

Effect of olive oil massage on weight gain in preterm infants: A randomized controlled clinical trial

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ABSTRACT

Background: Despite the fact that effect of massage with or without oil on the baby's weight gain is not clear, but recent studies have shown that massage with essential oils make lipid absorption through the skin. The aim of this study was to evaluate the effect of olive oil massage on weight gain in preterm infants. **Materials and Methods:** This study was a single-blind, randomized controlled clinical trial. In this study, infants who met inclusion criteria for the study were divided into two groups by using random numbers table. Newborns in intervention group were under massage for 10 days and 3 times for 15 min daily; the mother of these newborns had been trained already using olive oil. Moreover, the infants of the control group were under massaging without oil same as the above-mentioned method. Researchers weighed babies daily during 10 days and recorded it at the checklist. Data from the study were reviewed and analyzed by descriptive statistics and repeated measure test using the statistical software SPSS/13. **Results:** This study showed that the neonatal weight gain in the infants with the oil massage was 21 g daily in average, whereas the increase in infant massage without oil was 7 g. This difference was statistically significant ($P < 0.001$). **Conclusion:** Considering the positive effect of infant massage on weight gain in premature infants with olive oil, it is recommended that nurses use oil in infant massage in the neonatal units.

Key words: Massage, olive oil, prematurity, weight gain

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INTRODUCTION

The infant mortality rate is one of the main developmental indexes of a community, and the number of low birth weight, and prematurity is a measure of the mortality rate in the neonatal period.¹ Each year, approximately 20 million infants are born with low birth weight. The rate of prematurity in the least developed countries is high. These countries account for a high percentage of infant mortality. Therefore, taking care of these babies has a burden on health and social systems of the community.²

Sensory stimuli are one of the basic human needs, especially to facilitate development and evolution of premature infants.³ However, due to constraints arising from the need to care for premature babies and occasional periods of relative isolation, they are deprived of tactile stimulation.⁴ In recent years, tactile stimulation has been considered as a complementary method in the Neonatal Intensive Care Unit (NICU).⁵

Skin massage is also considered as a therapeutic-touching intervention that has physiological and mental effects on the infants. Numerous studies have been done on the effects of massage on the skin of premature infants, all showing a positive effect on metabolism, birth weight, length of hospital stay, incidence of late infection, behavior, motor, and brain development.⁶

Infant massage is a simple tool that should be recognized as a part of the infant developmental care.⁷ Some studies have shown that massage of preterm infants increased on average 31–49% more weight, with a further increase in the head circumference and height. Diego *et al.*'s study showed that after 5–10 days the weight of infants whom were massaged was more than infants who did not receive massage.⁸ Due to the researchers' viewpoint, the probable mechanism of increased weight gain is attributed to activation of vagal

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system, which increases gastric peristalsis and baby's weight gain.⁹⁻¹¹ In Modrcin study (2003), although there was no statistically significant difference between the weight of premature infants in the massage and control group, despite lower mean birth weight of premature infants in the intervention group, neonates at discharge had gained more weight than the control group.⁴

Effects of massaging on the growth of premature infants with or without oils remain unresolved. Studies show that the oil can act as heat and nutrition source, but it is not clear exactly, what is the effect of oil individually upon the growth of preterm infants.¹² Recent studies suggest that infant massage is best combined with oil. Using oil during massaging makes it frictionless, long rubbing with suitable and continuous press to be performed; the oil also makes the skin soft and completely reduces skin dryness or stops its dryness.¹³

Selecting the type of oil is important; as many local products have side effects such as toxic after absorption, in which delays the healing of the skin rash. It must be acknowledged that due to the advantages of traditional oils, massaging skin with these oils has shown growing tendency; for instance, natural oils are used on the skin of newborn infants for a few 100 years in countries like India and the Mediterranean area.¹⁴ This can be due to this fact that these oils are less irritating to the skin compared to synthetic oils.¹³ Applying natural oils for infant skin has many benefits, including the prevention of injury and skin infection, skin temperature regulation by reducing water loss through the epidermis and absorbing some of the essential lipids.²

The above-mentioned discussions suggest a positive impact of massage on weight gain in preterm infants. Unfortunately, there has not been enough evidence in researches regarding the use or denying the oil in massaging and its impact on weight gain in infants; hence, this study has been carried out to find out the effect of oil massage on weight gain in premature infants.

METHODS

This study is a randomized clinical trial, which is the result of a research project, number 5147 that has been registered in IRCT website (201107036918N2). This study was carried out on 90 preterm infants admitted to the NICU at Al-Zahra hospital in Tabriz. Inclusion criteria for the study were as following: Infants fed with breast milk, birth weight between 1500 and 1000 g, gestational age between 32 and 28 weeks, APGAR of 5th min score >7, no anomalies, no congenital and systemic diseases, physiologic stability. If there were symptoms such as fever, respiratory distress, muscle stiffness, vomiting, and sensitivity to olive oil, infants were excluded from the study by the lack of completion of massage period.

After explaining the aims of the study and signing an informed consent by the parents, the neonates were

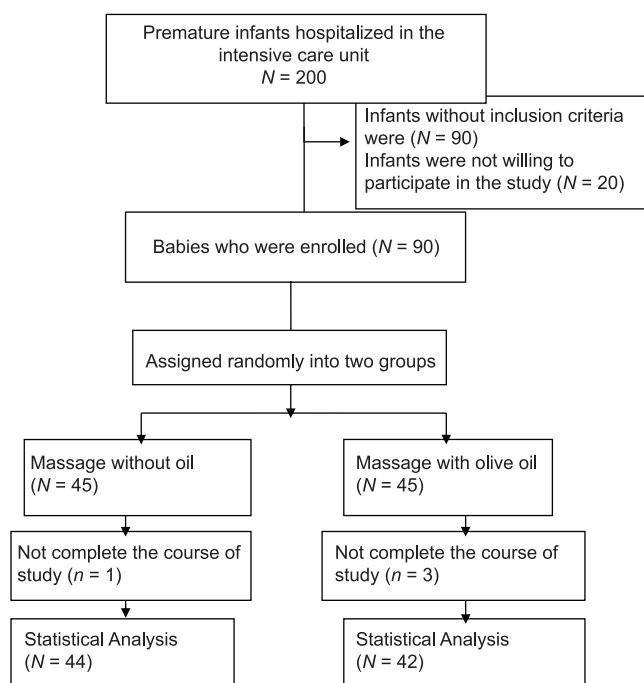
divided into two groups by using a table of random numbers generated by the computer. Newborns in the intervention group were under massage for 10 days and 3 times per day for 15 min daily; the mother of these infants had been trained how to use the olive oil by an NICU nurse. The control group was under massaging without oil same as the above method.

The proportion estimation formula was used to determine the sample size. Since the likelihood of weight gain was considered as the primary outcome, therefore, a total of 90 samples were selected as sample size, and then 45 samples were considered by randomly for each group.

Check list is used to record the data: The first part was related to demographic characteristics and the second part related to infant's weight control during the study. The executive nurse who was not aware of the groups allocations, measured, and recorded the weights of infants in all three groups during 10 days without any coatings by the use of a Seca calibrated scale with a precision of ± 10 g. Data from the study were analyzed by using descriptive statistics (mean \pm standard deviation (SD) and frequency - in percent) and frequent measure test were analyzed by using statistical software SPSS version 13 software. The value of $P < 0.05$ was considered statistically significant [Flow Chart 1].

RESULTS

From the 90 neonates, 45 infants were in the massage with oil, and 45 in the massage without oil, in which one baby in the massage without oil and three cases in massage



Flow Chart 1: Study participants

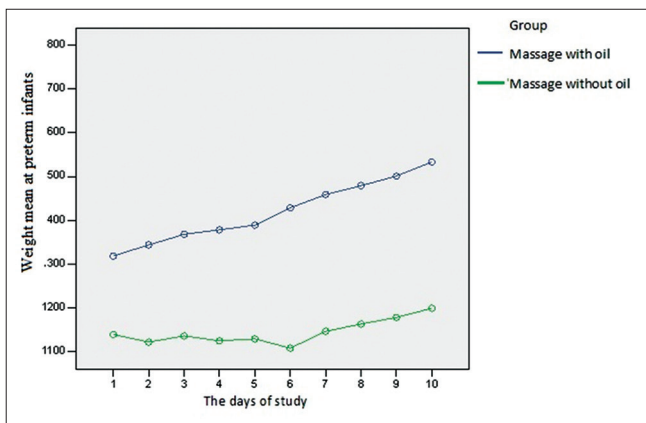
with oil were taken from the study as a result of early discharge and lack of massaging time. Hence, at the end data of only 86 infants were analyzed. Based on the results, no significant difference was observed between the two groups in terms of some of the sociodemographic profile of infants and mothers, [Tables 1 and 2]. The mean duration of hospitalization in massage with olive oil was 31.36 ± 14.98 and in the massage without oil 29.50 ± 11.56 days. Independent *t*-test showed that the mean length of hospital stay between the two groups was not statistically significant. The results indicated that the mean and SD of weight change during the 10 days studying for a massage with olive oil was 211.11 ± 102 g and in massage without oil was 72.61 ± 114.86 g. Statically *t*-test revealed that this difference is statistically significant [Table 3]. ($t = 6.00$ $df = 86$ $P = 0.000$). Graph 1 shows the changes of weight mean at preterm infants at two groups during the 10 days. The repeated measurement analysis showed that the weight gain over the course of 10 days was different in the two groups, and the rate of weight gain with olive oil massage was over than in nonoil massage ($P < 0.001$).

DISCUSSION

Many studies have reviewed the advantages of massaging on physical and neurological development of neonate, but the benefits of massage on the growth of preterm infants with or without oils remain unresolved. The researchers in this study have attempted to address this issue by conducting a clinical trial study.^{8,15,16}

Massage with or without oil, resulting in a positive impact on infant's weight had been shown in several studies such as Saroyan (2000) and San Diego (2005). Askafydy (1990) showed that the intervention group had a higher weight gain 21–40% than the control group after receiving massage of 15 min 3 times a day for 5–10 days.

Study results of Vickers *et al.* and Dabi *et al.* also showed a significant increase in weight with massage oil compared to the control group.^{17,18} Study results of Basirimogadam *et al.*



Graph 1: Changes of weight mean at preterm infants at two groups

at Mashhad also showed a significant increase in weight compared with the control group reported after 10 days intervention which was statistically significant.¹ The results of this study showed that weight gain at massage group with oil was 21 g daily compared to 7 g weight gain at massage group without oil.

Sankaranarayanan *et al.* examined the effects of massage on two groups of infants. Group I were under massage with coconut oil and Group II were used powder instead of oil. The results of this study indicate that the first group had weight gain more than the second group.¹⁹ At Solanki *et al.* study also infants who were massaged with oil had higher

Table 1: Comparison of the demographic characteristics of infants in the two groups

Variables related to of infants	Groups		Test result
	Massage with oil	Massage without oil	
Weight at birth (mean±SD)	1232.5±190	154.8±1189	$t=1.17$ $df=85$ $P>0.05$
Gestational age (mean±SD)	28.8±1	629±1.7	$t=0.32$ $df=87$ $P>0.05$
Sex (female), frequency (%)	23 (52.3)	20 (45.5)	$\chi^2=0.4$ $df=1$ $P>0.05$

SD – Standard deviation

Table 2: Comparison of demographic characteristics of mothers in the two groups

Variables related to of mothers	Groups		Test result
	Massage with oil	Massage without oil	
House wife: Mother's job, frequency (%)	40 (97.6)	41 (97.6)	$\chi^2=0.00$ $df=1$ $P>0.05$
Mother's educational level: High school, (frequency (%)	30 (70)	32 (76)	$\chi^2=1.54$ $df=2$ $P>0.05$
Mother's social status, frequency (%)	27 (50)	27 (50)	$\chi^2=0.4$ $df=1$ $P>0.05$
Mother's age (mean±SD)	26.5±6.9	29.8±6.9	$t=1.38$ $df=86$ $P>0.05$

SD – Standard deviation

Table 3: Comparison of changes of weight mean at the first and last day of intervention at two groups of study

Groups	Mean±SD			CI
	Weight of the first day	Weight of 10 th day	Weight changes	
Massage with oil	1321.56±119.6	1532.67±148.73	211.11±102.43	108.33-241.88
Massage without oil	1145±148.73	1217.84±170.24	72.61±114.86	37.69-107.53

SD – Standard deviation; CI – Confidence interval

weight gain compared to the oil-free group.²⁰ In a study by Arora *et al.* weight gain in infants 20 days after the massage oil was higher than the control group and oil-free massage. Furthermore, the weighting difference between the group with oil massage and the control group without oil massage was of great importance.¹²

The results of this study showed that applying olive oil at massage increases the rate of weight gain in preterm infants, and its benefit is most from massaging the skin solely. Preterm infants under massaging with olive oil had greater weight gain than the infants who received massage without oil. Fernandez *et al.* point out on the effect of vegetable oil absorbed through the thin skin of premature infant as a reason for this difference. The premature baby's skin is thin and full of blood vessels, which absorbs the fat easily. This could lead to higher calorie intake and hence weight gain better. In Fernandez's study, the infants were under massage with corn oil every 4 h for 3 days. In this study, high levels of triglyceride in infants between 1000 and 1500 g was reported as a result of high fatty acid uptake.²¹

CONCLUSION

Due to the positive effect of infant massage on weight gain of premature infants using olive oil massage, this method is recommended as a simple method for nurses at NICU. Moreover, training of oil massage for preterm mothers at home is necessary to stimulate baby's development after discharge.

As this study was conducted on infants weighing 1000–1500 g, so the results of this study could not be generalized to infants weighing less than 1000 g or >1500.

Because the individual differences can affect the rate of weight gain in individuals, so this limitation was beyond the control of the researchers. Therefore, as a suggestion, a study can be carried out on the effects of massage on weight gain in preterm infants with different weights. Furthermore, other studies can be carried out on comparing the effectiveness of massaging with different oils on weight gain of preterm infants.

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Conflicts of interest

There are no conflicts of interest.

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