

# The Influence of Zinc Supplement in Feeding Patterns on the Incidence of Stunted in the Toddler

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## ABSTRACT

This study aims to analyze the influence of zinc supplement in the feeding patterns on the incidence of stunted in toddler especially in a region of Blora. This research uses a quantitative approach with the application of descriptive methods and explanations. Data were collected using weight status to 32 respondents that divided into intervention and control groups. Those were analyzed by paired t-test of statistical program. This study concludes that feeding system using zinc syrup was effective in decreasing stunted incidence so it can be applied for nursing intervention to improve toddler's nutrition.

**Keywords:** Stunted, Zinc, Toddler

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## Research Background

Malnutrition is health problem of toddler in Indonesia that hasn't been resolved. This condition can be seen from the government program in the RPJMN (Rencana Pembangunan Jangka Menengah Nasional) at 2015 - 2019 which is improving the nutritional health status of mothers and children. At the international level, this program supports the Scaling up Nutrition (SUN) Program which focuses on fulfilled the need of the first thousand days of life in to prevent malnutrition (RI, 2015). The first thousand days of life constitute the *Golden Age* or *Critical Period* consists of two hundred and seventy days of pregnancy and the first seven hundred and thirty days after birth. The fist thousand days of life are fertilization or pregnancy period plus 2 years the age of toddler. It is time for stunted must be prevented by fulfilling nutrition and others. (RI, 2015). Stunted is a problem of malnutrition which involves intake of undernourished for a long time. This happens because the food which is given to toddlers is not sufficient to nutritional needs, so they are shorter in body and low body weight doesn't match their age and also their bone growth is delayed.

Prevalence of toddler mortality caused by malnutrition is increasing every year. It is proven by WHO's data in 2013 which malnutrition occurred in 35% children in the world and increased became 45% in 2018. Indonesia was ranked fifth in the world for a country with the highest number of malnutrition (ranged of 36% or 7.7 million children). Riskesdas 2013 showed that the number of children suffering deficit-malnutrition was 19.6% consist of 13.9% deficit nutrition and 5.7% malnutrition. Whereas in Central Java there were 3.4% children suffered malnutrition and 13.9% undernourished (RI, 2015). The incidence of stunted also happened in one of the districts in Central Java especially in Blora (Jepon). There was 298 of short-body toddler and 136 this-body toddlers. Thus, malnutrition become a very important problem to be solved to improve their growth and developing process.

Nurses as caregivers have full responsibility for educating and maintaining healthy lifestyles especially the quality of nutrition in food which is given to toddler. Because of stunted is also influenced by behavioural aspects especially in poor parenting practice in feeding system. They not only need macronutrient for growth and development, but also micronutrients for protein synthesis, cell differentiation

and growth process that can be obtained by zinc consumption (Prasad, 2013). Zinc is also an anti-inflammation and antioxidant in the human body (Liberato, Singh, & Mulholland, 2015).

Zinc is a micronutrient which absolutely must be inside the body because it can't be replaced by other nutrients. Adequacy of zinc is very useful for individual especially in growth and development of toddler (Widhyari, 2012).

The role of zinc in growth is closely related to increase insulin plasma concentrations like Growth Factor I (IGF-1) which is a growth hormone mediator as a growth promoting factor in growth process. So, if toddler suffering zinc deficiency in their feeding system, so IGF-1 concentration will decrease, and their growth and development will be inhibiting (Kusudaryati, 2013). This condition is initial progress of stunted incidence. The purpose of this study was to determine the effect of zinc supplement on the feeding system on the incidence of stunted in toddler.

## RESEARCH METHODS

### Research Design

This study adopted quantitative approach with pre-test and post-test design was selected on toddler in the Jomblang village of Blora district, Central Java that divided into 30 peoples was experimental and others were control group. The experimental group was given 5 millilitres of zinc syrup on their feeding system every day for 30 days, while the control group was given 5 millilitres zinc syrup once a week. The incidence of stunted was assessed at initial of study before zinc syrup was given and evaluated after 30 days using weight status. Descriptive analysis was used for univariate analyzing and paired t-test test for bivariate analyzing.

### A. Research Variables and Operational Formulations

This research involves two main variables; there are dependent and independent variables. Dependent variable is stunted incidence while independent variable is zinc syrup on the daily feeding system of toddlers. Besides that, there is control variable in the form of zinc syrup once a week in toddler's feeding system.

To be able for measuring the variables, it is necessary to

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first define these variables conceptually as follows:

1. Zinc supplement is defined as micronutrient which was given for toddlers in the form of syrup as much as 5 milliliters in everyday for 30 days.
2. Body weight is defined as body size in terms of weight that is weighed in a minimal of dressed without any equipment.
3. Stunted is defined as malnutrition condition which is measured using weight and high body status. In this study, it was measured on the initial of study (pre-test) and the last of study or after 30 days (post-test).

## B. Population and Samples

The community in this study is all toddlers (0 – 3 years old) in patient in the Jomblang village of Blora district, Central Java who met the inclusion criteria within 1 months of the study period. The sample size was determined total sampling that is using all population that meet the existing inclusion criteria as research objects. The sampling method used is simple random sampling where samples are taken alternately distinguished by even and odd numbering. Odd numbers was defined as control group which were 16 respondents (they were given zinc supplement one a week for 30 days) and even number was defined as experimental group which were 16 respondents (they were given zinc supplement every day in their feeding patters for 30 days). Samples were taken must appropriate with inclusion criteria such as their age were 0 - 3 years old, didn't suffer any diseases or illness.

## C. Data Collection Techniques

The study was conducted in the Jomblang village of Blora district, Central Java for one month, August 2019. Data were collected by all the authors that conducted a common perception regarding feeding system procedure and the use of weight scale for measuring toddler's body weight.

The first procedure was submit a permit to conduct research, determine the respondent or family responsible, family of respondents especially their parents who agrees become respondents are given an informed *consent form* to be signed by the respondent or responsible family and they became subjects of this study. They were randomly divided into experimental and control group and observed their stunted status using high and weight of body in 30 days.

## D. Data Analysis Techniques

Data analysis techniques in this study used simple statistical analysis (univariate analysis) and bivariate analysis. Univariate analysis included as frequency table analysis (percentages) while bivariate analysis was paired t-test for experiment and control group. Independent t-test was used to determine the influence of zinc supplement on the stunted incidence. The influence of it was described by *p* value on statistical program (SPSS for Windows version 18 program). If the analysis result of *p* value was  $p \leq 0,05$ , so the zinc supplement gives effect or influence toward stunted incidence.

## RESULTS AND DISCUSSION

### A. Research Results

**Table 1.** Socio-Demographic Characteristics of study participants

Characteristics	Experimental group (n=16)		Control group (n=16)		Total	
	N	%	n	%	n	%
<b>Gender</b>						
Male	10	63	8	50	18	56
Female	6	37	8	50	14	44
<b>Age (months)</b>						
0 – 12	6	37	5	31	11	34
13 – 24	6	37	6	38	12	37
25 – 36	4	26	5	31	9	29
<b>Weight Status</b>						
Normal	5	32	6	37	11	35
Abnormal	11	68	10	63	21	65

Based on table 1, most of toddler participants were male (56%). The age was mostly in the range 13 - 24 months (37%). While their weight status, most of them were in abnormal range (65%).

**Table 2.** The Influence of Zinc Supplement in the Feeding Patterns on Stunted Incidence

Variable	Experimental group (n=30)		Control group(n=30)		P
	N	%	n	%	
Normal	14	88	7	44	0.01
Abnormal	2	12	9	56	

According to table 2, the stunted incidence in experimental group was 2 patients (12%) while the control group was 9 (56%). The number of stunted incidences in control group was higher than the experimental group. The influence of the intervention was analyzed by alternative of independent t-test and the result of it was  $p < 0.01$  or  $p < 0.05$ .

## B. Hypothesis Testing

The results of statistical analysis of the variables studied, independent variables were zinc supplement (X) and the stunted incidence (Y) as the dependent variable. Based on the results of independent t-test analysis it was very significant with the value of P (P-value) = 0.01 is smaller than  $\alpha = 0.05$ , then the hypothesis that the independent variables which is Zinc Supplement have a significant effect the stunted incidence, especially in toddler at Jomblang Village of Blora, was convincingly accepted.

## C. Discussion

### Socio-Demographic Characteristics

The results of univariate analysis found that almost of study participant's gender were male (56%). Meanwhile, the ages of them were 13 – 24 months old (37%). Those subjects were consisting with previous study that showed toddler with 12 – 59 months old weren't influenced by zinc supplement, so it needed to improvement of zinc supplement such as frequency and doses. This study involved a lot of toddlers in 13 – 24 months because it is time for stunted must be prevented by fulfilling nutrition

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and others. Almost of them were abnormal nutrition statuses (65%) which their body weigh less than the normal limit. Toddlers in 1-3 years old have dependency on mothers to carry out their daily living activities. They are passive consumers that mean they receive food from their mothers. At this aged, their growth rates are increasing so they require more supply of nutrient (Merryana Adriani, Wirjatmadi, MS, & Gk, 2014).

### The Influence of Zinc Supplement on Stunted

Stunted incidence was observed in this study for 30 days in the experimental and control group. In the initial condition, there were 11 (68%) stunted toddlers in experimental group and 10 (63%) in control group. In this study, both of them were given treatment. The experimental group was given once zinc supplement in their daily feeding patters as much as 5ml for 30 days and the control group was given 5 ml zinc syrup once a week. After 30 days, every study participant was measured the body weight using same instrument. The result of this study showed the incidence of stunted in experimental group was 2 persons or 12%. This number was decrease from 11 persons to 2 persons. Meanwhile the control group there was 9 stunted incidence or 56%. It also decreases from 10 to 9 persons. Statistically the value of p was 0.01 which proven that zinc supplement influences the stunted incidence especially it was effective to increase the body weight of toddlers. It was consistent with previous study which concluded that zinc supplement has a significant impact on weight and height body (Liberato et al., 2015). Besides that, other study which done in children with giving zinc supplement showed that zinc supplement was effective to improve weight body in one month (Muhammad, Nurhajjah, & Revilla, 2018).

The role of zinc in growth is closely related to increase insulin plasma concentrations like Growth Factor I (IGF-1) which is a growth hormone mediator as a growth promoting factor in growth process (Prasad, 2013). Besides that zinc induces neuropeptides in hypothalamus, growth hormone secretion, endogen growth hormone sensitivity, growth hormone bioactivity and growth hormone receptors (Bonotto, Schneider, Santos, Gigante, & Assunção, 2012). Zink stimulates GHRH which stimulate the somatotrophic pituitary area which secretes growth hormone. Zinc is responsible for longitudinal bone growth especially in chondrocyte cells in epiphyses. So, zinc affects all mechanism the growth of cell and bone (Brown, Peerson, Baker, & Hess, 2009). The growth of bone will affect body height, meanwhile the growth of cell will improve or increase of body weight.

### CONCLUSIONS

The study shows the stunted incidence in the experiment group which was given zinc supplement in their daily feeding patters was lowering than the control group which was given zin supplement once week. It described zinc supplement influence on stunted incident and effective to apply in feeding patters of toddler.

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