EFFECT OF BODY MASSAGE
ON THE GROWTH OF LOW BIRTH WEIGHT (LBW) NEONATES

An introduction to subject matter and its importance

About 6-70% of all birth are low birth weight infants, while the estimated rate of their mortality is about 75% Annually, about 19% of infants are born with LBW disorder. This disorder is one of the main determinants of neonatal and postnatal morbidity. Physical growth is one of the most obvious and significant changes in infants. Therefore, one strategy to consider infants' health condition is to evaluate their physical growth, i.e. measuring weight, height, and head circumference. Research suggested that body massage only at birth during early months helps infant's growth, especially LBW infants. Infants have been among the most vulnerable groups and their health status criteria have been considered as the most important sustainable development goals. Increasing LBW infants' weight to the level of their normal counterparts, by means of body massage as a simple effective strategy, is being less noticed in the Islamic Republic of Iran.

The purpose

The purpose of present study is to consider the effect of body massage by mothers on the trend of growth of physical parameters (weight, height and head circumference) in LBW infants.

Tools & Methods

A quasi-experimental, clinical trial study was conducted on 19 LBW neonates hospitalized in NICUS in the selected hospitals on Isfahan medical university through an accessible sampling method and with regard to the criteria to include in this study. Infants were randomly assigned to three groups with 31, 32, and 33 subjects, respectively. In these three groups, inclusion criteria were including. Weightless than 2500 gr, age less than 18 days, breastfeeding, Iranian ethnicity, not a history of inherited cardiac, pulmonary, gastrointestinal daises nervous system disease, respiratory distress syndrome, septicemia, lack of mother's drug addiction, continuous oral feeding, parenteral nutrition. Not having blood transfusion during this study. In both surface and deep body massage, infants received body massages 3 times a day, for 15 minutes for lo consecutive days by their mothers. In a deep body massage, more pressure is imposed than surface body massage, as such mother's hand move at the infant skin, the pressure is imposed on the muscles and stimulates the subcutaneous structure (muscles, veins, nerves, and connective tissue). For the control group, the intervention consisted of standard and routine care. Weigh, height and head circumference were measured at the beginning of the study, after 10th and 30th days, i.e. 20 days after stopping body massage in three groups. The weighting scale and infant meter were made by Germany, Seco, with precision 10. To assess the reliability of this device, for every infant, measurement was done by one person through one unit. At the end of the study, weight, height, and head circumference changes were evaluated in three groups

Limitations

Infants' appetite is diverse and their received milk is subjected to their appetite. Regardless of training and evaluating the validity of this strategy, it must be said that its validity was not controllable in consecutive days, as samples gradually were discharged from hospital.

Findings

Because of such problems as measurement error, registration error, discharge from hospital and inhibiting more participation, some samples have missing data.
In regard to weight data, only 44 subjects have completed this study. In regard to average birth weight, mother's age and the number of her adorations, gestational age, APGAR score, gender (male to female) ratio, delivery mode and mother's used medication, it was not observed a meaningful difference among these groups (P<0.05) with regard to natural weight loss in 20 days after birth and having less than 18 days age for inclusion in this study, the average of infant weight at the beginning of the study was 62.44 gr less than their birthday (P<0.001). During this study, weight changes had normal distribution (P<0.005).

The average of weight changes in these groups from birth day to the beginning of study had no meaningful difference (P=0.75). But, at the beginning of study (body massage) toward 5th and 10th days (body massage ending). There is a meaningful difference between the average weight gains in confidence interval %25. This value during a 10-day body massage had a meaningful difference (P<0.05). This index in surface and deep body massage groups is 111.1 gr (P<0.05) and 137.8 gr (P<0.005) more than the control group, respectively. Comparison of the slope regression line showed that the velocity of weight gain with deep body massage is more than surface body massage, in turn, more than the control group.

Descriptive Statistics of Weight Changes During present study

Groups		No.	min	max	mean	Sd.
Surface body massage	from birth day to the 1st day of study	31	-250.00	150.00	-64.1935	101.613
	from 1st day of study to 5th day	31	-150.00	350.00	56.7742	116.201
	from 1st day of study to 10th day	30	-50.00	550.00	185.166	163.425
	from 1st day of study to 30th day	16	100.00	1350.00	561.250	312.876
Deep body massage	from birth day to the 1st day of study	32	-400.00	300.00	-73.2813	158.448
	from 1st day of study to 5th day	32	-250.00	300.00	57.8125	119.751
	from 1st day of study to 10th day	32	-150.00	800.00	211.875	213.744
	from 1st day of study to 30th day	13	110.00	1100.00	516.923	350.319
Control	from birth day to the 1st day of study	33	-250.00	250.00	-50.3030	102.271
	from 1st day of study to 5th day	30	-250.00	200.00	-17.5000	107.613
	from 1st day of study to 10th day	32	-370.00	550.00	74.0625	193.705
	from 1st day of study to 30th day	8	50.00	600.00	342.500	177.422
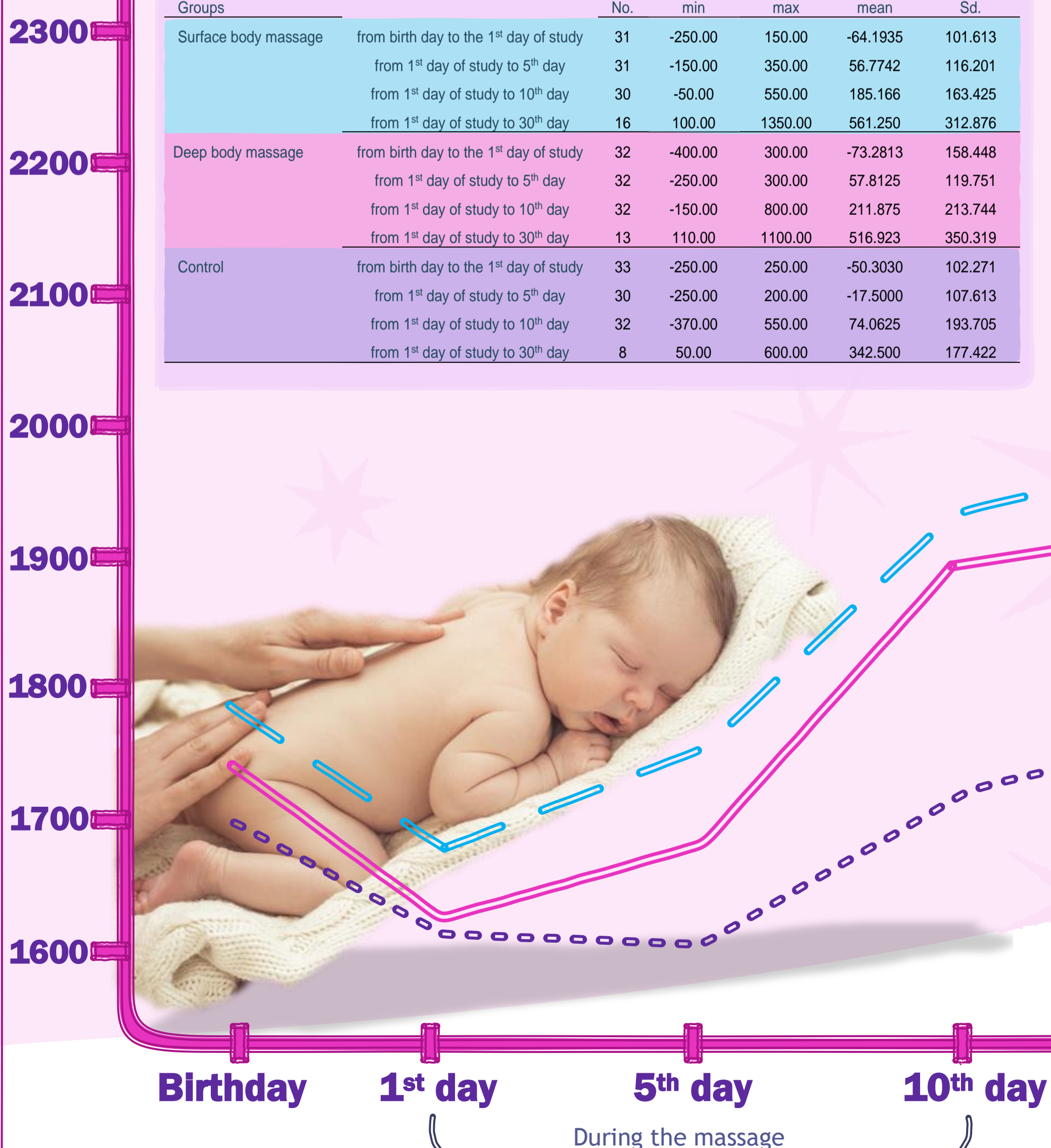
The regression equation to estimate weight in the 10th day (dependent variable) with respect to weight at the beginning of this study (independent variable) for these groups is as following,

Weight in 10th day = weight at the beginning of this study × B

Regression coefficients

| Groups	B	Sd.	t	P_value	Adjusted R Square
Surface body massage	1.177	.080	14.759	.000	.878
Deep body massage	1.186	.072	16.492	.000	.897
Control	1.156	.073	15.844	.000	.887

$H_0: B=0$

Also, regression equation to estimate weight in 30th day (dependent variable) with respect to weight at the final day of body massage (independent variable) for individual groups is as following:

Weight in 30th day = weight in 10th day × B

Regression coefficients

Groups	B	Sd.	t	P_value	Adjusted R Square
Surface body massage	1.103	.083	13.354	.000	.922
Deep body massage	1.299	.070	18.436	.000	.960
Control	1.209	.082	14.666	.000	.947

$H_0: B=0$
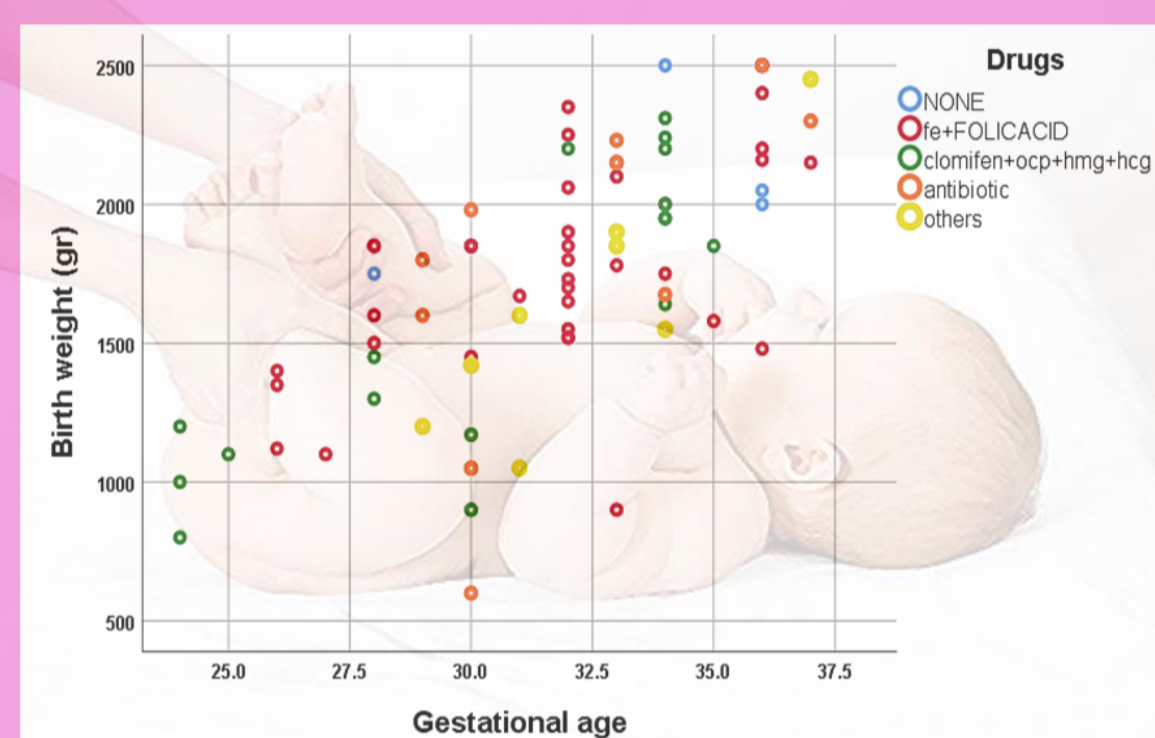
The point diagram of gestational age against birth weight

Small for gestational age (SGA) as one of prevalent determinants of LBW infant birth is observable in the point diagram of gestational age against birth weight. Iron and folic acid have no effect on the determination of gestational age. Clomiphene, ocp and other drugs of this class have been consumed by the mother of the infants who had the lowest gestational age.

To consider concomitant increase of growth parameters weight, height, and head circumference size, it was used the following researcher -made index .Using Kruskal-Wallis one-way analysis of variance and Mann-Whitne U-tests ,it was observed a meaningful difference at confidence interval .%95 By comparing average weight ,height and head circumference changes ,we concluded higher velocity in the deep body massage group.

Growth index from i-th day to j-th day

$$index\ i-j = \sqrt[8]{e^{\left(\frac{weight_j - weight_i}{10}\right)} + \left(height_j - height_i\right) + \left(head\ circumference_j - head\ circumference_i\right)}$$

Mean changes

From 1st day of study to 10th day	Surface body massage	Deep body massage	Control	total
Weight changes	185.1667	211.8750	74.0625	156.4362
Height changes	1.1450	1.8750	1.3684	1.4644
Head circumference	1.1500	1.1750	7250.	1.0167
Concomitant growth	124.18	2759	12.02	1001.76

Conclusion

Body massage, both deep and surface, would affect the velocity of weight gain in LBW infants. Also, deep body massage has a positive effect on increasing growth velocity (weight, height and head circumference). Therefore, body massage could be used as an effective and safe non-medical intervention to increase growth velocity in LBW infants.

Mean of weight (gr)

2300
2200
2100
2000
1900
1800
1700
1600

Surface body massage

Deep body massage

control

time

Birthday   **1st day**   **5th day**   **10th day**   **30th day**

During the massage

[1] Agarwal K.N., Gupta A., Pushkarna R., Bhargava S.K., Faridi M.M., Prabhu M.K. (2000). Effects of massage & use of oil on growth, blood flow & sleep pattern in infants. Indian Journal of Medical Research, V. 112, (pp. 212.217).
[2] Hosseinzadeh Kh., Azima S., Keshavarz T., Karamizadeh Z., Zare N. (2011). The Effects of Massage on the Process of Physical Growth among Low-Weight Infants. Journal of Isfahan Medical School, Vol 29, No 165, 1st week, February 2012