



Protein and Anthropometry Status and Nutirien Intake of Stunting Infants by Providing Amino Acid Cysteine after Being Given High Dose of Vitamin A

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Abstract

Nutrition problem solving, including stunting, in South Sulawesi have been done by many government programs, and well as people initiative solution. Though this stunting problem still become a huge problem. Indonesian health data profile in 2011 reported that under-five-children nutrition prevalence status with TB/U index in South Sulawesi is remind in a high number of case, that is 38,8 % compared with national percentage 35,6 %. This problem deserves a special attention in South Sulawesi. One of amino acid that could help the acceleration of development process is cysteine Amino acid. It has an important role in accelerating hormone receptor transcription in *zinc finger protein* (ZFP) reaction, *Transforming Growth Factor β* (TGF β) induction and *Cysteine Rich Intestinal Protein* (CRIP) forming which is related to advance metabolic reaction. Cysteine amino acid providing is a must in metabolic reaction because Cysteine Rich Intestinal Protein (CRIP) is needed in macro and micro nutrition metabolic reaction. Cysteine amino acidic is an essential semi-amino acidic which is not provided fully by human's body so that it has to be added by supplementing process. By all these account it is necessary to do a research about cysteine amino acidic supplementation which is related to urine protein, anthropometry status as well as nutrition intakes in stunting case. This research was done by using *Randomizedpre and post control Group Design*.

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The first group is the experiment group which is given cysteine amino acid and the second one is the control group. The experiment group was treated in 90 days or 3 month total sample 30. By giving the amino acid cysteine in toddler stunting after high-dose vitamin A supplementation can improve urine protein status, body weight and body height and improving intake of energy and nutrients such as carbohydrate, protein and fat. Giving food with high content of the amino acid cysteine or high protein can be used as an alternative for amino acid cysteine in the form of supplementation.

Keyword: Cysteine Amino Acid; High Doses Vitamin A; Protein Urin; Body Weight; Body Height; Nutrient IntakeS.

1. Introduction

Nutrition problem solving, including stunting, in South Sulawesi have been done by many government programs, LSM, as well as people initiative solution. Though this stunting problem still become a huge problem. Indonesian health data profile in 2011 reported that under-five-children nutrition prevalence status with TB/U index in South Sulawesi is remind in a high number of case, that is 38,8 % compared with national percentage 35,6 %. This problem deserves a special attention in South Sulawesi [1].

In 2005 *Millenium Development Goals* (MDGs) Indonesia launched a plan to decrease nutrition problem including stunting into 15,5% [2]. MDGs needs a hard work to be realized, it can be seen by the fact that shows how this problem is still up until now. Stunting in under-five-children prevalence reached 36.8% at 2007 and took a step down into 35,6 % at 2010. Nationally, there were 1,2 % reduction in 3 years [2]. A direct factor of stunting is the low intakes of nutrition, macro and micro. Macro nutrition compliance like carbohydrate, protein, and fat is a priority related to energy composer in human's body. In order to support the development process and to solve this stunting problem we should fulfill the carbohydrate and fat, and saving the protein as much as possible [3].

Protein as an organic compound which is composed by amino acid. Protein has carbon, hydrogen, oxygen and nitrogen in it. It is important in a new cell development, cell repairing, producing essential compound, keeping the balance of body's solution, illness resisting, acting as a transport in a mechanism, and as an energy sources. The amount of protein intakes would increase in a development periods like 1 to 5 years old [4].

One of amino acid that could help the acceleration of development process is cysteine acid. It has an important role in accelerating hormone receptor transcription in *zinc finger protein* (ZFP) reaction, *Transforming Growth Factor β* (TGF β) induction and *Cysteine Rich Intestinal Protein* (CRIP) forming which is related to advance metabolic reaction [5,6].

Stunting of an under-five-children is always followed by insulin resistention. If this happens to a stunting case then insuline inhibition effect to endogen glucose production would not happen optimally which would increase a glucose production in the heart. So that, glucose fulfillment in an undernutrition children is more than the endogen system. It could cause the stunting children lose their appetities due to the low amount of glucose intakes from exogen. Cysteine amino acid providing is a must in metabolic reaction because Cysteine Rich

Intestinal Protein (CRIP) is needed in macro and micro nutrition metabolic reaction. Cysteine amino acidic is an essential semi-amino acidic which is not provided fully by human's body so that it has to be added by supplementing process. By all these account it is necessary to do a research about cysteine amino acidic supplementation which is related to urine protein, anthropometry status as well as nutrition intakes in stunting case.

2. Materials and Methods

The sample of this research was short under-five-children chosen by screening based on TB/U index in the -2SD to -3SD, in a health condition and had gotten a high dose of vitamin A as a government program twice a year. It was a random sampling. There were 11 sample for each group as a result of the number of sample equation. There were 15 samples for each group in the end of research. This research was done by using *Randomizedpre and post control Group Design*. The first group is the experiment group which is given cysteine amino acidic and the second one is the control group. The experiment group was treated in 90 days or 3 month. Cysteine amino acid control method was doing by enumerator watching the sample. An enumerator for 2 samples [7]. Cysteine amino acidic treatment was provided by PT.

Autocindo Indonesia. In a powder form, with no taste and white. It was given in 25 mg/days in 2 months or 60 days. It should be given to the children in a solution where 25 mg cysteine amino acidic could be mixed in 100 mL mineral water. Each sample would be provided by 10 sachet of this powder acidic to consume in 10 days as well as control card about the treatment. Vitamin A supplementation followed the government program which is done every February and August every year. 1-5 years old children consumed a 200.000 SI (60.000 µg retinol) Vitamin A capsule.

Human's body would need 500µg retinol/day of this so that it would be enough for 5-6 months later. Vitamin A supplementation control was done by visitation into each samples house, the vitamin was given by TPG or researcher to make sure that all dose was consumed by samples. It was to prevent from dose failure in vitamin A treatment. Anthropometry status was based on the height and the weight of the samples which was measured every month in 3 months. Result evaluation was each sample getting higher and weightier every month. Nutrition intake is the amount of macro energy and nutrition intakes. This intakes was measured by food recalling 24 dan food weight and it was not done every month in the research.

Measurement result was categorized by enough and less based on Angka Kecukupan Gizi for children. Urine protein is a measurement result of metabolic by using urinalysis method. It is a test to the under-five-children stunting by using Urinalysis Reagan Strips. Measured indicator was Protein (PRO).

3. Research Result

The number of sample of this research was 30 stunting children which was divided into 2 groups, an experiment and 2 control groups. Stunting status of the children was divided into 63,3 % short and 36,7 % very short. This research was done in August so that every sample already has a high dose of vitamin A as a program of the government. Sample characteristic could be seen in the following table:

Table 1: Characteristic samples on protein and Anthropometry status and nutrient intake of stunting Infants by Providing amino acid cysteine after Being Given High-Dose vitamin A

Sample Characteristic	Group 1		Group 2	
	n	%	n	%
Age (year)				
≤ 2.5	2	13,33	3	20
> 2.5	13	86,67	12	80
Total	15	100	15	100
Sex				
Male	10	66,67	6	40
Female	5	33,33	9	60
Total	15	100	15	100
TB/U				
Short	9	60	10	66,67
Very Short	6	40	5	33,33
Total	15	100	15	100
BB/U				
Good nutrient	12	80	13	86,67
Less nutrient	3	20	2	13,33
Total	15	100	15	100

It can be seen in table 1 that not all of stunting toddlers experienced nutrient problem. It is proved by nutrient status according to body weight based on the age (BB/U), where it is seen 80% good nutrient in group 1 and 86,67% normal nutrient in group 2. Indicator metabolic disorder measured in the research is protein status that can figure protein absorption disorder as the impact of malnutrition influencing in the low of albumin content. The following sample of urine status picture can be seen in Table 2

Table2: Characteristic of sample based on Urine Protein Status on protein and Anthropometry status and nutrient intake of stunting Infants by Providing amino acid cysteine after Being Given High-Dose vitamin A

Nutrient Status of Urine Protein	Group 1				Group 2			
	Pre		Post		Pre		Post	
	n	%	N	%	n	%	n	%
+++	1	6,7	1	6,7	1	6,7	1	6,7
+	11	73,3	9	60	12	80,0	13	86,6
0	3	20	5	33,3	2	13,3	1	6,7
Total	15	100	15	100	15	100	15	100

Table 2 shows the changes of urine protein status in both group 1 and group 2. A significant change is in group 1 which urine protein status with normal category rises from 20% to 33,3% before and after giving amino acid cysteine. On the other hand, protein + decrease from 73,3% to 60%.

The result of this anthropometry research divided in 2 terms, weight and height of body. The following changes in body weight and height can be seen in Figure 1 and Figure 2.

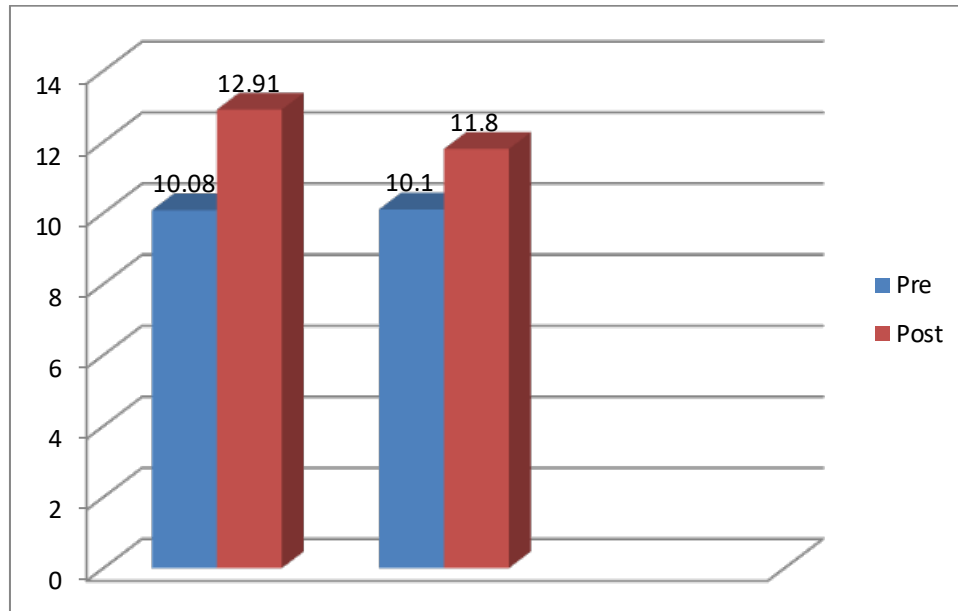


Figure 1: An average change in samples of body weight in the research on protein and Anthropometry status and nutrient intake of stunting Infants by Providing amino acid cysteine after Being Given High-Dose vitamin

A

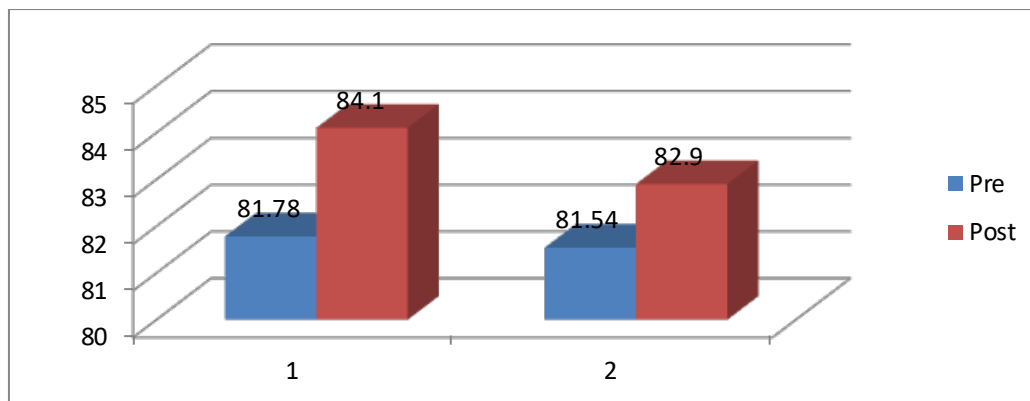


Figure 2: An average change in sample of body height in the research on protein and Anthropometry status and nutrient intake of stunting Infants by Providing amino acid cysteine after Being Given High-Dose vitamin A

Anthropometry status in experiment group (group 1) is higher improvement compared with control group

(group 2). There is an increase of average weight by 2,83 Kg and control group by 1,78 Kg. Body height in experiment group increase by 2,32 cm while body height in control group increase merely 1,36 cm. The result of measurement on energy and nutrient involving nutrient intake macro can be seen on table 3.

Table 3: Characteristic sample based on energy intake and macro nutrient. on protein and Anthropometry status and nutrient intake of stunting Infants by providing amino acid cysteine after Being Given High- Dose vitamin

A

Intake	Group 1				Group 2			
	Pre		Post		Pre		Post	
	n	%	n	%	n	%	N	%
Energy								
Sufficient	3	20,0	8	53,4	4	15,3	5	30,7
Deficient	12	80,0	7	46,6	11	84,7	10	69,3
Total	15	100	15	100	15	100	15	100
Protein								
Sufficient	4	26,6	9	60,0	8	53,3	9	60,0
Deficient	11	73,4	6	40,0	7	46,7	6	40,0
Total	15	100	15	100	15	100	15	100
Fat								
Sufficient	2	13,3	7	38,4	2	13,3	4	15,3
Deficient	13	86,7	8	61,6	13	86,7	11	84,7
Total	15	100	15	100	15	100	15	100
Carbohydrate								
Sufficient	5	33,3	8	53,4	6	40,0	6	40,0
Deficient	10	66,7	7	46,6	9	60,0	9	60,0
Total	15	100	15	100	15	100	15	100

On the table 3 reveals that in group 1 (experiment group), commonly there is an improvement in sufficient category in energy, protein, fat and carbohydrate intake. Energy intake increases by 33,4% from 20% to 53,4% in sufficient category. Protein intake improves between 26,6% and 60,0% in sufficient category. On the other hand, Fat intake increases from 13,3% to 38,4% in sufficient category while carbohydrate also rises between 13,3% and 38,4%. Comparing with group 2, it can be seen that the improvement in group 1 is higher than group 2. All in all, this treatment can increase energy intake and macro nutrient.

4. Discussion

The whole of samples in this research were a toddler stunting. Toddlers stunting should be a priority in the

improvement of nutritional status. WHO reveals the results of research in developing countries problem of malnutrition including stunting, mostly experienced in poor families, low education levels and poor environmental sanitation. The prevalence of short children living with the head of household who has not educated and poor was 17 times higher than the prevalence of children who live in households with a head of educated households and not poor [8,9].

The goals of prevalence in 2015 of short toddlers were 32% by 35.6% in 2010. The stunting proportion of poor families in Sul-Sel was 10%. Chronology of the proposed interventions in infants and toddlers are giving an appropriate complementary feeding, vitamin A supplementation on age 6-59 months and zinc supplementation in diarrhea in children over aged 6 months. The problem is less of vitamin A and retinol indicator% <20 mg decreased from 54% in 1992 to 14.6% in 2007. The results of this research reveals it is associated with family characteristics in accordance by the results of study reported by WHO that the socio-economic level is one of the factors in disruption of linear growth in young children. One of the impacts into the consideration overcoming this problem is socio-economic empowerment of society [9].

Child stunting may inhibit the future quality of human resources. The research shows that short children is strongly related to the educational achievement which is not good, long period of education and low income in adulthood. Short child has a greater possibility to grow into adults who are less educated, poorer, less healthy and more susceptible of not infectious diseases [8,9]. Amino acid supplementation in this study reveals that it can fix urinary protein status. Cysteine as an amino acid also has several biological roles caused of a molecular structure that can be through oxidation or reduction. Cysteine has a different function related to structurally stable, so it can be catalytic in various translational. Therefore, we can conclude that cysteine is an amino acid that must fulfill in growth process, especially at the time of completion of the nutritional problems in infants such as short [10].

When cysteine and histidine bind with zinc will form stable bond, where in 4 cysteine residues bound to zinc will form four thiolate- Zn^{2+} which is an element of strong and big. These elements are stably as disulfide in the cytosol, so it can be a catalyst of amino acids that either the reduction reaction and the oxidation of some metals, such as between Zn^{2+} and sulfur, where the zinc will bind more strongly to the oxidation process, so that the amino acid cysteine that binds to zinc can oxidize rapidly in the cytosol, thereby quickly to produce energy. The fulfillment of the energy in pathway metabolite is usually accompanied of improvement of blood albumin levels so that the protein can be bound and transported throughout body and unreflected in form of urine protein filth.

Anthropometry status in this research was improved especially in group 1. The purpose of giving amino acids was to accelerate the process of cell differentiation, which can help the accelerate of bone growth in the short toddlers. Several studies have reported that amino acid supplements can increase your height and weight. Improved protein content can help metabolism glucose in muscle and fat cells. After bonding insulin and IRS 1, this signal takes a role increasing the quantity of GLUT-4 (glucose transporter-4). The process of synthesis and translocation of GLUT-4 will put in extra from intracellular glucose to subsequently undergo metabolism [11]. In this research, the average intake of energy and macro-nutrients increased between pre and post treatment. However, Many of them do not reached standard of requirement. Meera K Chhagan summed up the results of

research by giving multiple micro nutrient combined with vitamin is really appropriate to increase the growth of child stunting compared with the single nutrient supply. However, the effort to fulfill energy necessity of macro-nutrients such as carbohydrates, fat, and protein should be sufficient. Restriction of energy intake, protein and several micronutrients may lead to limited of synthesis protein like albumin which acts to be a medium transform in almost all nutrients [12, 13].

5. Conclusion

By giving the amino acid cysteine in toddler stunting after high-dose vitamin A supplementation can improve urine protein status, body weight and height and improving intake of energy and nutrients such as carbohydrate, protein and fat. Giving food with high content of the amino acid cysteine or high protein can be used as an alternative for amino acid cysteine in the form of supplementation.

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