

## Research Article

# The influence of supplementary feeding by local food and 123 milk toward increasing the nutritional status of 12-24 months children with undernutrition status in southeast Sulawesi province, Indonesia

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### ABSTRACT

**Background:** Until now, the case of energy protein malnutrition in children is still high in Indonesia. Kendari city, one of the areas in Indonesia with high prevalent of this disease, has a significant increase which risen from 9.2% in 2006 to 15.1% in 2007.

**Methods:** This was an experimental study that was under taken for 30 days. Sample of research was undernutrition children 12-24 months age that came from Puskesmas Puuwatu area and Perumnas in Kendari City that collected by simple random sampling technique. 16 children under five in the Puskesmas Puuwatu area received local food intervention and 16 children in the area of Puskesmas Perumnas received 123 Milk intervention.

**Results:** There was significant difference in the Mean of body weight differences before and after intervention between children group that was given Local food and 123 Milk ( $p=0,032$ ). Analysis with using paired t test indicated the differences between Z-Score value with BW/A and BW/H index before and after treatment in the children group that received local food intervention ( $p=0,000$ ). In the children group that received 123 Milk intervention, the analysis result of Z-Score value with BW/A index before and after intervention indicated that there was not any significant difference ( $p=0,084$ ), while the analysis of Z-Score value of BW/H index before and after intervention indicated the existence of significant different ( $p=0,000$ ). The analysis that used independent t test did not indicated the significant difference of Z-Score value with BW/A and BW/H index after the intervention between children group that received Local food and 123 Milk intervention. Independent t-test analysis toward difference Mean of Z-score value with BW/A index indicated that there was significant difference between children group that received Local food and 123 Milk intervention ( $p=0,025$ ). Analysis result toward difference Mean of Z-Score value with BW/H indicated the existence of significant difference between two group of intervention ( $p=0,028$ ).

**Conclusions:** Supplementary feeding by local food has better result in the increasing of body weight and Z-Score value than the giving of 123 Milk.

**Keywords:** Local food, 123 Milk, Children under five, Nutritional status, Undernutrition

## INTRODUCTION

The energy-protein deficiency is a condition of under nutrition caused by less energy and protein intake through daily food that can't afford the recommended dietary allowance.<sup>1,2</sup> Condition of KEP is commonly followed by other nutrient deficiencies.<sup>3</sup> This disease has become one of the nutritional problems afflicts growth and development of children in Indonesia.

The data in 2005 showed that prevalence of KEP in Southeast Sulawesi province was 19.34% were under nutrition and 10.04% were moderate undernutrition.<sup>4</sup> This prevalence decreased to 13.64% of children under five with undernutrition and 2.09% with moderate undernutrition in 2006 and increased again to 18.2% for undernutrition and 3.5% for moderate undernutrition case in 2007.<sup>4</sup> Meanwhile in Kendari city, there was a significant increase of the prevalence, which risen from 9.2% in 2006 to 15.1% in 2007. This case indicated that the intervention program had not given satisfying result yet.

One of the treatment programs to recover the nutritional status of children under five was Supplementary5 Feeding to children aged 6-24 months in form of manufactured formula. The manufactured formula feeding had weakness which the supplementary feeding came from one kind of ingredient makes child bored and leads to unoptimal feeding due to cannot eat up the supplementary food. Other weaknesses are mother addicted to the manufactured formula product and being taught less to utilize the available local food.<sup>6</sup> Generally, the manufactured formula is expensive, thus if the government's program were terminated, then limited ability to pay on family which had low income will be a threat to provide such an instant supplementary feeding.<sup>7</sup>

Hence, there must be another strategy to overcome this problem faster and sustainable that one of the alternatives is supplementary feeding by local food. The food stuff which easy to find and consumed by society was in a large amount of the source of carbohydrate as well as protein.<sup>8</sup> Based on the observation result, the most consuming local food in household level were Barongko, Palubutung, and Bubur Kacang Ijo. Nutrient content repair includes energy density repair and protein ratio was done through these kinds of food in order can be used as weaning food.<sup>9</sup> The using of these three kinds of local food alternatively as supplementary feeding to children is objected to avoiding boring on children and hoped to be a solution to complete the nutrient required on children.

The general objection of the study was to understand the influence of supplementary feeding by local food and 123 milk formula toward the increasing of nutritional status on under-five children aged 12-24 months with undernutrition in Kendari city Southeast Sulawesi province.

## METHODS

### *The kind of study*

The kind of the study was experimental research used non-equivalent pre-test post-test control group design.<sup>10</sup>

### *Population*

The population of the study was all children under five with undernutrition aged 12 – 59 months in working area of both Public Health Centres of Puuwatu and Perumnas kendari city by Z-score indices BW/A < -2 SD through -3 SD. Then, the population of both areas was screened to get the homogeny sub population with criteria: 1). Children under five aged 12 – 24 months with undernutrition by BW/A index < -2 SD through -3 SD. 2) had not suffered either congenital disability or other clinical pathology according to doctor's diagnose. 3) had been approved by their parents.

The sampling was done in sub population of children under five who had fulfilled the inclusive criteria and were determined by simple random sampling technique. The sample size was determined by formula, within 16 children under five in Public Health Center of Puuwatu as intervention group and the other 16 children under five in Public Health Center of Perumnas as control group. Before intervention, there had been done 24 hours dietary recall to get the real intake of the samples. The worm check also was done toward the sample and gave negative result in order no need to give vermicide. The early measurement of nutritional status by BW/A and BW/H indices had been done toward both groups. Then, both of groups received intervention for a month where the intervention group received local supplementary feeding of Palubutung, Barongko, and Bubur Kacang Ijo and the control group received 123 milk. At the end of the study, there was re-measurement of nutritional status by BW/A and BW/H indices on sample group<sup>11</sup>. The statistical analysis was done to learn whether there was or there wasn't difference between those 2 groups within the data of ratio scale used Paired t-test and Independen t-test.<sup>12</sup>

## RESULTS

### *The description of body weight of children under five before and after receiving intervention*

Before intervention had been done, the mean of body weight of children under five in local supplementary feeding group was (8.25±0.49) kg, while in 123 milk group was (8.42±0.70) kg. After receiving intervention the mean of body weight in local supplementary feeding group hit to (8.69±0.57) kg, and the other 123 milk group hit to (8.72±0.71) kg. The distribution of the mean of body weight measurement before and after receiving intervention was listed the following table below.

**DISCUSSION**

**Table 1: Distribution of children under five by the measurement result of body weight before and after receiving intervention in public health center of puuwatu and perumnas, Kendari city in 2009.**

Measurement Result of Body Weight	Intervention Group			
	Local Food (Public Health Center of Puuwatu)		123 Milk (Public Health Center of Perumnas)	
	Before	After	Before	After
Mean	8.25	8.69	8.42	8.72
Deviation Standard	0.49	0.57	0.70	0.71
Minimum	7.30	7.60	7.20	7.40
Maximum	9.00	9.60	9.60	10.00

**Z score index of body weight by age (BW/A) before and after receiving intervention**

The result of 2 independent samples T test before received intervention showed that p value = 0.297 (p>0.05) which indicated that there was no any significant difference of Z score index value of BB/A between Local Supplementary feeding and 123 milk group. The result of 2 independent samples T test toward the Z score value of children under five of both groups after had received intervention for a month showed that p value = 0.567 (p>0.05) indicated that there was no any significant difference of Z score index of BW/A between those 2 groups.

**Table 2: Distribution of children under five by the measurement result of Z score index by BW/A before and after intervention in Public Health Center of Puuwatu and Perumnas, Kendari city in 2009.**

Measurement Result of Z Score Index by BW/A	Intervention Group			
	Local Food (Public Health Center of Puuwatu)		123 milk (Public Health Center of Perumnas)	
	Before	After	Before	After
Mean	-2.40	-2.17	-2.33	-2.24
Deviation Standard	0.26	0.32	0.28	0.37
Minimum	-3.00	-2.81	-2.92	-3
Maximum	-2.09	-1.81	-2.08	-1.83

The independent sample t test of Z score in children group of local food showed p value = 0.000 (p<0.005), in which indicated that there was any significant difference of Z score in by BW/A between before and after intervention done. While, in 123 milk group, the independent sample t test showed p value =0.084 (p>0.05) in which indicated that there was no any

significant difference of Z score index by BW/A between before and after receiving intervention.

**Z Score index of body weight by height (BW/H) before and after intervention**

Distribution of Z score index of body weight by height (BW/H) in local supplementary feeding and 123 milk groups was listed the following table.

**Table 3: Distibution of children under five by the measurement result of Z score value by BW/H index before and after intervention in Public Health Center of Puuwatu and Perumnas, Kendari city in 2009.**

Measurement Result of Z score value by BW/H index	Intervention Group			
	Local Food (Public Health Center of Puuwatu)		123 Milk (Public Health center of Perumnas)	
	Before	After	Before	After
Mean	-1.36	-0.93	-1.65	-1.35
Deviation Standard	0.98	0.92	0.71	0.60
Minimum	-2.30	-1.80	-2.50	-2.10
Maximum	0.66	1.16	-0.40	-0.10

The result of 2 independent samples t test of Z score value by BW/H index between children group of local food and 123 milk before intervention showed that p value = 0.355 (p>0.05), indicated that there was no significant difference of Z score value by BW/H index between those 2 intervention groups in the early of the study. The 2 independent samples t test toward Z score value of BW/H index after receiving intervention for a month showed that p value= 0.136 (p>0.05), indicated that there was no significant difference of Z score between children group of local food supplementation and 123 milk supplementation.

The independent sample t test toward Z score by BW/H index before and after receiving intervention in local food group showed p value = 0.000 (p<0.05) indicated that there was any significant Z score by BW/H index before and after receiving supplementary feeding of local food. While in supplementary feeding group of 123 milk, the independent sample t test also showed that p value = 0.000 that indicated there was any significant difference of Z score by BW/H index before and after receiving intervention.

**The difference of body weight, the difference of Z score value of body weight by age index and body weight by height index before and after receiving intervention**

The 2 independent samples t test toward the difference of body weight between those 2 groups showed p value = 0.032 (p>0.05) that indicated there was any significant

difference of body weight gain between group received local food and 123 milk supplementation.

The difference of body weight gain before and after receiving intervention in both local food and 123 milk supplementation was listed in the following table below.

**Table 4: Distribution of children under five by measurement result of the difference of body weight gain before and after receiving intervention in Public Health Center of Puuwatu and Perumnas, Kendari city in 2009.**

Measurement Result of the Difference of Body Weight	Intervention Group	
	Local Food (Public Health Center of Puuwatu)	123 milk (Public ahealth Center of Perumnas)
Mean	0.43	0.29
Deviation Standard	0.17	0.14
Minimum	0.10	-0.10
Maximum	0.60	0.50

The result of the test toward the difference of Z score value by BW/A index showed any significant result in which the 2 independent samples t test showed p value = 0.025 (p<0.05), that indicated there was any significant difference of Z score by BW/A index in both of the groups. The 2 independent samples t test toward the difference of Z score by BW/H index showed any significant result that p value= 0.028 (p<0.05), that indicated there was any significant difference of Z score by BW/H index in both of the groups. The distribution of the difference of Z score of Body weight by age index and body weight by height index between Local food and 123 milk supplementation group was listed the following table below.

**Table 5: Distribution of children under five by measurement result of the difference of z score by bw/a index and bw/h index before and after receiving intervention in public health center of puuwatu and perumnas, kendari city in 2009.**

Measurement Result of the Difference of Z score by BW/A and BW/H indices	Intervention Group			
	Local Food (Public Health Center of Puuwatu)		123 Milk (Public Health Center of Perumnas)	
	BW/A Xndex	BW/H Index	BW/A Index	BW/H Index
Mean	0.27	0.42	0.09	0.29
Deviation Standard	0.21	0.17	0.20	0.15
Minimum	-0.09	0.10	-0.55	-0.10
Maximum	0.60	0.60	0.30	0.50

**The Difference between Body Weight and Z Score of Body Weight by Age (BW/A) Index toward Children Group who ate up the supplementary food**

The respondents who ate up the supplementary food that given in both local food and 123 milk group had the same number that were 10 respondents (62.5%). The mean of body weight gain of children who ate up the supplementary food on local food group was higher than the other 123 milk group. The mean of body weight gain after receiving intervention in a month on children group who ate up local supplementary food (0.55±0.07) kg, while on 123 milk group was (0.34±0.11) kg.

The mean of body weight change and Z score value in children group which ate up the supplementary feeding of both 2 groups was listed the following table below.

**Table 6: Distribution of the difference of body weight and Z score by BW/A index before and after receiving intervention in children group who ate up the supplementary food by intervention group in Kendari city in 2009.**

Measurement Result of the Difference of Body Weight and Z Score by BW/A Index	Intervention Group			
	Local Food (Public Health Center of Puuwatu)		123 Milk (Public Health Center of Perumnas)	
	Boby Weight	Z- Score by BW/A Index	Boby Weight	Z- Score by BW/A Index
Mean	0.55	0.38	0.34	0.15
Deviation Standard	0.07	0.11	0.11	0.12
Minimum	0.40	0.25	0.10	-0.08
Maximum	0.60	0.59	0.50	0.30

The 2 independent samples t test toward the difference of body weight of both 2 intervention groups showed p value = 0.000, indicated that there was any significant difference of body weight of both local food and 123 milk group. The statistical test toward the difference of Z score value by BW/A index also showed any significant result, in which the 2 independent samples t test between these 2 groups showed that p value = 0.001, indicated that there was any significant difference of Z score value before and after receiving supplementation in both group local food group and 123 milk one.

**DISCUSSION**

**The body weight gain of the subject of study**

The children under five in both intervention groups, either received local food or 123 milk ones, showed any body weight gain after receiving intervention. The mean

of the difference of body weight before and after receiving intervention in local food group was higher than 123 milk supplementation group and the statistical test showed any significant difference of body weight of the children under five ( $p = 0.032$ ) between these two groups.

The existence of body weight gain after receiving intervention was the consequences of adequate intake of energy and protein.<sup>13</sup> Any significant difference of body weight was predicted because of good acceptance energy toward the local supplementary food in children.<sup>14</sup> These 3 kinds of local food were Barongko, Palubutung, and Bubur Kacang Ijo given alternatively every day made children's appetite increased and could finish the portion of food giving, hence the body weight gain became maximal. The local supplementary food package gave  $\pm 21$  % calories of all energy requirements and  $\pm 20$  % of all protein requirements and these values can afford covering the deficiency in children under five of local food supplementation as well as lead to any significant body weight gain in advance.

In children group who received 123 milk supplements, though their acceptance energy toward this supplement was good, but according to the interview result of whose mother said that the appetite of the children toward the major food had fallen in order the body weight gain was not maximal.<sup>15,16</sup> Besides that, the number of morbidity between the 123 milk group was higher than the other local food group thus the body weight gain of some children in 123 milk supplementation group were not maximal.

#### ***Increase of Z score value and the difference of Z score of body weight by age (BW/A) index***

In local supplement group, the independent sample t test result toward the body weight by age index value showed any significant different before and after receiving intervention, meanwhile in 123 milk supplement group, the test result didn't show any significant difference ( $p = 0.084$ ). Besides that, the mean of the difference of Z score before and after receiving intervention by BW/A index in children group who received local food was higher than that who received 123 milk supplementation. The statistic test showed that  $p$  value = 0.025, indicated that there was any significant difference of Z score between these two groups. This case showed that local supplementary feeding more capable in increasing the Z score value of children under five than that 123 milk supplementation.

The insignificant change of Z score value in 123 milk supplementation group, due to the change of either body weight or nutritional status was not too high because of many of children suffered illness during intervention period. The kind of disease such as diarrhoea, fever, cough and cold with the onset was 2-4 days during the study.<sup>17-19</sup> While getting sickness, the appetite felt and got

worst, thus although the supplementation was consumed but that energy and protein intake were not adequate yet to gain body weight.<sup>20</sup>

#### ***The change of body weight and Z score value by BW/A index in children under five who could afford finishing the supplementary food***

In all children who afford finishing the supplement in both 2 groups, the mean of body weight gain and Z score value by BW/A index was higher in local supplementation group than that 123 milk supplementation. This case indicated that the local supplementary feeding in children with undernutrition was more capable to gain body weight and Z score value than 123 milk supplementary feeding.

Many factors instead of the nutritional content of supplementary food played in gaining the body weight of children with undernutrition status. One of most influencing factor is daily nutrient intake besides the supplementary feeding.<sup>21</sup> Although children consumed the supplementary food well, but the nutrient intake from the major food was not adequate in order the body weight was not maximal as well as nutritional repair.<sup>22</sup>

The body weight gain that lower in children group who can finish the supplementary food in 123 milk group was caused by the fall of daily food intake. Seeing from the interview result showed a fact that during intervention there was happening the fall of appetite in children under five. Rationally, the milk feeding won't fall appetite its self. The decrease of appetite of children in this group closed to the over doses and frequencies that caused them satiety as well as refuse eating another food<sup>23</sup>. All children fewer than five in this group consumed milk by using nipple/bottle with the number of frequencies was 5-6 times per day. While, the capacity of stomach can accommodate 30 gr/kg of body weight of children, then the children under five who drank milk used big nipple (size 240 ml) would lead to satiety and refuse eating another food. Eventually, the nutrition need of children aged over a year isn't only be filled through milk because of its function as supplement.<sup>5</sup> The big volume in each giving, also couldn't guarantee that children under five had received high calorie and protein intake.<sup>24</sup> The big volume yet diluted concentration will lead to satiety but the nutritional value is low. This case considerably triggered not optimal body weight gain in children under five, although the supplementary food could be eaten up.

In local supplementary food group, three kinds of food (Barongko, Pallubutung, Bubur Kacang Ijo) was given as supplementary interlude food to fill the empty between main food timetable of children that given in 9.00 through 10.00 o'clock. Thus, the supplementary food played as interlude food and didn't disturb the main food timetable. The local food that given to children under five also considered the size of portion that might be able to be eaten up by children. Each portion of local food given

approximately the weight was  $\pm 146$  gram and varied every day made the children felt no boring and could finish each portion of supplementary food. The calories and proteins contained in each portion can fill  $\pm 20\%$  of calorie and protein deficiencies in children of this group, which was described through any significant body weight after receiving intervention for a month.

## CONCLUSION

1. There was any significant difference of the mean of body weight before and after receiving intervention between children fewer than five groups received local food and 123 milk supplementation.
2. There was any significant difference of Z score value by BW/A index and BW/H before and after receiving intervention in children group received local food supplementation. In 123 milk group, there was no any significant difference of Z score value by BW/A before and after receiving intervention, but the analysis of Z score by BW/H index showed any significant difference.
3. There was no any significant difference of Z score by BW/A and BW/H indices after receiving intervention both the children groups received local food and 123 milk supplementation ( $p=0.576$ ,  $p=0.136$ ). The 2 independent samples t test showed that there was any significant difference of mean of Z score value by BW/A and BW/H indices in both children groups received local supplementary food and 123 milk intervention. In children group that ate up the supplementary food of both two groups received intervention, showed that there was any significant difference of mean of body weight and Z score value of BW/A index between local food and 123 milk supplementation group ( $p=0.000$ ,  $p=0.001$ ).

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