

## Effect of massage stimulation on weight gain in full term infants

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### Abstract

**Background** Massage is a tactile/kinesthetic stimulation with biochemical and physiological effects on the body. Newborn infant massage stimulation given by mothers may promote maternal-infant bonding and attachment, enhance infant weight gain and stimulate the production of breast milk. There have been few studies on the effect of massage stimulation on weight gain in full term infants, and this topic remains controversial.

**Objective** To examine the effect of massage stimulation on weight gain in full term infants.

**Methods** This quasi-experimental study was held in Sanglah Hospital and Bunda Setia Maternity Clinic. Massage stimulation was performed by mothers once daily for a four week period. Massage stimulation was given to 30 full term infants and their weight gain was compared to 31 control infants who did not receive massages.

**Results** There were no differences in subject characteristics between the massage and control groups. Median weight gain in the massage group was 1230 grams, while that in the control group was 830 grams ( $P=0.028$ ).

**Conclusion** Weight gain in full term infants in the massage group was significantly greater than that in the control group after 4 weeks. [Paediatr Indones. 2011;51:202-6].

**Keywords:** *massage stimulation, weight gain full term infant*

massage stimulation given by mothers may promote maternal-infant bonding and attachment, enhance infant weight gain and stimulate the production of breast milk.<sup>2,3</sup>

The effect of massage therapy on infants' weight gain is still controversial. Some researchers have observed a significant weight gain in infants receiving massage stimulation, compared to a control group,<sup>3-12</sup> but others did not find similar results.<sup>13,14</sup> One study showed a significant weight gain in full term infants who received massage therapy compared to a control group, at the age of 2 months, but not at the age of 4 months.<sup>14</sup> We aimed to evaluate the effect of massage stimulation on weight gain in full term infants.

### Methods

A quasi-experimental study was done in Sanglah Hospital and Bunda Setia Maternity Clinic from November 2009 to January 2010 to evaluate the effect of massage stimulation on weight gain in infants. We

Optimal conditions in the infant stage greatly influence a child's growth and development.<sup>1</sup> Massage is a tactile/kinesthetic stimulation with biochemical and physiological effects on the body. Newborn infant

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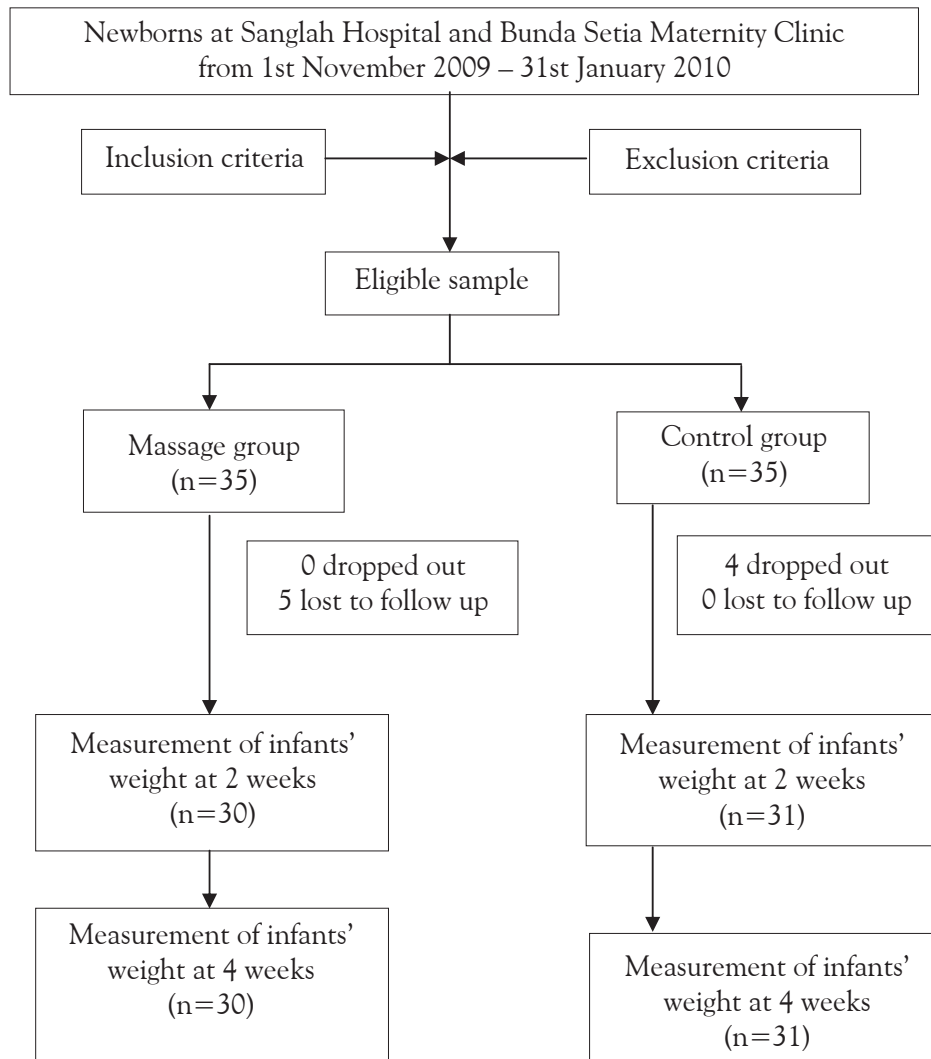
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included all full term babies, born spontaneously with a birth weight of 2500-4000 grams, and whose parents lived in Denpasar. We excluded those with severe asphyxia or major congenital anomaly. Written, informed consent was obtained from parents. Sample size was calculated using a standard deviation of 0.595,<sup>12</sup> power 80%,  $\alpha$  0.05, and effect size 0.46. With a dropout sample estimation of 10%, the minimal simple size required was calculated to be 29 for each group. We used consecutive sampling to allocate the subjects.

Massage stimulation was given to infants who were born in Bunda Setia Maternity Clinic for 15 minutes per day for a four week period at home. The massage procedure was taught to mothers by a skilled

nurse, according to the *Massage Therapy Guidance for Preterm and Full Term Infants Aged 0 to 3 Months*.<sup>2</sup> Infants born in Sanglah Hospital were set as the control group who did not receive massage and were handled with standard procedure.

Data on weight gain, nutritional intake, history of illness, and compliance from massage stimulation were obtained at 2 and 4 weeks of age. Subjects in the massage group were considered dropouts if they did not fulfill at least 40% of the total massage stimulation. Subjects in the control group were considered dropouts if they received any massage stimulation during the study period. Bodyweight was measured with a digital baby scale with an accuracy of 10 grams. All infants were weighed without clothes or blankets.



**Figure 1.** The recruitment scheme of the study subjects.

**Table 1.** Baseline characteristics of subjects

Characteristics	Massage group (n= 30)	Control group (n=31)
Gender		
- Male, n	18	16
- Female, n	12	15
Mean birth weight, grams (SD)	3315 (326.9)	3167.74 (365.04)
Maternal nutritional state		
- Risk for chronic lack of energy, n	2	3
- No risk for chronic lack of energy, n	28	28
Maternal education		
- Elementary school, n	4	3
- Junior High school, n	3	6
- Senior High school, n	19	18
- University, n	4	4
Paternal education		
- Elementary school, n	2	2
- Junior High school, n	2	4
- Senior High school, n	16	20
- University, n	10	5
Median family income, thousands of Rupiah, (interquartile range)	500 (300 to 1,000)	500 (300 to 1,000)
Nutritional intake		
- Exclusive breast-feeding, n	23	26
- Mixed breast and formula feeding, n	7	5
Median frequency of breast-feeding per day, (interquartile range)	9 (8 to 10)	9 (8 to 10)
Illness status		
- Yes, n	1	2
- No, n	29	29

**Table 2.** Formula intake in mixed breast and formula feeding

Formula intake	Mean energy, kcal/day (SD)
Massage group (n=7)	75 (11.22)
Control group (n=5)	81.9 (17.25)

**Table 3.** Subjects' weight gain at 4 weeks of age

Variable	Weight gain, g, median (range)	P
Massage group (n=30)	1230 (857 to 1385)	0.028
Control group (n=31)	830 (730 to 1120)	

Mann-Whitney U test was used to compare weight gain between the two groups. A result was considered significant if the P value was less than 0.05. The study was approved by the Ethics Committee and Research Department of Udayana University Medical School, Sanglah Hospital and Bunda Setia Maternity Clinic.

## Results

Of 70 subjects (35 per group), 5 were lost to follow-up and 4 dropped out. Subjects' enrollment scheme is shown in **Figure 1**.

Baseline characteristics for each group of

subjects are shown in **Table 1**. There were no obvious differences between groups for gender, birth weight, maternal nutritional state, maternal and paternal education, family income, nutritional intake, frequency of breast-feeding per day, and illness status.

**Table 2** shows the average formula intake per day in subjects with mixed breast milk and formula feeding was similar between the two groups.

Using the Mann-Whitney U test, we found a significant difference in weight gain at the age of 4 weeks between the two groups ( $P = 0.028$ ). (**Table 3**)

## Discussion

Similar to previous studies,<sup>12,14</sup> we observed no differences in the characteristic data of the massage and control groups for gender, birth weight, maternal nutritional state, maternal and paternal education, family income, nutritional intake, frequency of breast-feeding per day, and illness status.

Also, we found no difference in the average daily formula intake for subjects with a mixed breast milk and formula diet between the massage and control groups. The nutritional intake data was acquired by 24 hour recall diet analysis at the second and fourth weeks. A previous study only showed the incidence of exclusive breast-feeding and mixed breast milk and formula, without recall diet analysis.<sup>14</sup>

We found that infant weight gain was significantly greater after four weeks of massage therapy in the massage group compared to the control group. Several previous studies have also shown that massage therapy promotes weight gain in full term infants. Dasuki<sup>12</sup> found that full term babies aged 4 months, who received massage therapy for 4 weeks had a greater than 33% median weight gain compared to the control group. Likewise, Rosalina<sup>3</sup> reported that full term infants at 1 month of age who received massage therapy for 12 weeks had significantly higher weight gain compared to control group. Similarly, Serrano *et al.* reported a significant weight gain in 2-month old infants after they received massage therapy beginning at the age of 2 weeks, compared to the control group.<sup>14</sup> Furthermore, research on massage therapy in preterm

infants has also shown similar results.<sup>4-11</sup>

Several studies have suggested a possible mechanism for the relationship between massage therapy and infant weight gain, involving the vagus nerve.<sup>15</sup> A study in preterm infants revealed that vagus nerve activity increased after massage stimulation, in turn facilitating the release of food-absorption hormones, such as gastrin and insulin, and increasing gastric motility. These effects cause food absorption to be more efficient.<sup>9</sup>

Our illness data showed that one infant in massage group had diarrhea while two infants in the control group had diarrhea and acute respiratory infection. We also collected data on compliance of performing massage therapy. We found that until the end of the study period, 85% of mothers in the massage group did massage stimulation on their infants daily, while the other 15% did so 3-5 times a week.

One limitation of our study was the quasi-experimental design, raising the possibility of a selection bias between the two groups. A second limitation was the lack of quantitative measurement of breastfeeding intake. As there are no guidelines for this measurement, we recorded the number of times the mothers breastfed their infants daily to determine the breastfeeding intake. We also did not account for variations in the massage treatment, such as the frequency and the length of massage stimulation that mothers gave to their infants, although we did instruct them on the guidelines of massage stimulation. In addition, we did not measure the levels of gastrin, insulin, cortisol and growth hormone, all of which have direct effects on the infants' weight gain, due to the lack of tools available to us.

In conclusion, we found a significant difference on infants' weight gain after receiving four weeks of massage therapy in the massage group compared to the control group, which did not receive massages. Further research may reveal the relationship between massage therapy and weight gain, potentially by way of laboratory examinations of infants' growth hormone, gastrin, insulin, or cortisol levels.

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