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The effect of massage by mothers on growth in healthy full term infants**

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Abstract
Objective: The objective of this study was to investigate the effect of massage by mothers on growth in healthy full term infants.
Methods: The research sample consisted of 60 healthy full term infants. The control group consisted of 30 healthy infants who were cross-matched with a massage group of infants for gender, gestational age, birth weight, birth length and date of birth. Mothers in the massage group administered 15 minutes of massage to their infants daily for 14 weeks, starting on day 15 ±2 of life. Body weight and height were measured in the two groups at birth and at the end of 4^{th} weeks and 16^{th} weeks corrected gestational age. The study was conducted at a public health clinic in an urban area of Izmir, Turkey between August 2003 and May 2004.
Results: Body weight and height gains in the massage group after 2 weeks and after 14 weeks of massage were higher than the control group. These differences in weight and height parameters were statistically significant. However it was determined that the male infants were the source of these differences.
Conclusion: This therapy would appear to be an easy, effective way for parents to enhance their infants' growth. Massage application may have a potential to improve the growth in infants.
Key words: Baby massage, infant, growth

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Introduction

Massage has been used for treatment and as a routine part of infant care for hundreds of years in many cultures and is one of the oldest therapeutic techniques in the world (Bond, 2002; Field, et al., 1996; Schneider, 1996). Massage has continued to be practiced even until this day in many traditional cultures especially Nigeria, Uganda, Fiji, New Guinea, Venezuela, and others are routinely massaged infants for the first several months as a natural part of child rearing that is passed down through the generations of mothers (Adomson, 1993; Field, 1994; Porter, 1996; Mainous, 2002).

In today's nurseries, massage has become a component of developmentally supportive care. Infant massage is a form of alternative medicine that is becoming increasingly popular because it is simple to do and requires very little equipment. Also it is easy to learn and can be done at home by the family.

In Turkey, traditionally, the infant massage has been applied in two different forms. In one form, in order to treat colic, abdomen and feet massage is applied by using some aromatic oils for the first months of the infant. In the other form, the extension and flexion of the extremities is used as a component of the infant care by mothers.

Specialists have advocated the practice of massage in the neonatal and infancy period over the years because several studies around the world have shown that it has beneficial effects for enhancing growth and development in infants (Agarwal, et al., 2000; Arora, et al., 2005; De Witt, et al., 1997; Dieter, et al., 2003; Field, et al., 2004; Field, et al., 1996). The baby massage is also a new field of application in infant care. Therefore, since this research was done, no other study has been carried out in this field in Turkey.

The purpose of the present study was to evaluate the effect of massage by mothers on growth (weight gain and height) of healthy full term infants.

Methods

The population for the study included full-term infants who were brought by mothers for the routine 2 weeks postnatal visit to Osmangazi Public Health Clinic in an urban area of İzmir, Turkey between August 2003 and May 2004. The research sample consisted of 60 healthy full term infants. They went under an examination and proved to be clinically healthy before they were assigned. 72 mothers volunteered to participate in this research. During the process, due to various reasons there were some dropouts and only 60 mothers

completed the trial according to the protocol. Twelve mothers didn't continue the massage application due to various reasons such as illness of the baby, immigration and unwillingness to continue massaging the baby.

Infants in the massage group and control group were matched for gender, gestational age, date of birth, body weight and height at the birth.

The babies, who took part in the study, were only breastfed until the end of the 4th month.

The massage group were administered massage application that included gentle rubbing, stroking or passive movements of the limbs.

Infants from the control group were allowed to follow their usual routine, and were not given any particular interventional experience.

The mothers of infants from the two groups were asked to fill in the questionnaire addressing infant, maternal and major demographic characteristics.

Mothers in the massage group were instructed in how to massage their infants and they administered 15 minutes of massage to their infants daily for two weeks, starting on day 15 ±2 of life.

Procedure

The first massage was given to the infants at the clinic for a period of 15 minutes in the presence of mother. Then, mothers were given a bottle of baby oil and an instructional CD including the application of baby massage which was prepared by the researchers. The following day the mothers were called and asked if they had already started the application or not and if there were any problems about it. On the subsequent days the massage was given daily for 15 minutes by the mother at home until 16th week. During these 14 weeks the mothers were followed up every week to ensure their compliance.

The mothers were given instructions and training for uniformity of massage strokes in terms of technique (force and direction) and time spent on massaging an individual body part. The infant was placed on a cotton blanket on top of an infant massage mat. Baby oil was applied during the massage, avoiding the face, hands, and fingers. Massage was given first to the infant's face and head (2 minutes) followed by arms (4 minutes), chest (2 minutes), and abdomen (2 minutes), legs and feet (4 minutes), and lastly the back (1 minute). Anthropometrics measurements were applied for body weight and height. Infants were weighed on a digital infant scale which was recalibrated at the beginning of each clinic

session. To record the heights, infants were placed with one leg extended on a massage table in a prone position. A mark was drawn on the blanket under the infant at both the base of the head and heel, and then the distance between the two marks was measured using a 152-cm measuring tape. Body weight and height were measured in the two groups at the birth and at the end of 4^{th} week and 16^{th} week. The nurses who assisted the study were trained and monitored by researchers to ensure accurate measurements.

The data were analyzed using a statistical package program. The homogeneity of the two groups was analyzed by Chi-square or Fisher's test and Student's t-test.
Repeated-measures analysis of variance was also used to assess for group differences in body weight, and height. Significant ANOVAs were followed by post hoc Bonferroni corrected t-tests. The data were expressed as means ±SD. The level of statistical significance was set at a *p* value of .05 (Akgül, 2003).

After obtaining the approval of the ethical committees of the Ege University School of Nursing, written permission was obtained from The Ministry of Health of Turkey, Management of County Health of İzmir before initiating the research. Mothers included in the study were informed about the research and a written consent was taken from the mothers before they participated in the study.

Results

Table 1 presents a summary of infant and maternal characteristics. According to the study design, the infants were cross-matched for gender, gestational age, and birth weight. No difference was found between the two groups in terms of feeding patterns at the end of 4^{th} and 16^{th} weeks of age.

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Table 1 Demographics of massage group and control group

Variables	Massage group (n=30) X±SD	Control group (n=30) X±SD	p*
Gestational age (wk)	39.46±1.13	39.33±1.18	NS
Birth weight (g)	3395.33±578.31	3463.67±560.03	NS
Birth height (cm)	50.07±1.74	49.93±1.72	NS
Gender Boys (%) Girls (%)	 50.0 50.0	 40.0 60.0	NS
Infant feeding at 2nd weeks Breast only (%) Breast and bottle (%)	 93.3 6.7	 100.0 -	NS
Infant feeding at 4th weeks Breast only (%) Breast and bottle (%)	 96.7 3.3	 100.0 -	NS
Infant feeding at 16th weeks Breast only (%) Breast and bottle (%)	 83.3 16.7	 76.7 23.3	NS
Birth order 1st 2nd	 60.0 40.0	 40.0 60.0	NS
Caesarean section Yes (%) No (%)	 80.0 20.0	 73.4 36.6	NS
Maternal age (yr)	26.78±4.70	27.17±4.16	NS
Maternal education University (%) Secondary school (%)	 33.4 66.6	 46.7 53.3	NS

(absolute figures (%) or mean values ± SD)

P*= X^2 test with Fisher's test for category variables and t test for continuous variables

NS= not significant

The arithmetic mean of body weight and height in the massage and control groups are shown in Table 2. There were still no statistically significant differences (P>0.05) between the two studied groups as regards gestational age, birth weight and birth height. After 2 weeks and 14 weeks of massage (at the end of 4th and 16th weeks of age) anthropometric values increased statistically in the massage group as compared to the control group. Also, the gains in weight and height were significantly greater than the control group. A statistically significant difference was only found in the male infants between the massage and control groups at the three measurement times [(for weight, F=3.760, p=0.026<0.05, for height, F=4.351, p=0.015<0.05), (Data not shown in the table 2)].

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Table 2 Anthropometrics at birth, after 2 weeks of massage and after 14 weeks of massage (at end of 4th weeks and 16th weeks of age)

anthropometry	Massage group (n=30) X±SD	Control group (n=30) X±SD	Statistical difference p*
Weight (g) at birth at 4th weeks of age at 16th weeks of age	 3395.33±578.31 5063.67±885.97 7380.63±1203.02	 4513.33±560.03 4513.33±728.83 6608.33±872.09	F=8.469 P=0.000<0.05
Height (cm) at birth at 4th weeks of age at 16th weeks of age	 50.07±1.74 55.40±2.22 64.60±2.43	 49.93±1.72 54.07±2.43 61.20±3.21	F=12.694 P=0.000<0.05

X= Arithmetic mean, SD= Standard deviation

Discussion

The present study demonstrates that massage contributes to greater gain in body weight and height. Growth patterns of our full term infant group concur with the results from previous established reports. Agarwal, et al. (2000) have reported that massage improved the growth in full term healthy infants as compared to infants without massage and stated that of four different oils (herbal, mustard, sesame, and mineral) compared with a non-treated control group demonstrated that sesame oil improved sleep patterns and growth (length, mid-arm, and mid-leg circumference) in 2-month-old infants. The infants who received massage therapy also showed a significantly greater increase in body weight from birth to the end of the study, consistent with data reported by Liu, et al (2001). In another study, term infants born to depressed, adolescent mothers were either rocked or given massage for 15 minutes 2 days per week, for 6 weeks (Field, et al., 1996). Massaged infants gained more weight, cried less and lower stress levels. For massage similar findings were described by some researchers as well as preterm infants (Arora, et al., 2005; De Witt, et al., 1997; Dieter, et al., 2003; Ferber, et al., 2002; Scafidi, et al., 1990), have shown better weight gain in those given massage thus supporting the observation of the present study. According to the study done by Moyer-Mileur et al. (1995) moderate pressure massage has a significant influence on the increase in height of the premature infants. According to Soriano et al. (2000) have demonstrated a significant increment in height after 30 days of oil massage in preterm infants. In another article it was reported that preterm infants who were given tactile stimulation had an 8 g higher weight gain per day than the infants in the control group who were given the same amount of calories (Field, et al., 1986). The reason for this growth is

presumed to be from the tactile stimulation-inducing growth hormone release (demonstrated in rats by Schanberg & Field (Schanberg, et al., 1987) and massage-induced vagal stimulation which causes the release of insulin and gastrin (Uvnas-Moberg, et al., 1987). Other studies have suggested that massage causes an increase in catecholamines levels (Acolet, et al., 1993; Kuhn, et al., 1991).

In the present study, particularly the male infants in the massage group had a clearer increase in their body weight and height than the female infants. Also in the literature any relation between gender and massage was not regarded.

In conclusion, the present study indicates that massage application may have a potential to contribute greater gain in body weight and height among infants. Since this is an easy and cost-effective practice, it should be encouraged as a part of the overall package of early infant intervention in infant care at home for parents to enhance their infants' growth. Maternal and child health nurses, midwives and other professionals who work in hospitals, clinics and local communities should recommend baby massage to mothers since it's a supporting element of baby care. Further research will be required to determine the underlying mechanisms for these massage therapy effects.

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