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The effect of a short course of moderate pressure sunflower oil massage on the weight gain velocity and length of NICU stay in preterm infants

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ABSTRACT

Objective: The aim of this study was to evaluate the efficacy of five-day course of sunflower oil massage with moderate pressure on the weight gain and length of NICU stay in preterm infants.
Methods: Forty-four healthy preterm infants with a corrected gestational age of 30–36 weeks at the time of the study, were randomly assigned to the study group receiving body massage with sunflower oil and the control group receiving only routine NICU care. The massage was performed three times per day, each session including three consecutive five-minute stages, for five days. The primary outcome was to evaluate the efficacy of a short course of moderate pressure sunflower oil massage on the weight gain velocity. The secondary outcome was to compare the length of NICU stay between the two groups.
Results: During the study period, the increase in the average daily and fifth-day weight gain was significant in the intervention group. The length of NICU stay was shorter in the intervention group significantly.
Conclusion: Our findings suggest that even a short course of body massage with sunflower oil for only five days increases preterm infants' weight gain and decreases their duration of NICU stay significantly.

1. Introduction

Prematurity, defined as birth before 37 completed weeks of gestation, occurs at an annual rate of 7.5%–12.5% across different world regions, with the highest rates being reported in developing countries (Beck et al., 2010; Vogel et al., 2016). In addition to being known as the leading cause of neonatal death and the second most common cause of under- 5 mortality, preterm birth also results in neuro-developmental and cognitive impairment, learning difficulties, socio-behavioral problems, higher health care costs and longer hospital stay (Harrison & Goldenberg, 2016; Saigal & Doyle,2008; Smid, Stringer, & Stringer, 2016). Preterm neonates are exposed to stressful stimuli such as noise, light, and medical procedures during neonatal intensive care unit(NICU)stay; leading to changes in their sensory, cognitive and motor functions (Pineda et al., 2014). Thus, during the last few decades researchers and clinicians have focused on developmental care programs, e.g. infant massage, kangaroo care, avoidance of painful/stressful

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stimulation and infant positioning. These programs help newborns to cope with NICU stressors, promote their neuro-development and facilitate their early discharge from NICU (Liu, Zhong, & Tang, 2007; Ramachandran & Dutta, 2013).

Infant massage therapy has been a traditional practice for centuries, especially in South-Asian countries (Kulkarni, Kaushik, Gupta, Sharma, & Agrawal, 2010). Although massage techniques vary across different regions, recent methods including tactile (moderate-pressure stroking) with or without kinesthetic (passive flexion and extension of the upper and lower extremities) stimulation have been used more commonly (Pepino & Mezzacappa, 2015). It has been suggested that moderate-pressure massage stimulates the parasympathetic activity via baroreceptors and mechanoreceptors (Field, Diego, & Hernandez-Reif, 2010a). This, in turn, leads to increased gastric motility and secretion of hormones such as gastrin, cholecystokinin, insulin and Insulin Growth Factor1 (IGF-1).These hormonal changes improve weight gain and reduce the length of NICU stay (Diego, Field, & Hernandez-Reif, 2005; Diego et al., 2007). It has also been shown that tactile/kinesthetic stimulation (TKS) may reduce the infants'behavioralmanifestations of stress through reduced cortisol levels (Acolet et al., 1993).

Topical oils (e.g. mustard, sunflower, sesame and coconut oils**)** have been globally used for infant massage, especially in South Asia and sub-Saharan Africa, depending on their availability, cost and safety (Kulkarni et al., 2010; Mullany, Darmstadt, Khatry, & Tielsch, 2005). The oil applied during infant massage enhances the skin barrier function and thermoregulation, reduces trans-epidermal water loss and neonatal infections,and improves skin integrity, neurodevelopment, and mother-infant bond (Salam, Das, Darmstadt, & Bhutta, 2013).

Several studies have addressed the effects of infant massage on preterm infants' weight gain; however, there are many variation terms of the massage technique, infants' characteristics, application of different oils and the study duration (Field, Diego, & Hernandez-Reif, 2010b; Pepino & Mezzacappa, 2015; Salam et al., 2013).

No study has evaluated the effect of a five-day course of sunflower oil TKS on preterm infants' weight gain and the length of NICU stay (Arora, Kumar & Ramji, 2005; Darmstadt et al., 2005; Diego et al., 2005; Dieter, Field, Hernandez-Reif, Emory, & Redzepi, 2003; Fallah et al., 2013; Kumar et al., 2013; Li et al., 2016). The present study aimed to evaluate the effect of a five-day course of TKS using sunflower oil on the preterm infants' growth velocity and length of NICU stay.

2. Methods

This doubled-blind randomized control trial was conducted to evaluate the effects of a five-day course of moderate pressure sunflower oil body massage on preterm infants' growth and length of NICU. The study was conducted at NICUs of Shariati and Arash Hospitals, Tehran, Iran, between May and August 2012. The primary outcome was to evaluate the efficacy of a short course of sunflower oil massage on the weight gain velocity. The secondary outcome was to compare the length of NICU stay between the two groups.

2.1. Participants

The subjects included 44 eligible preterm neonates with a mean corrected gestational age of 32.63 ± 1.75 weeks (30–36 weeks) and a mean weight of 1553.63 ± 410.35 g at the time of the study. The subjects were divided into two subgroups of 30–32 and 33–36 weeks of corrected gestational age and enrolled the study after recovery from RDS, sepsis or other associated diseases, so they were medically stable. About 54.5% of the patients were male and 45.5% were female. Twenty-two infants were allocated to each group and their parents provided written informed consent.

The subjects with medical conditions such as respiratory, cardiac, CNS and skin disorders; congenital anomalies; neonatal jaundice treated with phototherapy; signs of infection or allergic reaction to sunflower oil were excluded. The participants were also excluded if they were discharged before the end of the intervention or transferred to another center, if their parents decided to discontinue participation at any stage of the study or if they developed any condition requiring medical interventions. The sample size was determined to assume a confidence interval of 95%, a power of 80%, a 2-sided significance level of $\alpha = 0.05$ and loss to follow-up of 20%. Considering an effect size of 3 g/kg/day (Dieter et al., 2003), the sample size was estimated at 22 neonates for each group. Equal randomization and an allocation ratio of 1:1 were used for intervention and control groups. The primary outcome was measured and the secondary outcome was calculated by a NICU nurse blinded to infant allocation.

2.2. Feeding

Feeding was started as soon as the participants could tolerate feeding as follows: On the first day of feeding, 2 mL/kg breast milk was given every 2 h via NG tube in neonates 28–32 weeks/1000–1500 g. After the first day, the feeding volume was increased by 10–20 mL/kg/day to a maximum volume of 170–200 mL/kg/day according to the neonates' feeding tolerance. In neonates > 32 weeks/ > 1600 g, breastfeeding or bottle feeding was started with the volume tolerated by the infant every 2–3 h. The participants were enrolled the study when they tolerated at least 150 mL/kg/day of breast milk or formula with the least calorie intake of 120 kcal/day in both groups.

2.3. Study protocol

2.3.1. Randomization

Eligible neonates were randomized to either intervention (massage with sunflower oil along with routine NICU care) or control (routine NICU care without sunflower oil massage) groups using computer-generated random number sequences.