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Research Article

The Effect of Formula Modisco Supplementation on Weight Gain in Malnourished Toddlers In the Kendari City Health Center

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ABSTRACT

Background: There were 32 cases of malnourished children in 2022 at the Kendari City Health Center. Formulas Modisco can be used as a supplementary food to improve the weight of malnourished children. The aim of this research is to determine the influence of Modisco formula on the weight gain of malnourished children. The variables in this study are Modisco formula and the increase in weight of malnourished children.
Methods: The population in this study is malnourished children, and a total of 32 children were sampled by using total sampling technique. The research design was used a one-group pretest-posttest pre-experimental study and using paired t-test analysis.
Results: The statistical test results showed that the alpha value was < 0.05, which is 0.000, indicating that there is an influence of Modisco formula on the weight gain of malnourished children.
Conclusion: It is recommended to promote the use of Modisco formula as a supplementary food for malnourished children and to modify the formula by incorporating local ingredients to create snacks for children.

Keywords: Formula, malnutrition, children, food.

INTRODUCTION

According to data from the World Health Organization (WHO), as many as 2.7 million children in 2016 were estimated to suffer from malnutrition among children under the age of 5. This figure increased by 22.2% in 2017. In Asia alone, there were 83.6 million children with malnutrition, 0.5 million in North America, 5.1 million in Latin America and the Caribbean, 58.7 million in Africa, and 0.5 million in Oceania. To reduce child mortality due to malnutrition, WHO continues to promote the use of Exclusive Breastfeeding (ASI) as the first food to be given to infants because it is rich in various nutrients necessary for a child's growth and development (1).

This is supported by Indonesia, which has established regulations regarding Exclusive Breastfeeding, as stated in Government Regulation No. 33 of 2012. The aim is to encourage mothers to provide exclusive breastfeeding to their children without additional food (2). However, despite these regulations, Indonesia still faces challenges in the field of nutrition, which is not in line with its achievements in transitioning to a middle-income country over the past few decades (3).

Indonesia faces the dual burden of malnutrition, including both undernutrition and overnutrition. Undernutrition in Indonesia is attributed to poverty, inadequate food availability, poor environmental quality (sanitation), low community knowledge, balanced diets and health, and the presence of nutritionally poor areas (iodine deficiency). Additionally, infectious diseases are a contributing factor that worsens children's nutritional status, and conversely, nutritional disorders in children can weaken their ability to combat infections (4).

Step by step, Indonesia is working to reduce various malnutrition issues in children through research activities, capacity development, government programs, and community education. Efforts are also made to improve access to sanitation and clean water, as well as to provide social protection for mothers and children (5). In Indonesia, the prevalence of nutritional status among toddlers based on Weight-for-Age (BB/U) includes 3.9% with stunting, 13.8% underweight, 79.2% normal nutrition, and 3.1% overweight (6).

Data from the 2018 National Basic Health Research indicates that Southeast Sulawesi Province ranks among the top 10 provinces in Indonesia with a high prevalence of undernutrition. It recorded 5.6% of children with severe undernutrition and 16.4% with undernutrition. This problem is more prevalent in male children (4.5%) compared to female children (3.3%). Parents with education levels below elementary school have a 5.1% prevalence of children with severe undernutrition, and those working as fishermen have a 6.6% prevalence, while the majority are found in the 4.6% category (6).

The main factor contributing to severe undernutrition in Southeast Sulawesi is economic problems or poverty, which is highly correlated with low-income levels. The higher the poverty rate, the greater the potential for severe undernutrition in toddlers. Other causes of severe undernutrition in toddlers include improper child-rearing practices and the effects of diseases, especially infections. Child-rearing practices involve a mother's attitude towards her child's closeness, feeding, care, health, cleanliness, affection, and more (7).

According to the performance report of Kendari city, it is noted that the incidence of

malnutrition in Kendari has been on the rise over the past 5 years. In 2019, there were 23 cases of children with malnutrition, and by the year 2022, the number of malnutrition cases in children increased to 32 cases. The highest number of cases was recorded in the Abeli sub-district with 5 cases, followed by Wua-Wua with 5 cases, Kadia with 4 cases, Kendari with 3 cases, Baruga and Kambu with 2 cases each, and Mandongan and Nambo with 1 case each. There were also 103 cases of Low Birth Weight (BBLR) out of 8,457 live births (8).

Based on the nutritional management approach, children with undernutrition should receive nutritional care, including additional nutritional intake (9). One effective method to address undernutrition is by providing dietary therapy using Modified Dietetic Skimmed Milk and Coconut Oil (MODISCO). MODISCO can also be used as part of supplementary feeding. Dietary therapy for children with protein-energy malnutrition using MODISCO consists of skim milk or full cream, sugar, and oil or margarine. MODISCO has been tested and meets specific dietary requirements for toddlers in Indonesia and can be used as supplementary feeding to improve nutrition (10).

The administration of Modisco to children is effective, affordable, and provides a relatively small portion of food or beverage but contains high calories and protein. It is easily digestible as it consists of vegetable fats and medium-chain fats. It serves as an alternative for children who do not like drinking milk and can help increase weight rapidly, around 30 - 100 grams per day. To popularize Modisco in the community, the formula has been slightly modified to make it more accessible, with cottonseed oil replaced with margarine. Its administration is tailored to the specific case of weight or protein energy deficiency in each child, whether it is mild, moderate, or severe. However, Modisco Formula can also be given to children when they need extra energy, such as when they have a reduced appetite, have recently recovered from illness, or are engaged in strenuous activities.

METHODS

The variables in this study are the Modisco formula and the weight of malnourished toddlers. This study utilizes a pre-experimental research design known as the one-group pretest-posttest design. The subjects undergo an initial measurement (pretest) followed by the application of the intervention, and then a final measurement (posttest) is conducted. The results are analyzed to observe whether there is a difference or change before and after the intervention. The population in this study consists of 32 malnourished toddlers. The sample is drawn using a total sampling method, meaning all 32 toddlers in the population are included in the study. The instrument used to measure the nutritional status of toddlers is the Z-Score table. The Modisco formula is created based on the basic Modisco formula table and its modifications (12).

RESULTS

Table 1. Distribution of Respondents Based on Age

No	Age	n	%
1	0 – 12 months (0 - 1 year)	0	0
2	13 – 36 months (2 – 3 years)	25	83,33
3	37 – 59 months (4 – 5 years)	5	16,67
Total		**30**	**100**

Based on Table 1, it can be observed that toddlers aged 2 - 3 years constitute the majority, accounting for 83.33% of the sample. In contrast, toddlers aged 4 - 5 years make up 16.67% of the sample, while there are no toddlers aged 0 - 1 year in the sample.

Table 2. Distribution of Respondents Based on Gender

No	Gender	n	%
1	Men	13	43,3
2	Women	17	56,7
Total		**30**	**100**

Table 3. Distribution of Respondents Based on Ethnicity

No	Ethnic	n	%
1	Muna	12	40
2	Tolaki	9	30
3	Bugis	8	26,7
4	Jawa	1	3,3
Total		**30**	**100**

Table 4. Distribution of Respondents Based on Mother's Education

No	Education	n	%
1	SD	7	23,3
2	SMP	7	23,3
3	SMA	10	33,3
4	SI	6	20,1
Total		**30**	**100**

Table 5. The table below provides an overview of the nutritional status of toddlers at the Kendari City Health Center before and after receiving Modisco formula

No	Initial name	Age	Implementing Formula Modisco	Weigt Before	Weigth After	Difference
1	AN. Rn	10 month	Modisco I dan II	6	8	1.800 gr
2	An. Rm	10 month	Modisco I dan II	6	7	1.700 gr
3	An. Al	6 month	Modisco I dan II	5	6	1.600 gr
4	An. Af	24 month	Modisco II	8	10	1.600 gr
5	An. Wg	10 month	Modisco II	7	9	1.600 gr
6	An. Fr	6 month	Modisco I dan II	5	7	1,700 gr
7	An. Fd	9 month	Modisco I dan II	6	7	1,600 gr
8	An. Sn	41 month	Modisco I dan II	10	11	1,500 gr
9	An. Ma	17 month	Modisco II	8	9	1,800 gr
10	An. B	36 month	Modisco II	10	11	1,800 gr
11	An. D	36 month	Modisco II	9	11	1.900 gr
12	An. G	30 month	Modisco I dan II	8	10	1,600 gr
13	An. T	36 month	Modisco III	11	12	1,600 gr
14	An. T	38 month	Modisco II	9	11	1,700 gr
15	An. M	36 month	Modisco III	11	13	1,600 gr
16	An. A	16 month	Modisco II	7	9	1,600 gr
17	An. S	22 month	Modisco II	8	9	1,600 gr
18	An. H	39 month	Modisco III	10	12	1,800 gr
19	An. K	24 month	Modisco II	8	10	1,800 gr
20	An. L	34 month	Modisco II	9	11	1,700 gr
21	An. M	43 month	Modisco II	10	12	1,600 gr
22	An. P	19 month	Modisco II	7	9	1,800 gr
23	An. K	27 month	Modisco III	8	10	1,800 gr
24	An. A	24 month	Modisco II	8	10	1,900 gr
25	An. S	26 month	Modisco II	8	10	1,700 gr
26	An. H	48 month	Modisco III	11	13	1,700 gr
27	An. R	36 month	Modisco III	10	12	1,500 gr
28	An. D	14 month	Modisco II	7	8	1,600 gr
29	An. L	26 month	Modisco II	8	10	1,800 gr
30	An. S	37 month	Modisco II	9	11	1,800 gr

Table 7. Results of statistical test using paired t-test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PRE TEST - POST TEST	-1.70000	.46609	.08510	-1.87404	-1.52596	-19.977	29	.000

Before conducting statistical tests, a normality test of the data was first performed. The result of the data normality test indicated that the data is normally distributed; therefore, the test used is the Wilcoxon test. It is known that the sig. value (2-tailed) is 0.000 < 0.05, thus it can be concluded that there is a difference in the increase in toddler's weight before and after the administration of Modisco formula.

DISCUSSION

Malnutrition is a nutritional condition in toddlers characterized by one or more signs such as bilateral pitting edema, at least in both ankles, weight-for-length or weight-for-height less than -3 standard deviations (< -3 SD), and an upper arm circumference (UAC) of less than 11.5 cm in toddlers aged 6-59 months. Malnutrition is a serious issue and requires immediate medical attention. Toddlers experiencing malnutrition should receive adequate nutritional care and medical treatment to prevent potentially fatal complications (11).

Modisco stands for "Modified Discharge solution," which is used as a recommended fluid therapy for weight gain in malnourished or undernourished toddlers. Modisco is one form of oral rehydration therapy. However, it is important to remember that Modisco is a specific therapy typically administered by licensed medical professionals. The Modisco formula may vary depending on the medical protocols used and the specific condition of the toddler.

In the management of malnutrition, the administration of Modisco formula to toddlers is divided into 3 phases: the stabilization phase, the transition phase, and the rehabilitation phase. During the stabilization and transition phases, the child with malnutrition should have their food gradually and slowly increased in quantity to prevent the occurrence of heart failure, which can happen if the child consumes a large amount of food suddenly. The dietary requirements involve providing Modisco Formula I/II, with the following nutrient amounts: Energy: 150 – 200 Kcal/kg body weight/day, Protein: 2 – 3 grams/kg body weight/day, Fluid: 150 ml/kg body weight/day.

The stabilization and transition phases are the initial steps taken in treating malnourished toddlers at home. During this phase, the first priority is to prevent hypothermia and hypoglycemia because malnourished children have low blood sugar levels and a decreased level of consciousness, weakness, seizures, cold sweats, and paleness. To prevent these, the patient should receive food every two hours, as the risk of hypoglycaemia and hypothermia remains high during this period. Furthermore, the food should gradually become thicker and denser in consistency and nutritional content.

As for the rehabilitation phase, if the child is still receiving breast milk, breastfeeding should continue, supplemented with formula food because the energy and protein from breast milk alone will not be sufficient for catch-up growth. The dietary requirements involve providing Modisco Formula III, with the following nutrient amounts: Energy: 150 – 200 Kcal/kg body weight/day, Protein: 4 – 6 grams/kg body weight/day, Fluid: 150 – 200 ml/kg body weight/day.

The main benefit of Modisco is to address malnutrition in children quickly and

easily. Modisco has a high calorie content and is easily digestible by children. Additionally, the ingredients used to make Modisco are readily available at an affordable price, even for those in the middle to lower economic groups. The administration of Modisco formula is not limited solely to toddlers suffering from malnutrition but can also be given to children who are in the process of recovering from illnesses or engaging in strenuous physical activities. This formula contains high levels of protein and calories in relatively small portions, yet it is easily digestible because it contains medium-chain fats.

CONCLUSIONS

It is known that the sig. value (2-tailed) is 0.000 < 0.05, thus it can be concluded that there is a difference in the increase in toddler's weight before and after the administration of Modisco formula.

ACKNOWLEDGMENT

Improving the utilization of local food ingredients by modifying the Modisco formula into various nutritious and healthy snacks to enhance children's weight gain. Additionally, healthcare workers in the Kendari city health centers need to conduct public awareness campaigns to encourage the consumption of Modisco formula as a food that can promote weight gain in children, not only for malnourished children but for the entire community.

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