

The Contribution Of Fiber In Entmoli Enteral Formula As A Functional Food

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ABSTRACT

Background: Enteral formula is a liquid food that can be orally or parenterally. This experimental study aims to develop an enteral formula with high nutritional value and good organoleptic properties, namely Entmoli. Entmoli is an alternative enteral formula for patients who need fiber intake. It contains high fiber with exceptional functional food like Moringa leaves. Moringa leaves have high fiber and micronutrients that help the healing process of disease.

Research Methods: Entmoli's nutritional value is analyzed using comparative tests and calculations with TKPI (Indonesian Food Composition Table).

Research Result: Based on the proximate test, per serving (50g), Entmoli contains 149 kcal of energy, 4.9 g of protein, 1.3 g of fat, and 27.8 g of carbohydrates. In TKPI calculations, per serving of Entmoli contains 224.2 kcal of energy, 11.3 g of protein, 7 g of fat, 28.7 g of carbohydrates, and 5.9 g of fiber.

Conclusion: The difference in results may be due to the loss of nutrients due to the processing of the formula. The organoleptic test results also show that Entmoli has good scores in all aspects of organoleptic properties, including taste, color, aroma, and texture.

BACKGROUND

The enteral formula is a liquid food consistent from liquid to thick. These foods can be administered orally or parenterally. The enteral formula can be given when a person is not safe to consume food orally or when oral intake does not meet nutritional needs (Almatsier, 2009). Enteral nutrition involves using unique formulas or medical food administered orally or through a tube placed in the gastrointestinal tract. Enteral nutrition is used when the body cannot correctly process foods to maintain the nutrition the body needs. (Univ.UTAH, 2018).

Moringa oleifera, also known as Moringa leaves, contains about 19-29% protein and 16-24% fiber in 100 g of leaves. The predominance of Moringa leaves lies in the content of nutrients, especially vitamins, and minerals. Moringa leaves are reported to contain vitamins A, C, and E. They also contain phenol, protein, calcium, potassium, magnesium, iron, manganese, and copper (Rani, 2019). In another study, sensory evaluation of moringa powder results showed that the acceptability of two traditional, complementary foods decreased as the level of moringa leaf powder increased. Nevertheless, all participants expressed willingness to use Moringa in complementary foods provided they would be trained to process it. (Sithandiwe Ntila, et.al, 2019).

The flouring process on Moringa leaves can increase their nutritional content. 100 g of Moringa flour contains the following nutrients: 10.5% water content, 28.25% protein, 11.92 mg of β -Carotene (pro-vitamin A), 2241.19 mg of calcium, 35.91 mg of iron, 28.03 mg of magnesium. Moringa leaf flour per 100 g contains 205 kcal of energy, 27.1 g of protein, 2.3 g of fat, 38.2 g of carbohydrates, and 19.2 g of fiber (Zakaria et al., 2012).

The use of liquid food (enteral formula) in the hospital is relatively high. One is an enteral mixer formula or hospital-made enteral formula with a composition resembling average food but in liquid form. Mixer enteral formulas are usually given to patients who need additional fiber. Based on these data, researchers are interested in making high-fiber enteral formula products in dry/powder dosage forms. "ENTMOLI" is an enteral formula made from milk with dietary fiber from Moringa leaves and green beans. With high-fiber food ingredients, Entmoli enteral formulas can become high-fiber enteral formula products.

MATERIAL AND METHODS

The type of this research is a case study. The research design used is a single case design, which is a case study that emphasizes research on only one case unit. Thus, researchers only focus on one particular object and study it as a case (Riyanto, 2011).

The production of the Entmoli formula was carried out at the researcher's place. The Entmoli formula was carried out by two tests, namely the organoleptic test and nutritional value. The organoleptic test was carried out at the Nutrition Installation of RSUD Dr. Soetomo Surabaya, with panelists of 20 nutritionists. The nutritional value formula was carried out by proximate test at the Nutrition Laboratory, Faculty of Public Health, Airlangga University, Surabaya. Meanwhile, the nutritional value is calculated using Microsoft Excel based on TKPI. The time for conducting the research is November - December 2022.

The formula ingredients used are Moringa leaves (400 g), green beans (50 g), granulated sugar (30 g), skim milk flour (60 g), whole cream milk flour (100 g), maltodextrin (60 g), and coconut oil (30 g).

Data collection methods were divided into 2: organoleptic test analysis and nutritional quality analysis of the Entmoli enteral formula. Organoleptic tests using questionnaires and processed using Microsoft Excel 2019, presented using pie and bar charts, and then discussed descriptively. The nutritional value test compares the nutritional value based on the proximate test and TKPI calculations using Microsoft Excel 2019, which are discussed descriptively. Analysis of nutritional quality using the proximate test, analysis of protein content using the Kjeldahl method, analysis of fat content using the Soxhlet method, analysis of carbohydrates using the By Difference method, and analysis of calculating the contribution of fiber compared to the fiber needs of healthy people equivalent to the calorie requirement of 2100 kcal according to the 2019 RDA.

RESULTS DAN DISCUSSION

A. Organoleptic Test

The organoleptic test uses hedonic assessment. Hedonic assessment includes color, aroma, taste, texture, thickness, packaging, sticker/label, and selling price plan. I use four scales: Dislike, Somewhat like, Like, Like very much.

Table 1. Entmoli Hedonic Test Results

Variables	n	%
Color:		
Somewhat Like	1	5
Like	16	80
Like very much	3	15
Aroma:		
Dislike	1	5
Somewhat Like	6	30
Like	12	60
Like very much	1	5
Taste:		
Dislike	5	25
Somewhat Like	12	60
Like	3	15
Texture:		
Somewhat Like	4	20

Like	15	75
Like very much	1	5
Thickness:		
Dislike	1	5
Somewhat Like	3	15
Like	14	70
Like very much	2	10

Based on the results of the organoleptic test using the hedonic assessment, it was found that, in general, the panelists liked the product based on color, aroma, texture, thickness, packaging, and labels. Some panelists do not like the enteral formula's taste because the Moringa leaves still tastes like leaves. Thus, it is not comforting when consumed. An active protease enzyme in the leaves causes the unpleasant aroma and taste of Moringa leaves. The processing mode can inactivate the enzyme by blanching Moringa leaves for 5 minutes before the leaf flouring process (Fatimah et al., 2014).

B. Nutritional value

The proximate analysis classifies the components present in food ingredients based on their chemical composition and function, namely: water (moisture), ash, crude protein, crude fat (ether extract), and nitrogen-free extract.

The results of the comparison of nutritional values based on the proximate test and TKPI calculations using Microsoft Excel are presented in Table 2.

Table 2. Comparison of Entmoli nutritional value with proximate test and TKPI calculations using Microsoft Excel

Variables	Proximate Test	TKPI
Energy (kcal)	149	224.2
Protein (g)	4.9	11.3
Fat (g)	1.3	7
Carbohydrate (g)	27.8	28.7
Fiber (g)		5.9

Based on the proximate test, per serving (50g), Entmoli contains 149 kcal of energy, 4.9 g of protein, 1.3 g of fat, and 27.8 g of carbohydrates. Meanwhile, calculations using TKPI use Microsoft Excel; Entmoli contains 224 kcal of energy, 11.3 g of protein, 7 g of fat, and 28.7 g of carbohydrates per serving.

The way of processing can cause the risk of loss of nutrients. The decrease in the nutritional content of foodstuffs due to heat processing depends on the number of processing processes. Processing of protein foodstuffs that are not adequately controlled can cause a decrease in their nutritional value (Sundari, 2015). Meanwhile, another study stated that Food processing technologies such as solar drying and fermentation are energy efficient and most suited for conditions in rural communities. Prepared moringa leaves are often perceived as bitter due to the antinutritional factors present in moringa leaves. This compromises the sensory quality of food and any product prepared from the leaves.(Ngwekazi Nwabisa Mehlomakulu & Mohammad Naushad Emmambux, 2020).

One of the significant declines in nutritional value is protein. Food processing using hot media can reduce the amount of protein in foodstuffs. Protein is a reactive compound composed of several amino acids that have reactive groups that can bind to other components, such as reducing sugars, polyphenols, fats, and their oxidation products, as well as other chemical additives such as alkali, sulfur dioxide, or hydrogen peroxide. For example, the reaction between one amino acid and another is the formation of solanine from lysine and alanine. This can lead to a decrease in the nutritional value of protein due to a decrease in protein digestibility and the availability of essential amino acids. In addition, the reaction between protein and reducing sugar, known as the Maillard reaction, is also the leading cause of protein damage during processing and storage (Palupi & Zakaria, 2007).

The fiber in one serving of Entmoli enteral formula is 5.9 grams. The value of fiber in one serving measure of the formula is obtained from calculating the nutritional value of fiber according to TKPI, which is calculated using Microsoft Excel. According to the AKG (2019), the need for fiber daily is equivalent to the calorie requirement of 2100 kcal, which is 29 grams of fiber. Based on daily fiber requirements, according to the AKG (2019), Entmoli enteral formula has a fiber contribution of 20.34% in meeting daily fiber needs.

CONCLUSIONS AND SUGGESTIONS

Entmoli is an enteral formula development product made from Moringa leaves, green beans, skim milk, whole cream milk, oil, granulated sugar, and maltodextrin made in dry/powder form as an alternative to high-fiber functional food.

Based on the proximate test, per serving (50g), Entmoli contains 149 kcal of energy, 4.9 grams of protein, 1.3 grams of fat, and 27.8 grams of carbohydrates. Meanwhile, calculations using TKPI using Microsoft Excel per serving size of Entmoli contain 224 kcal of energy, 11.3 grams of protein, 7 grams of fat, and 28.7 grams of carbohydrates. Based on the results of the organoleptic test using the hedonic assessment, it was found that, in general, the panelists like the product based on color, aroma, texture, thickness, packaging, and labels. However, there are still areas for improvement in the taste of the formula because the taste of Moringa leaves is very distinctive. Suggestions for this research are to test the nutritional content of fiber.

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