ORIGINAL ARTICLE

Effectiveness of Healthy Massage on Growth and Development among Stunting Babies

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ABSTRACT

Introduction: Stunting is growth flattering in height less than standard deviation (-2 or -3). A low birth weight and birth length < 48 cm are at risk of stunting infants, because of delayed growth and development. Therefore, early stimulation through healthy massage is needed to increase their growth and development. This study aimed to determine the effectiveness of healthy massage on the growth and development among stunting infants. **Methods:** The method used in this study was true – experimental design with pre – posttest control group. A total of 41 out of 375 stunting infants born from July to August were recruited through simple random sampling technique and divided into two groups (intervention and control group). The intervention group was performed a healthy massage for 15 minutes, twice a day over four weeks. An anthropometrics measurement and the Denver II score were assessed in both of groups. The independent t – test was used to analyze the effectiveness of healthy massage compared to treatments. **Results:** There was a significant improvement on personal social development (p=0.03) compared to the control group and upper arm circumference (p=0.000) and body length (p= 0.019) for anthropometric measurement. **Conclusion:** Healthy massage is an effective intervention for increasing the growth and development of stunting infants. Further research will required samples with an age of more than three months or a longer duration of intervention, using more sophisticated technology to monitor respondents remotely and using biomarkers for objective results.

Keywords: Stunting, Healthy massage, Anthropometry, Denver II

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INTRODUCTION

Stunting is a national and global problem; the results of Basic Health Research (2018) showed the prevalence of stunting decreased from 37.2% (2013) to 30.8% (2018), but the percentage of reduction is still above the WHO cut point (20%). Likewise, the stunting rate in Blora Regency has also decreased from 2017 – 2019 from 5,861 cases (15.3%), 3,662 cases (8.3%) and (8.2%), respectively (1).

Stunting is a growth disorder caused by maternal malnutrition during pregnancy so that the fetus experiences growth retardation or stunted growth while still in the womb (Intra Uterine Growth Retardation / IUGR) and eventually babies are born with LBW and body length of less than 48 cml (2, 3) LBW and body length <48 cm are the most dominant factors in the occurrences of stunting. Another theory states that mothers with malnutrition from the beginning to the end of pregnancy would give birth to LBW indicating to become stunted children in the following days (4).

Due to the serious consequences of LBW, it is necessary to make various efforts to pursue normal growth (catch-up growth) during the first thousand days of life to prevent stunting babies. Specific and sensitive nutrition interventions are programs in dealing with stunting. Stimulation is part of sensitive nutrition intervention. Various kinds of stimulation techniques have been carried out, including physical activity, play and touch therapy given during the first thousand days of birth (5). The type of stimulation (WHO, 2018) was mostly carried out in previous studies focused on physical activity and playing in stunting toddlers (6).

Touch therapy is a good part of stimulation in improving the relationship between mother and baby in bonding attachment and having a positive impact on increasing the growth and development of the baby, in particular LBW or premature babies. Forms of touch therapy can be either direct touch between mother and baby (skin to skin) or baby massage (infant massage). Many studies have integrated touch therapy and baby massage in routine care of premature babies or LBW in the NICU (7).

Stunting prevention programs include parenting and breastfeeding to stimulate growth and development; however, the results are not sufficient to prevent the

stunting. There is need of an effective intervention. One of the interventions is healthy massage. This study provides a healthy massage intervention as an effort to prevent stunting. Healthy massage is a combination of loving baby massage, tactile kinesthetic stimulation and oral massage using sunflower oil. Healthy massage movement was given for 15 minutes inconsecutively, twice a day, after morning and evening bath for four weeks. A successful indicator of intervention was indicated from the results of measurement the anthropometric value on growth and DDST II for development. The results of previous studies emphasized on growth value, there is no research that assesses both growth and development assessment. Furthermore, this study looked at the effectiveness of healthy massage movements on changes in growth and development in stunting babies.

MATERIALS AND METHODS

Study design

This is a true experimental study, pretest – posttest with control group was conducted to evaluate the effects of a healthy massage on growth and development among stunting babies. The study was conducted in 16 locus stunting in Blora, from July to October 2020. This study had two groups. The first group, the intervention group, was the babies who were given a healthy massage by mothers and the mothers who were given healthy massage training, a leaflet of healthy massage, video and notebook to record the massage activities carried out by mothers. The second group, the control group, was the babies who were not given a healthy massage and mothers who were not given an explanation of how important healthy massage is for their babies, a leaflet of healthy massage, video and notebook to record their activities to take care of their babies.

Participants

The target population in this study was 375 babies born from July to August 2020 in the Blora district. The data were obtained from the family nutrition section of the Blora district health office. The affordable population was 137 babies with the characteristics of babies born with a birth weight of less than 2500 grams and a birth length of less than 148 cm and located in the stunting locus area in Blora district, then randomly selected to get eligible samples according to the inclusion and exclusion criteria. A total of 44 eligible samples were selected in this study, and randomly allocated into the intervention group and the control group.

During the process of study, due to various reasons, there were some dropouts and only 41 samples completed the study protocol. In the intervention group, one respondent dropped out because of moving to other city, while in the control group, one respondent became sick and another moved to other city (Figure 1).

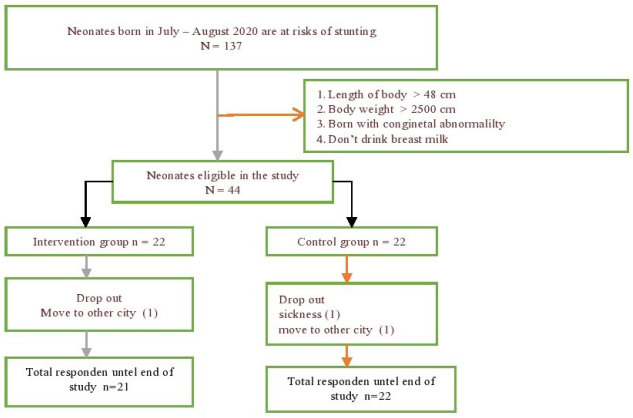

Figure 1: Flow Participant Diagram

The inclusion criteria were as follows: birth weight less than 2500 gram, birth length less than 48 cm, given breastfeeding from the birth, did not have congenital abnormalities and other infectious diseases, the baby was taken care of by her mother, mother was able to read and write, mother had android device and mother was willing to participate in the study to completion. The exclusion criteria were as follows: birth weight greater than or equal to 2500 gram, birth length greater than or equal to 48 cm, not given breastfeeding from the birth, have congenital abnormalities and other infectious diseases, baby was taken care of by other family, mother not capable to read and write, mother did not have an android device, mother was not willing to participate in the study to completion.

Research Procedure

The intervention group received a healthy massage training for four consecutive days by trained village midwives using leaflets, videos and through direct practice of a healthy massage using a doll then continued with hands-on practice with their babies.

Measuring and Monitoring

Due to the COVID-19 pandemic, the researchers have to comply with strictly health protocols in dealing with respondents, so this study was assisted by enumerators who were the village midwives on duty at the respondents' area. The task of the enumerator was to provide training on healthy massage, monitor the implementation of intervention, record the intervention and collect the pre and post intervention data.

Monitoring the intervention was carried out by trained village midwives through video calls and direct supervision every three days and recorded in a notebook. In addition, parents were asked to report their massage activities via video calls or send photos via WhatsApp and written in a notebook.

The intervention was conducted over four weeks, the data pre-intervention was taken at the beginning of

the first week prior to research activities and data post-intervention was taken at the end of the fourth week.

The baseline characteristics of the respondents including birth weight, birth length, age, sex, history of immunization and breastfeeding were recorded. Prior to intervention started, babies in the both groups were assessed using the anthropometric measurement as the growth indicators and the development using Denver II. The growth and development data were also measured weekly by enumerators. At the end of the fourth week, the measurements were taken to obtain post–intervention data.

Intervention

A healthy massage is a form of touch on the skin to skin combined with loving baby massage, tactile kinesthetic stimulation and oral stimulation given by parents twice a day after bathing in the morning and evening over four weeks using a massage of sunflower oil. Each session consisted of 15 minutes divided into three minutes of preparation, 10 minutes of massage session, and two minutes termination. A healthy massage was started from the front of body, so the baby was laid down in a supine position. Firstly, the legs were massaged including Indian massage, sweeping top foot, Swedish massage, kinesthetic stimulation (knees-up), massage at stomach area: water wheels, chest: chest loving touch, arms and hands: lymphatic exercise, Indian massage, elbow flexion-extension. Face area included, cheek bone massage, mouth circle, smile upper lip and bottom lip, lips and chin circle stimulation. For back massage, the baby was laid in prone position, the strokes started from the head area, with head loving touch, shoulder, back loving touch, arm loving touch, and feet loving touch. A series of healthy massages was carried out six times for each stroke.

The protocol of healthy massage was combined from the previous studies including a tactile kinesthetic movement developed by Field (7), loving baby massage adopted from the Indonesian Holistic Care Association(8) and oral stimulation developed by Greene, O'Donnell, and Walshe (2016).(9) The implementation of healthy massage was four weeks, as the results of review study said that an effective duration of baby massage to increase the growth and development by parents was between 4 to 16 weeks (10).

Statistical Analysis

The differences in growth and development of stunting infants before and after massage intervention were carried out in the intervention group and the routine care group. Based on the results of non-parametric tests with Wilcoxon on category-scale data, there were differences in the development of all social, fine motor, gross motor and language stunting babies before and after being given healthy massage in the intervention group.

The effectiveness of the healthy massage on growth and development among stunting babies can be seen from the results of different tests between the two groups. Data with nominal and categorical scales used non-parametric two-sample unpaired Man-Whitney U. A normally distributed ratio data was analyzed with the independent t-test (data length of the body), while data on weight, head circumference and upper arm circumference were not normally distributed normal so used Mann-Whitney U.

Ethical Clearance

This research was approved by Health Research Ethics Committee, Poltekkes Kemenkes Semarang No.034/EA/KEPK/2020

RESULTS

Demographic data and characteristics of respondents in the two groups, with a nominal scale as a whole are not different (homogeneous) (Table I). The ratio scale data overall were not different from each group on the characteristics of body weight, head circumference and upper arm circumference with $p>\alpha$, except for the characteristics of body length $p<\alpha$ (0.01).

Table I: Characteristics of Stunting Infants with nominal scale (a) (n = 41)

Variable F		Intervention Group		Control Group		Homo-geneity Test
		%	F	%	p value	
Birth History	<37	12	57.1	8	40	0.721 **
	≥ 37	9	42.9	12	60	
Immuniza-tion	Complete	15	71.4	12	60	0.155 **
	Incomplete	6	28.6	8	40	
Frequency of breast-feeding	<7	1	4.8	0	0	0.047
	≥ 7	20	95.2	20	100	
Parents Education Level	SD	7	33.3	0	0	0.007
	Junior High	7	33.3	16	80	
	High school	7	33.3	4	20	

*** Homogeneous data*

There were significant differences in development in all sectors of personal social, fine motor, gross motor and language in the intervention group, before and after given healthy massage. Meanwhile, in the group with routine care, significant differences were found in the personal social and language sectors with p value=0.016 and p=0.004 (Table II). Furthermore, in the growth assessment, there were significant differences in body weight, body length, head circumference and upper arm circumference in each group with $p <0.05$ (Tables III).

The effectiveness of the healthy massage movement was shown from the results of different tests between the two groups. There was a significant difference in personal

Table II: The difference in the development of stunted babies before and after the healthy massage intervention.

Variable		Control Group				p value	Intervention Group				p value
		Before		After			Before		After		
		F	%	F	%		F	%	F	%	
Personal Social Development	Suspect	4	20	4	20	1,000	7	33.3	0	0	0.016 **
	Normal	16	80	16	80		14	66.7	21	100	
Fine Motor Development	Suspect	4	20	0	0	0.125	6	28.6	2	9.5	0.125
	Normal	16	80	20	100		15	71.4	19	90.5	
Gross Motor Development	Suspect	4	20	0	0	0.125	5	23.8	0	0	0.063
	Normal	16	80	20	100		15	76.2	21	100	
Language Development	Suspect	0	0	0	0		9	42.9	0	0	0.004 **
	Normal	20	100	20	100	0.001	12	57.1	21	100	

*** There is a difference*

Table III: The difference in growth of stunting babies before and after the healthy massage intervention

Variable	Control Group									Intervention Group							
	Before				After				p value	Before				After				p value
	Mean	SD	Median	Min-Max	Mean	SD	Median	Min-Max		Mean	SD	Median	Min-Max	Mean	SD	Median	Min-Max	
Weight	3.9	1,135	4.3	2-5	3.9	1.14	4.3	2-5	0.000 **	6.16	7,133	5	3-37	5.33	0.8	5.5	4-7	0.001 **
Length	51.3	4.74	49	47.5-60	54.99	4.96	54.1	48-62.4	0.000 **	55.28	2.53	55.5	50-58.8	57.92	2.31	58.2	53-61	0.000 **
Head Circumstance	34.3	5.82	33	29.5-57	37.26	6.99	34	30.3-50	0.001 **	34.97	3.05	36.5	30-38	34.97	2.85	38	31.4-39	0.000 **
Upper Arms Circumstance	9.46	1.43	10.5	7-10.5	10.3	1.41	11.3	7.9-11.4	0.000 **	10.96	1,296	10.5	9-13.5	12.23	1.42	12	10-14.5	0.000 **

*** There is a difference*

social development with p value=0.033 (Table IV). A significant difference was also shown in the growth in the circumstance of the upper arm with p value = 0.0000. The variable body length statistically showed p value <0.05 = 0.019, but it could not be said that healthy massage is an effective intervention to increase body length, because the initial data showed that the variance between these groups was not homogeneous. It was likely that there was difference between the two groups from the beginning of the study and body length was different between the two groups (Table V).

DISCUSSION

Stunting is caused by inadequate catch-up, especially babies born in short, growth faltering (failure to grow) (11). Catch-up in the first 1000 days of birth includes specific nutrition and sensitive nutrition interventions carried out by health workers, including stimulation, either by the staff or the parents themselves. Stimulation carried out by parents will have a positive impact in achieving optimal baby growth and development (12,13). Tactile kinesthetic and massage are effective stimulations to increase growth and development for both term and preterm neonates and LBW as well.(14) While the combination of healthy massage with oral stimulation is effective to improve the activation of the oxybulary muscles, which helps in the process of sucking and swallowing and oral massage can increase pre-feeding in LBW babies.(15) Touch therapy and oral massage also have a positive impact on increasing the growth and development of babies, especially LBW or premature babies, who are indicators of stunting babies (14).

In this study, providing healthy massage interventions as an effort to prevent stunting with anthropometric assessment indicators and DDST II in the intervention group was compared with stunting infants with routine care. Healthy massage with tactile kinesthetic movements, loving baby massage and oral stimulation had a positive impact on the results of growth examinations on all anthropometric indicators in both groups. The results of this study are supported by review articles that massage for newborns will have a positive impact on physical growth and development (7). The significant difference from the results of the anthropometric examination may be related to a healthy massage protocol combined with oral simulation (16) which proved to be effective to increase body weight as in previous studies. In addition, a meta-analysis study that examined the efficacy of massage in premature infants

Table IV: The effectiveness of healthy massage on developmental changes in stunting babies

Variable		Intervention Group		Control Group		p value	Group		p value
		After		After			Mean Rank		
		F	%	F	%		Intervention	Control	
Personal Social Development	Abnormal	0	0	4	20	0.033 **	23	18.9	0.033 **
	Normal	21	100	16	80				
Fine Motor Development	Abnormal	2	9.5	0	0	0.162	20.1	22	0.162
	Normal	19	90.5	20	100				
Gross Motor Development	Abnormal	0	0	0	0	1,000	21	21	1,000
	Normal	21	100	20	100				

***There is a difference*

Table V: Effectiveness of Healthy Massage on growth changes in stunting infants

Variable	Control Group				Intervention Group				p value
	Mean	ST Dev	Median	Min-Max	Mean	ST Dev	Median	Min-Max	
Weight	3.9	1.14	4.3	2-5	5.33	0.8	5.5	4-7	0.433
Length	54.99	4.96	54.1	48-62.4	57.92	2.31	58.2	53-61	0.019 **
Head Circumstance	37.26	6.99	34	30.3-50	34.97	2.85	38	31.4-39	0.369
Upper Arms Circumstance	10.3	1.41	11.3	7.9-11.4	12.23	1.42	12	10-14.5	0.000 **

***There is a difference*

from the short and long-term outcomes showed that massage therapy as formed of comfortable therapy that improved weight and mental development in premature infants admitted to the NICU (17). This statement was in line with the results of current research in terms of growth with anthropometric values; however, there was a difference on developmental assessment. This study applied DDST II form to measure the development but previous study applied mental development form (17).

The findings of this study emphasized the effectiveness of healthy massage movements to improve growth and development of infants with a stunting diagnosis. There was a significant improvement on growth with indicators of body weight, body length, upper arm circumstances and head circumstance and the development indicators consisted of personal social, gross motor, fine motor and language. These finding are similar to previous study which applied giving massage and kinesiotherapy among hospitalized premature infant (18).

The effectiveness of healthy massage showed a significant difference in the measurement of upper arm circumference with p=0.0000, while the effectiveness of healthy massage on body length with p= 0.019 cannot be said to be effective in increasing body length, because the initial data showed that the variance data between these groups were not homogeneous. It is possible that, prior to beginning of the study, there were differences of body length between the two groups. In addition, it is possible because during the COVID-19 pandemic, parents in providing massage movements could not be directly monitored by researchers. As a COVID–19 task forced to comply with the health protocol, this study was thus empowering the parenting attitude of the parents (19). The results are the same as previous research conducted by Elmoniem (2020) that massage techniques with or without physical exercise, given twice a day in the morning and evening after eating for five days, showed that there was an increased body weight, even though, the results did not reveal a significant difference (p = 0.65) (20,21). Other researchers also obtained almost the same results, which was the tactile and kinesthetic and touch therapy methods carried out by mothers in newborn babies in 15 minutes twice a day before mealtime, for 28 days, revealed that there was no significant difference in average of body weight, body length and head circumference between the intervention group and the control group (p> 0.05) (22).

The unique findings of this study were shown in the developmental assessment, that there was a significant difference in the personal social sector, p = 0.033; this might be related to age development, that the tasks of personal social development in infants aged 0-3 months were very significant so it was easy to identify. Meanwhile, the developmental tasks in fine motor, gross motor and language required a longer time according to the age to achieve optimal growth and development (23). These findings were in line with several previous studies that massage was effective in stimulating infant development in several sectors, namely neuro motor (fine motor and gross motor) and sucking reflex and developments in the DDST II form; however, it is not explained in detail the significance of the difference or increase in each development sectors (24).

This present study indicates that healthy massage may have a potential to contribute greater gain in anthropometric measurements and development in

personal social among stunting babies especially in the COVID-19 pandemic. Since this is an easy and cost-effective practice, it should be encouraged as a part of the overall package of stunting prevention programs for parents to enhance their babies' growth and development.

The discrepancy between results and hypothesis might be caused by some limitations including the respondent's age which is too early for development examination using Denver II. Limitations on research procedure and monitoring intervention were due to COVID-19, so the researchers could not directly follow up every time, only monitor by video calls and reports in notebooks. It was not enough to evaluate the right techniques and the level of parental compliance with research protocols.

CONCLUSION

It can be summarized that healthy massage in stunting infants is associated with an improvement growth (anthropometry) and development (Denver II) parameters. Although the significant differences were in the parameters of upper arm circumference and body length for growth indicators and personal social for development indicators. Further research will require samples with the age greater than three months and a longer duration of intervention to see the development of infants, using more sophisticated technology to monitor respondents' compliances and using biomarkers for objective results.

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