Nutritional Content and Modisco Acceptance (Modified Dried Skimmed Milk and Coconut Oil) With Additional Soybeans and Fruit

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Abstract:
Modisco is a highly nutritious liquid food that can be used to help toddlers with nutritional disorders. Modisco's basic ingredients are skim milk, sugar and cooking oil. Modifications to the modisco were made by adding soybeans and fruit which aims to overcome the weakness of the modisco from the lack of mineral mix content. For this reason, it is necessary to add fruits, especially those containing magnesium and potassium as a substitute for the mineral mix. The fruit used as a substitute for mineral mix is apples. This study aims to determine the effect of the addition of soy milk and fruit at different levels on the nutritional content and the level of preference for modisco. This research was conducted from July to September 2021. This study used Non-Randomized Pretest-Posttest with Control Group Design with three treatment levels and three repetitions, namely P0 = 100 g skim milk, 50 g margarine, 50 g sugar, 0 g soybeans and 0 g apples (control), P1 = 100 g skim milk, 50 g margarine, 50 g sugar, 40 g soybeans and 20 g apples, P2 = 100 g skim milk, 50 g margarine, 50 g sugar, 60 g soybeans and 20 g apples. The nutritional value of modisco which includes carbohydrates, fats and proteins can be determined using the SNI 01-2891-1992 method. Modisco and modified modisco were made in 3 formulas with different amounts of composition, namely the original modisco, the modified modisco formula 1 and the modified modisco formula 2. The results showed that the addition of soybeans and fruit had a significant effect on the nutritional value (carbohydrate p=0.001, fat p=0.015, protein p=0.036) and level of preference for modaco (taste p=0.002, color, p=0.001, aroma p=0.003 and texture p=0.013).
Key Word*: modisco milk, soybeans, preference test.*

I.   Introduction

The trend in the prevalence of stunted toddlers in the world has tended to improve, this is evidenced by the decline in cases where in 2000 the prevalence reached 32.6% and continued to decline to 22.2% in 2017. Although the trend continues to decline, the highest proportion of stunted children under five is in the region. Asia, which is 55% or there are around 83.6 million children under five. South Asia has the highest proportion at 58.7%, followed by Southeast Asia at 14.9% and the lowest is Central Asia at only 0.9%. According to WHO, Indonesia is the third highest country in the Southeast Asia Region where from 2005 - 2017 the average prevalence was 36.4%. The lowest prevalence is Thailand with an average prevalence of 10.5% and the highest is Timor Leste with an average prevalence of 50.2% [1].

The prevalence of nutritional status of children under two years old based on BB/U in 2018 in South Sulawesi for malnutrition status was 14.8% (95% CI = 12.8-17.1), 3.4% higher when compared to the national level, which was 11,4% (95% CI = 10.9-11.9). While the prevalence rate of poor nutritional status based on body weight is 4.8% (95% CI = 4.1-6.2) 1% higher than the level of nationally, namely 3.8% (95% CI = 3.6-4.1). If we look at the data for the previous 3 years, namely 2015, 2016 and 2017, Indonesia has succeeded in reducing the prevalence of malnourished children, in 2015 the prevalence of malnourished children was 18.8%, in 2016 the prevalence of malnourished children was 17.8%. 2017 the prevalence of malnourished children is still 17.8% [2].

II.   Material And Methods

This *Non-Randomized Pretest-Posttest with Control Group Design* study was conducted on students of the Nursing Departement of the Ministry of Health of Makassar, Indonesia, from July to September 2021. A total 25 adult subjects (both male and females) of aged ≥ 18, years were for in this study.

Study Design: Completely randomized design study
Study Location: The study was conducted at the Health Polytechnic of Ministry of Health, Makassar and at the Food Materials Testing Laboratory Balai Besar Industri Hasil Perkebunan, Makassar, Indonesia.

Study Duration: July to September 2021.
Sample size:
    a. The research sample for the acceptability test was as many as 25 untrained panelists taken from students of the Nursing Department of the Health Polytechnic of the Ministry of Health Makassar.
    b. The sample for the examination of the nutritional content of the modisco milk was 500 ml.

Research Procedure
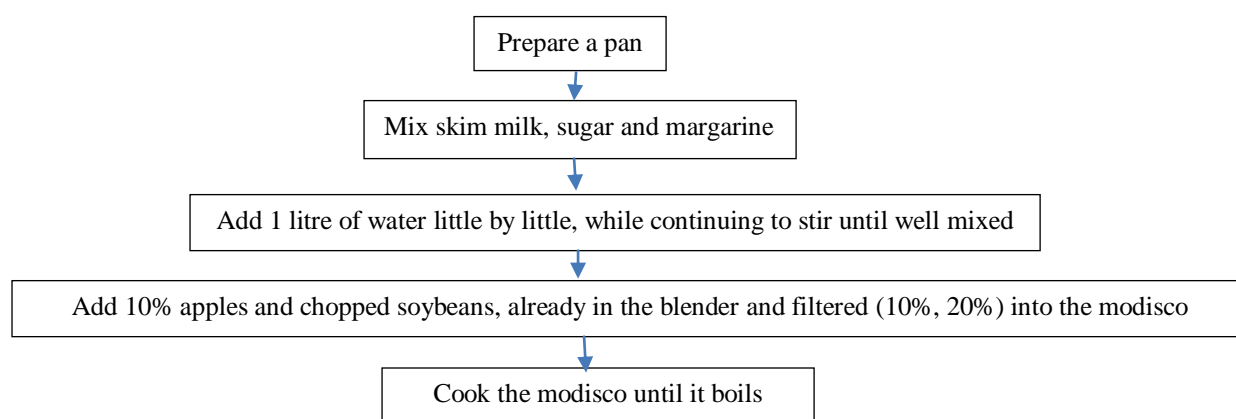**Modisco Making Procedure**
The steps for according are as follows:
    a. Mix skim milk, sugar and margarine.
    b. Stir until smooth, then add 1 litre of water little by little while continuing to stir until the liquid is homogeneous.
    c. Strain and drink warm.
Modisco making procedure with added edamame the steps for making modisco with the addition of soybeans are:
    a. Mix skim milk, sugar and margarine.
    b. Add 1 litre of water little by little while continuing to stir until the liquid is homogeneous.
    c. Add the soybeans that have been blended and filtered eith the addition of 10% and 20% soybeans into the modisco. At the time of blending the soybeans, 100 ml of water was added to each treatment with the addition of 10% and 20% soybeans. The goal is to make it easier to blend and filter soybeans.
    d. Blend the modisco that has been added to the soybeans then strain.

The flow of making modisco with the addition soybeans can be illustrated in the chart below:

Prepare a pan

↓

Mix skim milk, sugar and margarine

↓

Add 1 litre of water little by little, while continuing to stir until well mixed

↓

Add 10% apples and chopped soybeans, already in the blender and filtered (10%, 20%) into the modisco

↓

Cook the modisco until it boils

Protein test procedure the protein [3]:
Test standart issued by the National Standards Agency regarding food and beverage testing methods are as follows:
    a. Weigh carefully 0.51 g of the sample, put it a Kjeldahl 100 mlflask.
    b. Add 2 g of a mixture of selenium and 25 ml of H_2SO_4 concentrated..
    c. Heat over an electric heater or burner until it boils and the solution becomes clear greenish (about 2 hours).
    d. Allow to cool, then dilute and put into a 100 ml volumetric flask, aligning to the mark.
    e. Pipette 5 ml of the solution and put it in a distiller, add 5 ml of 30% NaOH and a few drops of PP indicator.
    f. Distill for about 10 minutes, as a container use 10 ml of a 2% boric acid solution that has been mixed with indicators.
    g. Rinse the tip of the cooler with distilled water.
    h. Titar with 0.01 N HCL solution.
    i. Perform blank determination.

Calculation protein content

$$= \frac{V1\text{-}V2 \times N \times 0{,}014 \times f.k \times f.p}{W}$$

Where :

W   = weight of trailer
V1   = volume of 0.001 N HCl which is used *penitaran* example
V2   = volume of HCl used for titration of blank samples
N   = Normality of HCl
f.k   = protein from food in general 6.25; milk and its processed products 6.38; and peanut oil 5.46
f.p   = dilution factor

The fat test standards issued by the National Standards Agency regarding food and beverage testing methods (SNI 01-291-1992) [3], are as follows:
   a.   Carefully weigh 1 g – 2 g of the sample, put it in a paper sleeve lined with cotton.
   b.   Plug the paper sleeve containing the sample with cotton, dry it in an oven at a temperature of not more than 80 ^{o}C for approximately one hour, then insert it into a soxhlet apparatus that has been filled with a fat flask containing boiling stones that has been dried and whose weight is known.
   c.   Extract with hexane or other fat solvent for approximately 6 hours.
   d.   Distill the hexane and dry the fat extract in a drying oven at 105 ^{o}C.
   e.   Cool and weigh.
   f.   Repeat this drying until a constant weight is reached.

$$\text{Calculation of fat content} = \frac{W \cdot W_1}{W_2} \times 100\%$$

Where:

W   = is the weight of footage example, in g;
W_1 = is the weight of fat before extraction, in g;
W_2 = is the weight of the fat flask after extraction, in g;

The carbohydrate test standards issued by the National Standards Agency regarding food and beverage testing methods (SNI 01-291-1992) [3], are as follows:
   a.   Carefully weigh approximately 5 g of the sample into a 500 ml Erlenmeyer;
   b.   Add 200 ml of 3% HCl solution, boil for 3 hours in an upright cooler;
   c.   Cool and neutralize with 30% NaOH solution (with litmus or phenoltallein), and add a little CH_3COOH 3% so that the solution is slightly acidic;
   d.   Transfer the contents into a 500 ml volumetric flask and squeeze it up to the line mark, then strain;
   e.   Pipette 10 ml of filter into a 500 ml Erlenmeyer, add 25 ml of Luff's solution (with a pipette) and a few grains of boiling stone and 15 ml of distilled water;
   f.   Heat the mixture on a constant flame. Try to bring the solution to a boil within 3 minutes (use a stop watch), continue to simmer for exactly 10 minutes (counting from when it starts to boil and use a stop watch) then quickly cool in a bath of ice.
   g.   Once cool add 15 ml of 20% Kl solution and 25 ml of H_2SO_4 25% slowly;.
   h.   Titar immediately with 0.1 N thio solution (use the indicator of 0.5% starch solution);
   i.   Also do the blanks.

Calculation:

(blank-penitar) x N thio x 10, equivalent to the reduced continuity. Then look at the Luff Schoorl list how many mg of sugar are contained for ml of tio used.

$$\text{Calculation of glucose levels} = \frac{W_1}{W} \times fp \times 100\%$$

Where:

W_1 = is the weight of the sample, in mg
W   = is the glucose contained for ml tio used (mg), from the list
fp   = is the dilution factor

Acceptance test procedure

Acceptance test observation is carried out using a hedonic scale test to determine the level of acceptance of the existing scale (3; like, 2: normal, 1: dislike) on taste, color, aroma and texture on fashionableco with or without the addition of fruit and soybeans. The untrained panelists selected in this preference test were students of the third diploma nursing program who were selected based on inclusion and exclusion criteria. Acceptance test in this study used 25 untrained panelists. panelists were selected using purposive sampling technique.

the testing process is carried out by serving fashionableco with or without the addition of fruit and soybeans in different proportions. each of the fashionableco samples is coded. all panelists were not given instructions regarding the characteristics or the amount of material used in each of the samples presented.

Statistical analysis

This research was carried out in two stages, namely the first stage of preparation for the manufacture of original and fashionable Modisco milk formula 1 and formula 2. After that, the original Modisco milk product, and Modified Modisco formula 1 and Formula 2 were tested for acceptability using the Hedonic method and analyzed using the Hedonic method. Kruskal Wallis Test. Furthermore, the original and modified Modisco milk products of formula 1 and formula 2 were tested for nutritional content in the form of examination of carbohydrates, fats and proteins which were carried out at the Food Materials Testing Laboratory *Balai Besar Industri Hasil Perkebunan*, Makassar, Indonesia. Nutrient content test using SNI 01-2891-1992 test method and analyzed using ANOVA test. The second stage uses a quasi-experimental research design with a Non-Randomized Pretest-Posttest with Control Group Design.

III. Result

1. Nutrient Value

The nutritional value of modisco milk with various formulas.

Table 5.1 Distribution of Nutrients of various Modisco Dairy Products

Modisco Dairy Products	Nutrient Value (Mean)										
	Fat (%)				KH (%)				Proteins (%)		
	Repetition			Average	Repetition			Average	Repetition			Average
	1	2	3		1	2	3		1	2	3	
Original	2.03	1.89	1.72	1.88	8.01	8.05	8.07	8.04	1.30	1.10	0.97	1.12
Formula 1	1.87	1.98	2.17	2.01	8.71	8.73	8.75	8.73	1.29	1.62	1.75	1.55
Formula 2	2.31	2.29	2.32	2.32	9.15	9.21	9.23	9.20	1.46	1.66	1.79	1.64

Table 5.1 can be seen the average value of nutrients in the original Modisco milk product from 3 repetitions, each obtained: fat on average 1.88%, carbohydrates on average 8.04% and protein on average 1.12% . The results of the test of the nutritional content of the modified Modisco milk product formula 1 showed that the mean value of fat content was 2.01%, the mean value of carbohydrate content was 8.73% and the mean value of protein content was 1.55%.

The results of the test of the nutritional content of the modified Modisco milk product formula 2 showed that the mean value of fat content was 2.32%, the mean value of carbohydrate content was 9.20% and the mean value of protein content was 1.64%.

2. Modisco Dairy Preferred Value

Table 5.2 Distribution of preference levels of Modisco Milk in various formulas.

Modisco Dairy Products	Preferred Test Value (Mean)			
	Flavor	Color	Aroma	Texture
Original	2.52	2.44	2.40	2.48
Formula 1	2.76	2.64	2.64	2.72
Formula 2	3	3	2.96	2.92

Information :

1 = Dislike, 2 = Normal, 3 = Like

From table 5.2, it can be seen that the highest level of preference is obtained by Modisco Milk Products Modisco Formula 2, followed by Modisco Milk Products Formula 1 and Modisco Original Milk Products. The mean value of Modisco Product Preference Test Formula 2 got a mean value of 3, for Color got a mean value of 3, Aroma got a mean value of 2.96 and Texture got a mean value of 2.92. Meanwhile, the mean value of Modisco Product Preference Test Formula 1 for Taste, got a mean value of 2.76, for Color got a mean value of 2.64, Aroma got a mean value of 2.64 and Texture got a mean value of 2.72. The mean value of Modisco Original Dairy Product Likeness Test for Taste got a mean value of 2.53, for Color got a mean value of 2.44, Aroma got a mean value of 2.40 and Texture got a mean value of 2.48.

3. The Effect of Addition of Soybeans and Fruit Juice on the Nutrient Content of Modisco Milk

To determine the effect of the addition of soybeans and fruit on the nutritional content (fat, carbohydrates and protein) in modisco milk, the Anova test was carried out.

Table 5.3 Effect of Addition of Soybeans and Fruits on the Nutrient Content of Modisco

Variable	Treatment			p-value
	PX0	PX1	PX2	
	Mean (SD)	Mean (SD)	Mean (SD)	
Fat (%)	1.88±0.15	2.01±0.15	2.31±0.02	0.015
Carbohydrates (%)	8.04±0.03	8.73±0.02	9.20±0.04	0.000
Proteins (%)	1.12±0.17	1.55±0.24	1.64±0.17	0.036

Information "

PX0 : Measurement of nutrient content and acceptability of the original Modisco milk product

PX1 : Measurement of nutrient content and acceptability of Modified Dairy product formula 1

PX2 : Measurement of nutrient content and acceptability of Modified Dairy product formula 2

In table 5.3 above can be seen the results of the ANOVA test related to the content of fat (*p-value* = 0.015 <0.05), carbohydrates (*p-value* = 0.000 <0.05) and protein (*p-value* = 0.036 <0.05) it can be concluded that there is an effect of the addition of soybeans and fruit on the increase in the nutritional content (fat, carbohydrates and protein) of modified Modisco milk.

4. The Effect of Addition of Soybeans and Fruit Juice on the Acceptability Content of Modisco Milk

Table 5.4 Effect of Addition of Soybeans and Fruits on Modisco Terima Acceptance

Variable	Treatment			p-value
	PX0	PX1	PX2	
	Mean (SD)	Mean (SD)	Mean (SD)	
Flavor	2.52±0.65	2.76 ± 0.52	3±0.00	0.002
Color	2.44±0.71	2.64±0.49	3±0.00	0.001
Aroma	2.40±0.76	2.64±0.49	2.96±0.20	0.003
Texture	2.48±0.71	2.72±0.46	2.92±0.28	0.013

Information :

1 = Dislike, 2 = Normal, 3 = Like

In this study, the results of the preference test for modisco milk PX0 were 2.52 on average, 2.44 for color, 2.40 for aroma, and 2.48 for texture. The preference test for modisco milk PX1 has an average of 2.76, an average of 2.64 for color, an average of 2.64 for an aroma, and an average of 2.72 for a texture. The preference test for modisco milk PX2 is average 3, the color acceptability is 3, the aroma is 2.96 and the texture is 2.92.

IV. Discussion

In this study, the nutritional content of the modisco milk PX0 fat percentage was an average of 1.88%, carbohydrates an average of 8.04% and fat an average of 1.12%. The nutritional content of Modasco PX1 milk is an average of 2.01% of fat, an average of 8.73% of carbohydrates and an average of 1.55% of fat. The nutritional content of Modasco PX2 milk is an average of 2.31% fat, 9.20% average carbohydrates and 1.64% fat on average.

It was seen that there was an increase in the nutritional content after the addition of soybeans and fruit to the modisco milk. The results of the test of the nutritional content of the modisco Dairy product in various formulas using the ANOVA test are, fat *p value* = 0.015 < (0.05), carbohydrate *p value* = 0.000 < (0.05) and protein *p value* = 0.036 < (0.05). The conclusion is that there is a significant difference in the addition of soy beans and fruit to the increase in the nutritional content of Fat, Carbohydrates and Proteins in modisco milk.

Modisco milk is a milk that can be given to under-five children who are malnourished, such as KEP (Less Protein Energy) and may also be given to children whose appetite has decreased drastically. A research in Uganda regarding the intervention of modisco milk has been carried out on children with nutritional disorders with satisfactory results [4]. Nutrient content in fashionableco milk can still be increased by modifying the addition/substitution of food ingredients to add nutritional value. Foodstuffs that can be used as additions/substitutions are soybeans and fruit.

From the results of the study, Modisco milk has been proven to significantly improve the nutritional status of children under five and meet special dietary requirements for toddlers so that it can be used to improve nutritional status, or increase toddler's weight quickly. Giving modisco milk to malnourished toddlers can improve the nutritional status of toddlers in Purworejo Regency [5]. Research conducted in Jombang Regency concluded that giving modisco milk as PMT can significantly increase the body weight of toddlers [6].

The occurrence of differences in the nutrient content of Modisco milk substituted with soybeans and fruit compared to the nutrients in raw soybeans is caused by several things, one of which is the result of the cooking

process of food using heat energy which causes a decrease in the nutritional content of the Modisco milk compared to raw material as a result of a series of biochemical reactions. The magnitude of the decrease/shrinkage of soybean nutrients due to cooking is related to the temperature and duration of the cooking process. However, in addition to the cooking process that can damage the nutrients of soybeans, cooking has a beneficial impact, namely it can increase digestibility and decrease various anti-nutritional compounds. Cooking carbohydrates is needed to get the right starch digestibility. When starch is heated, the starch granules swell and break so that the starch is gelatinized [7]. The decrease in fat content during cooking is due to the nature of the fat that is not heat resistant, during the cooking process the fat will melt or even evaporate into other components such as *flavor* [8] .

In table 5.4 above, it can be seen that the results of the Kruskal Wallis test are related to taste characteristics (*p-value* = 0.002 < 0.05), color (*p-value* = 0.001 < 0.05), aroma (*p-value* = 0.003 < 0.05).) and texture (*p-value* = 0.013 <0.05) it can be concluded that there is an effect of the addition of soybeans and fruit on the acceptability (taste, color, aroma and texture) of modified Modisco milk.

V. Conclusion

There is a significant difference in the addition of soybeans and fruit to the increase in the nutritional content of Fat, Carbohydrates and Proteins in modisco milk. There is a significant difference in the addition of soybeans and fruit to the acceptability of Taste, Color, Aroma and Texture of Modisco milk.

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