% and 21.9% of the need for maternal energy and protein in pregnant women. For study furthermore can laboratory tests were carried out more carry on about rate proximate and substance nutrition micro . Product gimbap can made alternative snack For Mother pregnant .

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