The Evaluation of Formula 100 Utilization Program towards The Nutritional Status of Malnourished Children after Treatment at Muna District in 2016

Riska Mayangsari[1], Madarina Julia[2], Susetyowati[3]

[1]Student of School of Public Health Postgraduate Program, Faculty of Medicine, Universitas Gadjah Mada.
[2]Staff of Child Care Centerin dr. Sardjito Hospital, Yogyakarta.
[3]Health and Nutrition Departemen, Faculty of Medicine, Universitas Gadjah Mada

ABSTRAK

Latar belakang*: Persentase balita kurus di Kabupaten Muna sebesar 11,8% dan balita sangat kurus sebanyak 6,3%. Sesuai rekomendasi World Health Organization (WHO), perbaikan status gizi balita gizi buruk dilakukan dengan memperbaiki asupan zat gizi dengan memberikan formula terapi berupa pemberian Formula 100 (F-100), dimana F-100 merupakan makanan yang berbahan dasar susu yang diberikan pada fase transisi dan fase rehabilitasi.*

Tujuan*:Mengetahui daya terima F-100 oleh balita gizi buruk dan mengetahui hubungan daya terima F-100 balita gizi buruk dengan perubahan status gizi.*

Metode*:Jenis penelitian ini merupakan penelitian observasional yang menggunakan rancangan kohort prospektif. Sampel penelitian adalah seluruh balita umur 12-24 bulan yang mengalami gizi buruk berjumlah 73 balita yang telah memenuhi criteria inklusi dan eksklusi.Sampel penelitian mendapatkan F-100 selama 5 minggu.Analisis data yang digunakan adalah univariat dan bivariat.*

Hasil*:Sebagian besar subjek (63,08%) termasuk dalam kategori daya terima baik dengan menghabiskan F-100 yang diberikan dan sisanya (36,92%) termasuk dalam kategori daya terima kurang dengan tidak menghabiskan F-100 yang diberikan. Hasil uji Chi Square menunjukan ada hubungan antara daya terima F-100 dengan perubahan status gizi (p=0,02) (RR=2,7, 95% CI=1,07-7,21).*

Kesimpulan *:Terdapat hubungan yang signifikan antara daya terima F-100 denganperubahan status gizibalita (p<0,05).*

KATA KUNCI*: evaluasi, status gizi, F-100*

ABSTRACT

Background*: The total percentage of underweight children in Muna District was 11.8% and the percentage of severe wasted children was 6.3%. As recommended by World Health Organization (WHO),improvement in nutritional status of malnourished children is conductedby improving food supplementation. Giving therapeutic formula 100 (F-100), where F-100 is the food made from dairy products which given in transition and rehabilitation phase.*

Objectives*:To figure out the admission of F-100 by malnourished children and to find out the correlation between F-100 admission from malnourished children and the changing of nutritional status.*

Methods: *This research is an observational study using the design of prospective cohort study. The sample were the whole children aged 12-24 months who suffered malnutrition with the total number up to 73 children who have fulfilled the criteria of inclusion and exclusion. The study sample had received F-100 for 5 weeks. The data analysis used is univariate and bivariate.*

Results: *Most of the subjects are included in the category of well admission (63.08%) by spending given F-100 and the rests are included in the category of less admission (36.92%) by not spending the given F-100. The result of Chi Square Test shows that there is correlation between the admission of F-100 and the changing of nutritional status (p=0.02) (RR=2.7, 95% CI=1.07-7.2).*

Conclusions*: There is significant correlation between the admission of F-100 and the changing of children's nutritional status (p<0.05)*

KEYWORDS: *evaluation, status, nutrition, F-100*

INTRODUCTION

Children under five are the group that susceptible to health issues including malnutrition, which is a serious public health problem in Indonesia[1] .The prevalence of severe wasted in Indonesia was 5.3%, and the prevalence of thinness was 6.8%. Southeast Sulawesi still has the prevalence of malnutrition above the national prevalence rate with the total percentage of 21.2%. Based on the results of the nutritional status monitoring in 2015, the percentage of severe wasted children in Muna district was 6.3%[2].

In accordance with *World Health Organization* (WHO) recommendation, the improvement in nutritional status of malnourished children is achieved by these three means: improving supplementation of macro and micro nutritional intake by giving therapeutic dietary supplement and formulated food gradually, treating comorbid diseases, and malnutrition management conducted through inpatient and outpatient treatment for children without medical complication. The standard therapy for malnutrition is the treatment by one of F-75, F-100, or F-135 formulas, where F-100 is the food made from dairy products which given in transition and rehabilitation phase[3].

On a previous study in the area of Puskesmas Sukoharjo, there was relationship between F-100 therapy and the nutritional status of children under five[4]. Objectives of this study are to figure out the admission of F-100 by malnourished children and to find out the correlation between F-100 admission from malnourished children and the changing of nutritional status.

MATERIAL AND METHOD

This study was an observational study using the design of prospective cohort study through a quantitative approach, which evaluated the treatment of F-100program to the nutritional status of malnourished children after treatment in Muna District. This study was held on February 27 until April 1, 2017.Samples in this study were all children aged 12-24 months who suffered malnutrition in Muna District. Sampling method used in this study was random sampling .

Based on weight to height indicator, children with Z Score (WHZ)<-3SD were categorized as malnourished children,where the determination of Z score for children under the age of five was using WHO Antrophometry 2005. Another inclusion criteria used were the parent or family agreed to participate in this study by signing the informed consent form and for severe malnutrition children were in the advanced rehabilitation phase. The exclusion criteria of this study were children that had special treatment on Therapeutic Feeding Center (TFC) previously, being sample of another study that related to food intervention, or having medical complication.

The study sample had received F-100 five days a week for 5 weeks. On each day, the study sample should have received 400 kCal from 5-7 servings, and the standard serving was 100 mL each. Admission of F-100 was the independent variable, whereas nutritional status was the dependent variable. Data were analyzed by univariate and bivariate analysis. Ethical Committee of Faculty of Medicine UniversitasGadjahMada approved this study on February 27, 2017 with certificate number: KE/FK/0269/EC/2017.

RESULT AND DISCUSSION

There were 65 subjects in this study due to 8 subjects who were dropped out. Most of subjects 36 subjects (55,38%) were female(55.38%).. Mean age was 20,48 months (SD = 3,33), the average z score of body length according to the age was -3.6 (SD = 1,18), the z score of body weight according to the body length was -3,37 (SD = 0.47).

All respondents (100%) worked as a housewives and had status as the main caretaker of the subject. The mother's educational background in this research was divided into 3 groups: no school, graduated from elementary school and graduated from junior high school . Most of the mothers who graduated from primary school were 44 respondents (67,69%), and there were 12 respondents (18,46%) who did not go to school, and the rest were 9 respondents (13.85%) who graduated from junior high school.

The category of F-100 admission according to Leandro-Merhi*et al.*(2015)[5]. The admission of F-100

by the subject was stated based on the average intake of formulated food and being categorized into two admission categories. The F-100 admission which included in the category of depleted was 41 subjects (63,08%) and for not depleted is 24 subjects (36,92%). The characteristics of the subject to be compared were age, sex, body length according to age and body weight. For female sex subject, 22 children (61,11%) spent F-100, while 14 children (38,89%) did not spend the F-100 given. For male sex subject, 19 children (65,52%) spent F-100, and 10 children (34.48%) did not spend the F-100 given. The distribution of sex based on the admission is not statistically shows significant differences after being analyzed by using *Chi Square* (p=0.71).

While the result of analysis from the distribution of age, body length according to age, body weight according to body length based on the admission was not statistically different after being analyzed by using *independent t-test*(Table 1).

At the beginning of the study, the average z score of the subjects was -3,37 (SD = 0,47), at the end of the study the z score of the subjects was -3,01 (SD = 0,56), and for the z score the subject was 0,35 (SD = 0,46). At the end of the research, there was a change of nutritional status in some children under the age of five, those who still suffered malnutrition were 42 subjects (64.6%), and those who changed status to be malnourished/normal were 23 subjects (35.4%) . Analysis of differences between admission

with delta Z Score was using independent t-test (Table 2).

The result of statistical test indicates that there was a significant correlation between F-100 admission and the nutritional status because p <0,05 with RR = 2,7 (95% CI = 1,07-7,21) means that children who did not spent F-100 having 2,7 times risk and still have high probability to experiencing malnutrition compared to children under five who spent F-100. Analysis of relationship between admission with nutritional status was using *Chi Square Test* (Table3).

The result of statistical test shows that there is a significant correlation between total caloric sufficiency and the final nutritional status of under-five children because the value of p <0,05, with RR = 3,17 (95% CI = 1,22-8,25) means that children with the total caloric sufficiency≤70% or included in the less risk category of 3,6 times still experiencing malnutrition compared to the children with the total caloric sufficiency> 70%.Analysis of relationship between total calorie intakes with nutritional status was using *Chi Square Test* (Table4).

The result of statistical test shows that there is a significant correlation between infectious diseases and the nutritional status because p <0,05, with RR = 2,6 (95% CI = 1,01-6,73) means that children with infectious diseases when this research was conducted had a risk of 2,6 times will still experiencing malnutrition compared to the

Table 1. Distribution of Age, Height-to-Age, and Weight-to-Height by Admission of F-100

Variable	Admission, Mean (SD)				
	Less (<100%)	Well (100%)	Mean difference	95% CI	p
Age (month)	21(3.04)	20.17(3.49)	0.82	-0.88-2.54	0.34*
Height-for-Age	-4.15(1.29)	- 3.53(1.06)	-0.61	-1.24-0.01	0.06**
Weight-for-Height	-3.38(0.58)	-3.35(0.40)	-0.03	-0.31-0.24	0.80**

Table 2. Relationship between Admission with Delta*Z Score*

Admission of F100	Weight-to-Height Z Score[Mean(SD)]		
	*Z Score*Awal	*Z Score*Akhir	Delta *Z Score*
Less (<100%)	-3.38(0.58)	-3.22(0.63)	0.17(0.27)
Well (100%)	-3.35(0.40)	-2.88(0.48)	0.47(0.52)
Mean diff	-0.03	-0.33	-0.30
(95% CI)	-0.31-0.24	-0.64)-(-0.03	-0.50--0.11
p	0.80	0.03	0.003

Table 3. Relationship between Admission with Nutritional Status

Variable	Category	Nutritional Status				RR	95% CI	p
		Malnutrition		Underweight				
		n	%	n	%			
Admission	Less (<100%)	20	83.33	4	16.67	2.7	1.07-7.21	0.02
	Well (100%)	22	53.66	19	46.34			

Table4. Relationship between Total Calorie Intakes with Nutritional Status

Variable	Category	Nutritional Status				RR	95% CI	p
		Malnutrition		Underweight				
		n	%	n	%			
Total Calorie Intake	Less (≤70%)	22	84.62	4	15.38	3.17	1.22-8.25	0.006
	Well (>70%)	20	51.28	19	48.72			

Table 5. Relationship between Infectious Diseases with Nutritional Status

Variable	Category	Nutritional Status				RR	95% CI	p
		Malnutrition		Underweight				
		n	%	n	%			
Infectious Diseases	Yes	19	82.61	4	17.39	2.6	1.01-6.73	0.025
	No	23	54.76	19	45.24			

children who did not experience infectious diseases. Analysis of relationship between infectious diseases with nutritional status was using *Chi Square Test* **(Table5)**.

The majority of children spent F-100 , and some children did not spend F-100 . This was due to the support of the nutritionists and team who cooperatively assist the researchers. The nutritionists and team accompany mothers to give lessons patiently.

The results of the statistical test indicated that there was no significant relationship between age, sex, and initial nutritional status of the subject and the admission due to p>0.05. This is different in theory, because commonly in 1-2 years-old children, there is a behavior of *food neophobia* and *anorexia physiology*[6].

This is in line with a research conducted in Marzoeki Mahdi Hospital which states that there is no significant relationship between sex and patient's admission[7]. However, this is not in line with Almatsier's theory (2004), that sex can be a factor which affecting food admission[8].

This theory is also supported by Drewnowski (1997) who argued that sex can affect a person's admission due to differences in the taste response between men and women regarding the physiological function of each individual[9].The result of this study is different from the research conducted by Puspitasari, et al (2015) which states that there is a positive relationship between nutritional status and food admission[10].

In this research, all subjects of the study did not experience medical complications and still have a good appetite, so that ideally, the subject of research will be able to intake F-100 well. The average intake of F-100 in this research can be categorized as sufficient which is above 90%, but it only produces an average calories adequacy level of 30%. The high intake of F-100 is due to the facts that some subjects often get help from formulated milk, so the taste of the F-100 is no longer unfamiliar to children. The food intake is all kinds of foods and beverages consumed by the body every day. The average feed intake of the subjects in this study was insufficient when compared to the needs of

the day. Based on the *recall 24 hours,* the average consumption of food only reached 41.5% of the recommended nutritional value in a day.

The obstacle in this study is that the level of food availability is very low, because parents come from poor families who cannot afford to buy nutritional food to feed their children, the condition of the ailing subject causes no appetite, and there are complaints and side reactions received by the subjects such as diarrhea, nausea and vomiting. The total caloric intake is the total of the F-100 calories and the food calories consumed by the subject. The average of total calories intake in this study can be categorized as sufficient in meeting the needs of calories of a subject in a single day which is1200 kcal.

At the end of the study some subjects have experienced a change in nutritional status and become less nutrition, and it is also found that 1 subject recovered into a normal nutrition. This is in line with studies conducted in Malawi and Nigeria that malnourished children handled through outpatient treatment success to improve malnutrition status to normal nutrition status[11].

The treatment of F-100 influencing the weight of the subject to be increased in number. According to Ashworth, et al (2009), therapeutic feeding in the rehabilitation phase aims to improve nutritional status by catching up with body weight that has been experienced by children[12].

However, there are also subjects who did not gain weight,aside from the reason of low food intake, the optimal weight gain which has not achieved yet in this research also become the issue because the subject has suffered sicknessduring the time when the study took place. This is in line with Hartoyo's research, et al. (2001) which states that children with sickness usually have less appetite[13].

The result of the statistical test indicates that there is a significant relationship between admission of F-100 and the nutritional status because p <0.05 with RR=2.7 (95% CI=1.07-7.21).This is because, although the F-100 calories only contribute approximately 30% of the calories needs from the subject in a single day, but then the contribution of F-100 gives a good influence on the total caloric

intake of the subject, because if it is only based on the daily intake of subjects then the sufficiency of calories of subject is failed to be fulfilled.The result of this study is different from the research conducted by Sari, et al (2014), which states that based on *Pearson correlation test* there is a significant relationship between the admission of food and the nutritional status of children[8].

The result of statistical test shows that there is a significant correlation between total caloric sufficiency and the final nutritional status of children because the value of p <0.05, with value RR=3.17 (95%CI=1.22-8.25). The results of this study are in line with the results of research conducted by Yamborisut et al (2006), who also found a relationship between the intake of calories and the short status on children in NakhonPathom, Bangkok[14]. Nutritional status is influenced by the consumption of food and the use of nutrients inside the body. When the body obtains enough nutrient and it is used efficiently, then it will achieve the optimal nutritional status that enables physical growth, brain development, activity ability and health in general to the highest level [15].

The result of statistical test indicates that there is a significant correlation between infectious diseases and nutritional status because p<0.05, with RR=2.6 (95% CI=1.01-6.73). This is in line with Supariasa et al (2002) theory which states that there is a correlation between infectious diseases and reciprocal malnutrition, which is the infectious diseases that can worsen the nutritional condition, and the poor nutritional condition can be easily lead to infectious diseases[16].

In this research, nutritional status is not only influenced by food intake and infectious diseases but there are also several factors that indirectly affect nutritional status. These indirect factors include the access to public health facilities which locatedfar from home, unequal distribution of excellent nutritionists, and poor parental educational background. By having excellent health facilities, responsiveness and good access to the health services, then it is expected to support the improvement of public health status, particularly on the nutritional status of the children under the age of five. So, it will be

easier to detect nutritional problem in advance, then prevent and overcome it earlier[17.]

The availability and active participation of nutritionists are equal in each region by providing good and proper education about malnutrition management which can help to overcome the issue of malnutrition in the area, so that malnutrition management program is not only implemented in provincial level, but also can be run in district level[17]

The level of educational background of mothers mostly determines their attitudes and actions in dealing with various problems. A mother has an important role in the health and growth of the children. Children with poorly educated mothers have a higher mortality rate than children with a highly educated mother[18].

CONCLUSION AND RECOMMENDATION

The total of 41 subjects (63.08%) are included in the good admission category either by spending the given F-100 and total 24 subjects (36.92%) are included in the less admission category by not spending the given F-100. There is a significant relationship between F-100 and the changes of nutritional status of children. The need for equalization of malnutrition management training for all nutritionists and team, assistance and support for parents of malnourished children conducted by health center (puskesmas) community, improvement of road to access public health services more quickly and easily, and the concentration of nutrition improvement in the form of Home Recovery Nutrition for the handling of malnourished children can be done optimally.

REFERENCES

1. Ali Khomsan. 2004. *Pangandan Gizi untuk Kesehatan Ed 1*. Jakarta : Raja Grafindo Persada.
2. Riset Kesehatan Dasar. 2013. Kementrian Kesehatan Republik Indonesia.
3. Departemen Kesehatan RI. 2011. *Pedoman Pelayanan Gizi Buruk*. Jakarta. Departemen Kesehatan RI.
4. Murwati, Tuti Devianti. 2016. Peningkatan Status Gizi Balita dengan Gizi Buruk melalui Pemberian Formula 100. Kementerian Kesehatan Politeknik Kesehatan Surakarta Jurusan Kebidanan
5. Leandro-Merhi, V. A., Srebernich, S. M., Goncalves, G. M. S., & de Aquino, J. L.B. 2015. In-hospital Weight Loss, Prescribed Diet, and Food Acceptance. *Arc Bras Cir Dig,* Vol. 28, No. 1, hlm 8-12
6. Issanchou, S. dan Nicklaus, S. 2015. *Sensitive Periods And Factors In The Early Formation Of Food Preferences.* In M.L. Frelut (Ed.), The ECOG's eBookon Child and Adolescent Obesity. Diterima padatanggal 14 April 2016dari ebook.ecog-obesity.eu
7. Manasik, Arina 2011. Konsumsi Energi dan Zat Gizi serta Status Gizi Pasien Lansia di Ruang Gayatri Rumah Sakit Dr. Marzoeki Mahdi Bogor. FEM. IPB.
8. Almatsier S. 2004. Prinsip Dasar Ilmu Gizi. Jakarta: Gramedia Pustaka Utama.
9. Drewnowski, A. 1997. *Taste Preference and Food Intake*. Ann Rev Nutr 17:237–253.
10. Puspitasari, L., Sartono, A., Mufnaetty. 2015. Hubungan Daya Terima Makanan dengan Status Gizi Anak di Panti Asuhan Darunajah Semarang. Jurnal Gizi Universitas Muhammadiyah Semarang Vol. 4, No. 2 (2015).
11. Kurniah, I. 2009. *Faktor-faktor yang Berhubungan dengan Daya Terima Makan Siang Karyawan di RS Brawijaya Women and Children Kebayoran Baru Jakarta Selatan.* UniversitasBraijaya.
12. Ashworth, A. 2009. Simplifying the WHO Guidelines for Managing Severe Malnutrition. *Indian Pediatric, 46*(2), 2–3.
13. Hartoyo *et al.* 2001. Identifikasi Faktor yang Berpengaruh terhadap Efektifitas Pemberian Makanan Tambahan Anak Balita KEP di Kota Bogor. Media GizidanKeluargatahun XXV No 1; 11-18.
14. Yamborisut, U,.et al,. 2006. Factors Associated with Dual Form of Malnutrition in Children in NakhonPathom and Bangkok. J Med Assoc; 89 (7),1012-23.
15. Almatsier S. 2002. Prinsip Dasar Ilmu Gizi. Jakarta: Gramedia Pustaka Utama.
16. Supariasa,I.D.N,Bakri, B, &Fajar,I. 2002. *Penilaian Status Gizi*. Jakarta:EGC.

17. Ma'Rifat. 2010. Analisis Hubungan Pemanfaatan Pelayanan Kesehatan dengan Status Gizi Anak Batita. Sekolah Pascasarjana Institut Pertanian Bogor : Bogor.

18. Dian Kholika Hamal, 2011. Hubungan Pendidikan dan Pekerjaan Orangtua serta Pola asuh dengan Status Gizi Balita di Kota dan Kabupaten Tangerang Banten.