



Mentoring program to eradicate malnutrition on changes in the nutritional status of stunting toddlers

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ABSTRACT

Improving nutritional knowledge can be done with the right media without computer equipment into games that are easy, useful and fun are the most important keys in designing game. This type of research is a quasi-experimental research. The sample in this study were 14 stunting toddlers living in Denanyar Village. The research subjects were children aged 6 - 58 months with a Z score of Weight/Age -3 to 0 SD. Variables observed included changes in nutritional status. Data analysis was carried out using different tests and multivariate analysis with linear regression of dummy variables. After 3 months of intervention, the decrease in nutritional status in the intervention group was lower than the control ($p < 0.05$), there was an increase in the Z score Weight/Length score in the intervention group and a decrease in the Z score Weight/Length in the intervention group. Length in the control group ($p < 0.05$). The mentoring model is more effective than conventional counseling in suppressing the decline in the nutritional status of children aged 6-58 months. It is hoped that the Berakzi group mentoring program can be implemented in a sustainable manner and the target area is expanded so that it can reduce the prevalence of stunting in Jombang Regency.

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1. INTRODUCTION

Malnutrition in children (stunting, wasting, and overweight) is still a global health problem, including in Indonesia. Stunting is one of the health problems that contributes to most of the burden of disease and causes preventable premature death (Shrestha et al., 2020). Stunting is a condition of children under five years of age whose height is not proportional to their age, according to the World Health Organization (WHO) (Nutrition, 2013) (Organization, 2019).

Stunting or stunted/ short is a condition of failure to thrive that occurs in toddlers due to repeated infections and chronic malnutrition, especially in the first 1,000 days of birth (HPK). Children are classified as stunting if their height is less than minus 2 (two) standard deviations of height for their age (Dewi & Anisa, 2018).

Stunting is a key indicator of child welfare and is an indicator of the Sustainable Development Goals (SDGs) in accordance with Indonesia's 2045 vision (Tariku et al., 2017) (Tessema et al., 2018). WHO said that the South-East Asia region in 2019 was the region with the highest prevalence of

stunting in the world (31.9%) after Africa (33, 1%)(Organization, 2019)(Almoosawi et al., 2016)(Nutrition, 2013). Indonesia is a South-East Asian country with the sixth highest prevalence after Bhutan, Timor Leste, Maldives, Bangladesh, and India, which is 36.4% (Indonesia, 2014)(Taneja et al., 2004). Reducing stunting is one of the global targets for Sustainable Development Goals (SDGs) and the global nutrition target for 2025 (Tnp2k, 2017) (Torlesse et al., 2016). The SDGs target is to eliminate all forms of malnutrition by 2030(Mbuya & Humphrey, 2016).

Adverse effects arising from stunting problems in the short term are not optimal cognitive, verbal, and motor development, increased incidence of death and illness, and increased health costs (Null et al., 2016). Bad consequences in the long run, The length of decline in reproductive health, non-optimal body posture, increasing the risk of obesity and others, decreased learning ability, and low quality of work which has an impact on decreasing economic productivity (Park, 2017)(Brown et al., 1992). If allowed to continue, this condition will affect the quality of human resources in the future (Hotz & Gibson, 2005).

In Jombang Regency in 2020 according to the Health Service Report, the incidence of stunting was 16.9%. This can be overcome by specific nutrition intervention efforts, namely direct efforts given to the target, for example the group of mothers under five. Based on the results of a preliminary study conducted in Denanyar Village, Jombang Regency, 14 stunting toddlers were found from the total number of toddlers in the Weighing Post or as many as 20% of 69 toddlers (Remmers et al., 2014)(Checkley et al., 2008).

With the information above, the researchers confirmed a nutrition-aware group that has a scientific background in the health sector. Researchers also compiled the media used in the mentoring program for families with stunting toddlers. The media are arranged attractively in order to create a pleasant atmosphere because it is played by several people. The snake and ladder media method is able to provide a supportive influence, before and after giving material on the topic to be delivered.

2. RESEARCH METHOD

This research is a quasi-experimental randomized pre-post-test control group design. The research was conducted in Denanyar Village, Denanyar District, Jombang Regency. The working area of Pulo Lor Health Center (Santos et al., 2001).

The population in this study were all stunting toddlers aged 6-58 months in Denanyar Village, the working area of Pulo Lor Health Center. The subjects in this study were all stunting toddlers aged 6-58 months in Denanyar Village, the working area of the Pulo Lor Health Center who met the criteria.

- a. Inclusion criteria
 - 1) Child born at term
 - 2) Birth weight 2500 – 4000 grams
 - 3) Children aged 6 – 58 months with a Z score Length/Age < -2 SD.
 - 4) Domiciled in the working area of Pulo Lor Health Center
 - 5) The parents agreed to be the respondent and the child was the subject
- b. Exclusion criteria:
 - 1) Having a congenital disability (Down syndrome, mental retardation)
 - 2) Suffering from a chronic disease (Chronic Diarrhea)
 - 3) Malnutrition (kwashiorkor. Marasmus, marasmus-kwashiorkor)
- c. Drop out criteria:
 - 1) Did not participate in the full study for 3 months
 - 2) Moving from the research location

The results of the calculation of the sample size obtained as many as 7 children aged 6 - 58 months for each group. Taking into account the possibility of dropping out, a sample reserve of 15% is prepared for each group $(15\% \times 7) + 14 = 15.01$ or rounded up to 15 subjects.

2.1. Research variable

- 1) Independent Variables : Mentoring with mentoring program and conventional counseling
- 2) Bound Variable : Changes in Children's Nutritional Status

2.2. Research Instruments

- 1) Educational media Monopoly Balanced Nutrition and Snakes and Ladders compiled by researchers in consultation with several experts (midwifery lecturers and nutritionists). The materials contained in the media include growth monitoring, complementary foods for breast milk and mentoring methods.
- 2) The structured questionnaire contains open and closed questions that have been tested for reliability and validity of the questionnaire. Of the 31 questions that were prepared, the remaining 15 items met the validity and reliability requirements.
- 3) Weight measurement tool, namely the UNICEF Seca scale with an accuracy of 0.1 kg.
- 4) Body length measuring instrument using an infantometer with an accuracy of 0.1 cm.
- 5) Informed Consent Form.

2.3. Data analysis

The data were analyzed by computer using the SPSS for windows version 20 program to test the hypothesis. Prior to analysis, normality test was carried out with Saphiro-Wilk. Data that are not normally distributed are transformed into square, logarithm and reciprocal but it doesn't work, so parametric and nonparametric analyzes are carried out according to the normality of the data.

Bivariate analysis used was dependent t test and Wilcoxon Signed Rank test to analyze differences in nutritional status of subjects at the beginning and end of the intervention in each group (Wille et al., 2008). Independent t test and Mann-Whitney to analyze the differences in the sex of the subject, the age of the subject, the age given a balanced menu and the nutritional status of the subject between the intervention and control groups (Devine, 2009).

Multivariate Linear Regression Analysis with Dummy variables was carried out to examine the joint effect of the independent variables on mentoring model counseling (Hardy, 1993), mother's education, age at starting a balanced menu and the initial age of the subject on the dependent variable changes in nutritional status (Z scores Weight/Age, Z score Length/Age and Weight/Length). The extension variable of the BERAKZI mentoring model with category = 1; conventional counseling with category = 0.

3. RESULTS AND DISCUSSIONS

3.1. Results

The initial characteristics of the subject include gender and age. Number of male and female subjects; Z score Weight/Age, Z score Length/Age and Weight/Length between the intervention and control groups did not differ ($p > 0.05$), but the mean initial age in the intervention group was older than the control group ($p = 0.013$).

Table 1. Overview of Subjects at the Beginning of the Intervention between the Intervention and Control Group

Variable	Intervention n = 7	Control n = 7	Score	p
Gender:				
Male	3 (21,42%)	4 (28,,57%)	$X^2 = 1,093^a$	0,296
Female	4 (28,,57%)	3 (21,42%)		
Age (month)	15,7 ($\pm 3,84$)	13,4 ($\pm 3,64$)	$t = -2,540^b$	0,013*
Score Z Weight/Age	-1,4 ($\pm 0,78$)	-1,5 ($\pm 0,65$)	$t = -0,332^b$	0,741
Score Z Length/Age	-0,9 ($\pm 1,05$)	-1,19 ($\pm 0,73$)	$t = -0,265^b$	0,791
Score Z Weight/Length	-1,3 ($\pm 0,98$)	-1,3 ($\pm 0,91$)	$t = -0,145^b$	0,884

3.2. Measurement Before and After the Mentoring Intervention

The nutritional status data of the subjects consisted of Z scores of Weight/Age, Length/Age and Weight/Length. The mean Z scores of Weight/Age, Length/Age and Weight/Length at the beginning and at the end of the intervention in the two groups are shown in Table 3-5, respectively.

Table 2 Average Subject's Z Score Weight/Age at the Beginning and End of the Intervention

Group	Z Score Weight/Age		Score	p
	Beginning	End		
Intervention n = 7	-1,4 (±0,79)	-1,5 (±0,72)	t = 3,366 ^a	0,002 **
Control n = 7	-1,5 (±0,65)	-1,8 (±0,59)	t = 15,972 ^a	0,0001 **

**p<0,01; ^aDependent t test

The mean Z score Weight/Age at the beginning and at the end of the intervention was higher in the intervention group. Both groups showed a significant decrease in Z score Weight/Age (p<0.05) at the end of the intervention.

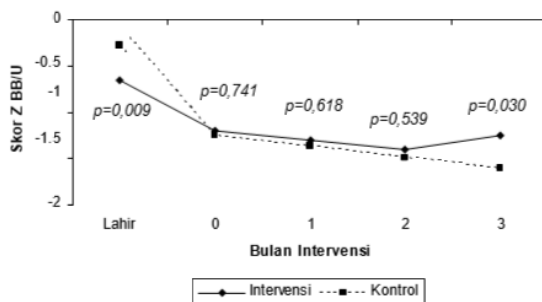


Figure 1. Graph of the Difference in Average Weight/Age Based on Repeat Observations in the Intervention and Control Group

The mean Weight/Age of subjects at birth was different between the intervention and control groups, not different at the beginning until the 2nd month of the intervention (p>0.05), but at the end of the intervention the mean Z-score Weight/Age between the intervention groups was higher than the different controls. (p=0.030).

Table 3 Average Subject Z score Length/Age at the Beginning and End of the Intervention

Group	Z Score Length/Age		Score	p
	Beginning	End		
Intervention n = 7	-0,9 (±1,06)	-1,3 (±0,91)	t = -4,900 ^a	0,0001 **
Control n = 7	-1,2 (±0,72)	-1,6 (±0,59)	t = 5,288 ^a	0,0001 **

**p<0,01; ^aWilcoxon Signed Ranks Test

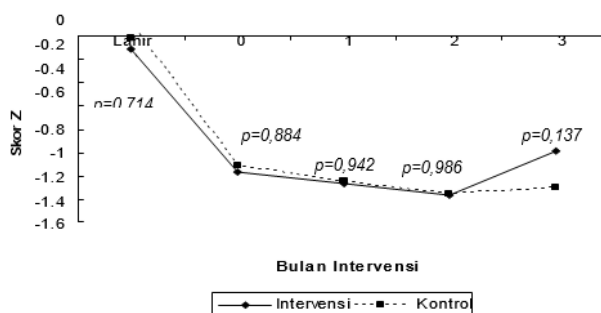


Figure 2. Average Subject Z score Length/Age at the Beginning and End of the Intervention

The mean Z score Length/Age at the beginning and end of the intervention was higher in the intervention group than in the control group. At the end of the intervention the mean Z score Length/Age of the two groups showed a significant decrease ($p=0.0001$)

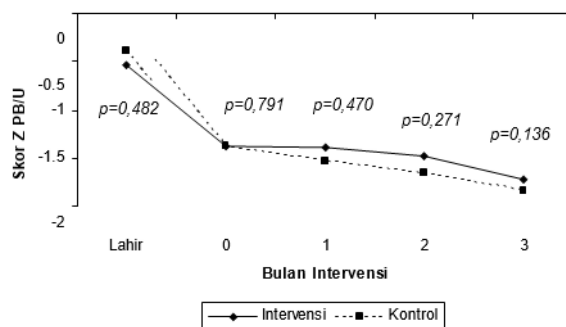


Figure 3. Graph of Difference in Length/Age Mean Based on Repeat Observations in the Intervention and Control Group

The mean Z score Length/Age from birth to during the intervention in both groups showed a consistent decrease. The mean Length/Age between the intervention and control groups did not differ ($p>0.05$) from the beginning to the end of the intervention.

Table 4 Average Subject's Z Score Weight/Length at the Beginning and End of the Intervention

Group	Z Score Weight/Length		Score	p
	Beginning	End		
Intervention n = 7	-1,3 (±0,98)	-1,1 (±0,92)	t = -8,300 ^a	0,0001 ^{**}
Kontrol n = 7	-1,3 (±0,91)	-1,4 (±0,87)	t = 10,556 ^a	0,0001 ^{**}

** $p<0,01$; ^aDependent t test

The mean Z score Weight/Length at birth did not differ but decreased until the beginning of the intervention. The mean Z score Weight/Length of the subjects between the intervention and control groups did not differ during the intervention ($p>0.05$), although the mean Z score Weight/Length in the intervention group increased in the 3rd month of the intervention.

The Effect of the Intervention on the Average Changes in the Subject's Nutritional Status.

Changes in the nutritional status of subjects in the intervention and control groups were assessed at the beginning of the intervention, the first month, the second month and the end of the intervention. The results of the analysis of the difference in the mean changes in the Z scores of Weight/Length, Length/Age and Weight/Age subjects at the beginning and end of the intervention between each group and the results of statistical tests are listed in Table 6.

The mean changes in the Z scores of Weight/Age, Length/Age and Weight/Length subjects between the intervention and control groups were different after 3 months of intervention (all with $p<0.05$). In general, there was a decrease in the mean Z Weight/Age and Length/Age scores of subjects in both groups, an increase in the Z score Weight/Age in the intervention group but a decrease in the control group.

Table 5 Differences in Mean Changes in Z scores Weight/Age, Length/Age and Weight/Length Intervention and Control Groups at the End of the Study

Group	Change	Change	Change
	Z Score Weight/Age ^a	Z Score Length/Age ^a	Z Score Weight/Length ^c
	x (SD)	x (SD)	x (SD)
Intervention (n=7)	-0,1 (±0,09)	-0,4 (±0,23)	0,16 (±1,112)
Kontrol (n=7)	-0,3 (±0,13)	-0,3 (±0,19)	-0,19 (±1,111)

Group	Change	Change	Change
	Z Score Weight/Age ^a x (SD)	Z Score Length/Age ^a x (SD)	Z Score Weight/Length ^c x (SD)
	^a z = -6,383, p = 0,0001	^b z = -2,136, p = 0,033	^c z = -6,791 p = 0,0001

Multivariate analysis of multiple linear regression of the Dummy variable was carried out on changes in the Z scores of Weight/Age, Length/Age and Weight/Length. The summary of the results of the multiple regression analysis of the dummy variable can be seen in the table. Based on the results of the regression analysis, it can be said that together the independent variables consisting of counseling model assistance, age of starting complementary feeding and initial age of the subject have a relationship with changes in score Z Weight/Age, Length/Age and Weight/Length ($p=0.0001$).

Where the independent variables contributed 77.2% to the change in Z Weight/Age score, 89.4% to the change in Z Length/Age score and 70.9% to the change in Z score Weight/Age.

Table 6. Summary of Multiple Linear Regression Analysis Results

Group	Adjusted R Square	p
Score Z Weight/Age	0,772	0,0001**
Score Z Length/Age	0,894	0,0001**
Score Z Weight/Length	0,709	0,0001**

Variable Multiple Regression Analysis Dummy Metode Enter; ** $p < 0,05$

3.3. Discussion

This study concludes that the counseling model of mentoring can reduce the decrease in the Z score Weight/Age, increase the Z score Weight/Length. The results of this study are in line with several previous studies, including the following research. Educational media makes it easier for someone to understand information or material that is considered complicated. It is necessary to improve education regarding the timing of giving, frequency, portion, type, method of making and giving complementary feeding as well as good sanitation and hygiene to the poor. The material and intensity of counseling between the intervention and control groups did not differ. Health education can be done with mentoring methods, but the material is not only about nutrition and should also be about environmental sanitation and efforts to increase family income.

4. CONCLUSION

The increase in the mother's knowledge score in the group that received the mentoring model counseling was significantly higher ($p = 0.001$) compared to the conventional counseling group. Both groups showed a significant decrease in Weight/Age and Length/Age Z scores ($p < 0.05$) at the end of the intervention. The mean Z Weight/Length score in the intervention group was higher but not significant than the control at the end of the intervention ($p=0.137$). Mean change in score Z Weight/Age, Length/Age and Weight/Length between intervention and control groups was different after 3 months of intervention (all with $p < 0.05$). Counseling on the mentoring model can change nutritional status, especially in the Z score indicators, Weight/Age (0.256 SD) and Weight/Length (0.321 SD) are higher than conventional counseling. The Z Length/Age and Weight/Length scores between the intervention and control groups were not different, while the Z scores Weight/Age were different at the end of the intervention. This is due to the difference in the age of the subject where the intervention group is older than the control group. while the Z score Length/Age did not differ from the beginning to the end of the intervention because changes in the Z score Length/Age took a long time. After 3 months of intervention Z Weight/Length score increased in the intervention group,

while the control group decreased. The Z Length/Age and Weight/Age scores of the intervention group were lower at the end of the intervention but the decline was not as sharp as the control group. This study is in accordance with the research of Jahari, that the rate of decline in the Z Weight/Age score in Indonesian children is about 0.1 SD per month on average. This situation shows that the growth of children increasingly deviates from the normal curve with increasing age. This result is acceptable because many factors affect nutritional status and it is difficult to expect improvement in nutritional status only with counseling. How long it will take to change practice is not known with certainty. Research in Bangladesh showed that nutrition education through demonstrations by village workers could reduce the decrease in Z-score Weight/Length, but the decrease in the treatment group was smaller than that in the control group (-0.19 vs -0.65 SB) (Cheng et al., 2016). Research in Haryana, India shows that nutrition education interventions can increase body length even though it is small but significant in the treatment group (mean difference 0.32 cm), while body weight was not affected (Danaei et al., 2016). Research in Indonesia by providing nutrition education through cadres and local community leaders, posters, leaflets, and radio shows that 1 year after the intervention, more than 50% of mothers in the treatment area correctly repeated at least one nutritional education content.

This study concludes that the counseling model of mentoring can reduce the decrease in the Z score Weight/Age, increase the Z score Weight/Length. The results of this study are in line with several previous studies, including the following research. Conducted a study on the effect of nutritional counseling on increasing child weight in Brazil. Concluded that nutrition counseling and training had a significant effect on children's weight gain, improving child and maternal feeding practices (Dewi & Anisa, 2018). There was a significant effect on feeding practice, meal preparation, amount of food given, energy intake, animal protein, niacin, riboflavin calcium and iron between the group given training on child feeding practices and the comparison group ($p < 0.05$).

The researchers' expectations of the implementation of educational programs through information media can be increased. So that the achievement of health degrees for stunting toddlers can be better. Especially educational media that are easily accepted by the general public, for example posters, snakes and ladders games, stickers, and others.

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