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Original Research Paper

Paediatrics

THE EFFECT OF TOUCH STIMULATION ON WEIGHT GAIN IN LOW BIRTH WEIGHT (LBW) INFANTS

Lili Rohmawati, Syamsidah Lubis

Department of Pediatric, University of Sumatera Utara, Medan, Indonesia

ABSTRACT

Background : Low birth weight (LBW) infants are vulnerable to various complications. Touch stimulation is an alternative care for LBW infants. Several studies concluded that touch stimulation promote weight gain of LBW infants. However, there are only few hospitals implement it.

Objective : To assess the effect of touch stimulation on weight gain, length gain, enteral intake and responds in LBW infants.

Methods : This was an experimental study, with pre and post test design, composed of two groups, intervention and control. Subjects were LBW infants admitted in H. Adam Malik hospital and several hospitals at Medan, from April to September 2018. Subjects were collected with consecutive sampling technique. Univariate and bivariate (t-test) analysis were performed with 95% CI and P value <0,005 were considered statistically significant.

Results : Subjects were 30 LBW infants, divided equally into two groups, intervention and control. There were differences on weight [mean diff. 87,6 (SD 49); P<0,001], length [mean diff. 0,5 (SD 0,2); P<0,001] and respiratory rate [mean diff. 2,5 (SD 3,7); P=0,021] after the administration of touch stimulation. There was no difference in enteral intake. There were differences on mean weight gain (87,6 g and 34 g; P=0,003) and length gain (0,5 cm and 0,3 cm; P=0,027) between intervention and control group, respectively.

Conclusion : There is significant weight gain after the administration of touch stimulation. There is significant difference on weight gain and length gain between LBW infants who receive and do not receive touch stimulation.

KEYWORDS : low birth weight infants, touch stimulation

INTRODUCTION

Low birth weight (LBW) infants (birth weight ≤2500 g) are vulnerable populations to various complications. Appropriate routine newborn care is required for the LBW infants to have normal growth and development.[1]

Touch stimulation on the skin as the widest receptor organ on the human body represents the non-verbal communication. Several studies regarding touch stimulation in preterm and LBW infants revealed positive beneficial effects on weight gain, body's temperature, sleep pattern and energy expenditure in infants population.[2,3,4,5,6] Other positive clinical effects also noted, such as enhancement of the immune system, promote parents-infants bonding and enhance the developmental aspects.[7,8] However, there are only few hospitals implement touch stimulation in NICU. The objective of this study was to assess the effect of touch stimulation on weight gain, length gain, enteral intake and responds in LBW infants.

Material and Methods

This was an experimental study, with pre and post test design, composed of two groups, intervention and control. Subjects were admitted in H. Adam Malik hospital and several hospitals in Medan, from April to September 2018. Inclusion criteria include infants with birthweight of <2500 g and medically stable infants. Infants with clinical instability and severe congenital anomaly were excluded.

Touch stimulation was administered by trained assistants for two times daily (6 AM–8 AM and 6 PM–8 PM), 15 minutes duration and 5 consecutive days. Weights of the subjects were measured two times daily (before touch stimulation in the morning and after touch stimulation in the evening). Lengths of the subjects were measured two times during the intervention period, on the first day (morning) and on the fifth day (evening). Procedure of touch stimulation composed of tactile and kinesthetic stimulations. Adequate amount of grapeseed oil was used as lubricant during touch stimulation activity. Vital signs (temperature, heart rate, and respiratory rate) and enteral intake were also documented on both groups.

This study was approved by the Institutional Review Board of Sumatera Utara University. Statistical data composed of univariate and bivariate (t-test) were analyzed using SPSS version 22 (SPSS Inc., Chicago) with 95% confidence interval. P value <0.05 were considered statistically significant.

Result

Subjects were 30 LBW infants, divided into two groups, intervention and control. Characteristics of the subjects' population were similar (Table 1).

Table1. Basic characteristics of subjects

Characteristics	Intervention n=15	Control n=15	P
Age (days)			
Range	10-59	4-44	
Mean (SD)	23,1 (13,3)	20,8 (10,9)	0,638
Gender			1,000
Girls, n(%)	7 (46,7)	7 (46,7)	
Boys, n(%)	8 (53,3)	8 (53,3)	
Gestational age(weeks)			
Range	30-36	30-38	
Mean (SD)	32,4(1,3)	33,6(2,0)	0,022
Birth weight (g)			
Range	1150-2100	1235-2000	
Mean (SD)	1601,3(261,3)	1537,3(216,2)	0,471
Birth length (cm)			
Range	40-46	37-49	
Mean (SD)	42,8(1,9)	42,3(3,1)	0,626
Mode of delivery			
Normal spontaneous, n(%)	3(20)	2(13,3)	
Sectio caesarea, n(%)	12(80)	13(86,7)	
Diagnosis			0,105
LBW, n(%)	6(40)	2(13,3)	

LBW with comorbidities	9(60)	13(86,7)	
Hyaline membrane disease	6	8	
Necrotizing enterocolitis	1	-	
Neonatal pneumonia	3	4	
Unproven sepsis	6	6	
Sepsis	1	-	
Icterus neonatorum	3	1	
Apnea of prematurity	1	1	
Neonatal seizure	-	1	

Table 2 showed the differences on weight [mean diff. 87,6 (SD 49); P=<0,001], length [mean diff. 0,5 (SD 0,2); P<0,001], and respiratory rate [mean diff. 2,5 (SD 3,7); P=0,021] after touch stimulation. There was no difference in enteral intake.

Table 2. Mean differences on weight gain, length gain, and LBW responds before and after touch stimulation

Variable	Mean score (SD)		Mean difference (SD)	95% CI	P
	Before	After			
Weight (g)	1721,3 (333)	1809 (326,1)	87,6(49)	60,5 to 114,8	<0,001
Length (cm)	45,1(2,2)	43,6(2,1)	0,5(0,2)	0,4 to 0,6	<0,001
Heart rate(bpm)	134(9,2)	137,4(9,9)	3,4(6,9)	0,4 to 7,2	0,079
Respiratory rate (bpm)	41,4(5)	44(6,9)	2,5(3,7)	0,4 to 4,6	0,021
Temperature(^{0}C)	36,8(0,2)	36,8(0,2)	0,0(0,2)	0,0 to 0,2	0,319
Enteral feeding (ml)	27,6(11,2)	28,4(10,7)	0,8(1,9)	0,2 to 1,8	0,132

There were differences on mean weight gain (87,6 g and 34 g; P=0,003), and length gain (0,5 cm and 0,3 cm; P=0,027) between intervention and control groups, respectively (Table 3).

Table 3. The differences on mean weight gain and length gain between intervention and control groups

Variable	Intervention	Control	P
Weight gain (SD), g	87,6 (49)	34 (39,5)	0,003
Length gain (SD), cm	0,5 (0,2)	0,3 (0,2)	0,027

DISCUSSION

Touch stimulation administered to LBW infants in neonatal intensive care unit (NICU) has beneficial effects to LBW growth and development.[2,4,10,11,12] Our research included LBW infants admitted in NICU, with gestational age of 30-36 weeks, chronological age of 10-59 days, and birth weight of 1150-2100 g in the intervention group. Several meta-analysis studies revealed that the early administration of touch stimulation to LBW infants in NICU within first week of life and weight less than 1000 g is safe.[2,3,12,13] Touch stimulation in this study was using tactile and kinesthetic stimulation, similar with those performed by Vimala McClure and Field et al.[14,15,16] Many studies used tactile and kinesthetic stimulation showed beneficial effects for LBW infants.[17,18,19,20]

Care of LBW infants in NICU promote the principle of minimal handling to reduce nosocomial infection, hence touch stimulation in this particular group may predispose to infection. Therefore, touch stimulation should be administered in clinically stable LBW infants. Efficacy and safety of touch stimulation in sick LBW infants also unclear. Many studies implement touch stimulation in clinically stable LBW infants.[2,10] Our study implemented the touch stimulation particularly in LBW infants which were clinically stable.

This study used organic grapeseed oil as lubricant to minimize the friction between the assistant's palm and the newborn's skin. Organic oil is preferred as it is less irritating to the skin. Sunflower oil, coconut oil, olive oil, soybean oil, sesame oil and grapeseed oil often used. The application of oil as the lubricant also becomes the skin physical barrier to prevent disruption of the skin, decrease the microorganism invasion, hence reduce the nosocomial infection.[10,21,22,23,24] Single blind randomized controlled trial by Jabraeile et al revealed that the weight gain on preterm infants who received the touch stimulation using oil as lubricant was higher than control.[25]

This study showed significant mean difference on the weight gain, length gain, and respiratory rate in LBW infants on the intervention group before and after the touch stimulation. On comparison between intervention and control group, there was significant difference in mean weight gain and length gain after the fifth day. Increase of weight gain in the LBW intervention group is comparable to other previous studies.[2,10,15,26,27] Kumar et al studied the effect of touch stimulation in preterm infants with body weight of <1800 g, revealed there was significant weight gain on the intervention compared to control group. Regarding the body length, the difference was not statistically significant.[5] Meta-analysis study regarding touch stimulation in preterm infants to evaluate short and long-term outcome revealed that touch stimulation serves as an option for caring preterm infants in NICU to enhance weight gain and mental development.[2] Low birth weight infants who received touch stimulation also had shorter length of hospital stay.[15] Several mechanisms of the weight gain are increase of insulin and IGF-1 levels, increase of the vagal activity which increase the gastric motility, enhance the optimal nutrient's absorption which result as weight gain.[10,26,29,30] Hypothermia often occurred as comorbidities in LBW infants population. Higher body temperature of preterm infants who received touch stimulation than their counterparts was demonstrated by Hikmah.[32] There was no episode of hypothermia in our study population.

Other benefits of touch stimulation include enhancing feeding tolerance and reducing the gastric residual volume, abdominal circumference, frequency of vomiting, and increase the frequency of defecation.[31,33,34] There was no difference found in volume of feeding in terms of feeding tolerance in our study population. This was occured maybe due to the brief duration of our intervention, therefore longer intervention period is warranted. The limitation of hospital stay of LBW infants as the condition improved was became monitoring constraint because the LBW infants already discharge from the hospital.

This study provided specific training to the parents for providing a beneficial touch stimulation at home. Touch stimulation may also alleviates the symptoms of maternal depression, stress, and anxiety.[7,8,9,16,35] Regarding long-term outcome, touch stimulation improves neurodevelopmental outcome at two years corrected age.[36]

Conclusions

There is significant weight gain after the administration of touch stimulation. There is significant difference on weight and length gain between LBW infants who receive and do not receive touch stimulation.

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