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Effect of massage therapy with or without oil on weight gain of low birth and very low birth weight babies: A Prospective randomized controlled trial

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Abstract

Background: *Infant massage is an ancient practice used primarily in Asian and Pacific Island cultures because touch in these cultures is considered healthful both physically and spiritually.. Massage therapy does have various benefits for the mother and the infant. It induces the bonding process between mother and child and causes increased weight gain and more organized sleep patterns in normal and premature infants. It even helps in the social development of the premature infant.* ***Material and Methods:*** *A non blinded randomized controlled trial was conducted in the form of a structured baby massage from day 3 onwards .The present study was conducted on 90 neonates,12 of which dropped out because of lack of follow up . 3 children developed features of late onset septicemia and were admitted in the N.I.C.U. and thus consequently omitted from study. All the babies incuded in the study were otherwise healthy, stable babies having birth weight >1000 gm and <2500gm with Apgar score >7 at 1 and 5 minute with no resuscitation required at birth .The mean birth weight of the study subjects was 2.0039 (± 0.15286) kg. The babies were enrolled prospectively and assigned into 1 of the following 3 subgroups.* ***Group 1-*** *in which the caregivers are educated about the correct technique of massage.* ***Group 2 – in*** *which the caregivers are advised to massage the newborns with olive oil with the correct technique (approx.40 – 50 ml per sitting)* ***Group 3 - in*** *which the caregivers are advised to use mustard oil for massage (approx. 40 – 50 ml per sitting).* ***Results:*** *The weight of every subject was checked and recorded at 1st,7th and 28th post natal days The mean increase in the weight after 28 post natal days was 371.7 (± 141.3)gms or a percentage gain in weight of 1.2323 % in Group 1, 360.8 (± 132.4) gms or a percentage gain in weight of 1.2027 % in Group 2 and of 353.3 (± 15) gms. Or a percentage gain in weight of 1.1766% in Group 3.* ***Conclusion:*** *It may thus be concluded that the practice of oil massage per se has a good effect on weight gain in neonates. The type of oil does not have much bearing on the final weight at least as observed within the scope of this study.*

Keywords: massage therapy, oil, weight gain, low birth weight babies

INTRODUCTION

Babies with birth weight of less than 2.5 kg. Irrespective of their period of gestation, are classified as LOW BIRTH WEIGHT BABIES. The sensations experienced in the

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intrauterine environment are ideal for the normal growth and neurobehavioral development of the fetus. After a premature delivery, this stimulation is no longer received. By applying extra uterine stimulation, there remains some continuity with intrauterine environment. The investigators have met this need for stimulation following premature birth with following premature birth with various forms of stroking, rubbing and touching. The aim is not to accelerate development but to put it on track and if possible various forms of stroking, rubbing and touching. The aim is not to accelerate development but to put it on track and if possible to maintain and facilitate it. ***Massage*** involves *application of the stimulus of pressure to tissues* and can elicit cutaneous, proprioceptive, vestibular and/or sensory perceptions.

Infant massage was introduced formally into the United States in 1978 when Vimala Schneider McClure, a yoga practitioner who served in an orphanage in Northern India, developed a training program for instructors at the request of childbirth educators. An early research study by R. Rice in 1976 had shown that premature babies who were massaged surged ahead in weight gain and neurological development over those who were not massaged. McClure's practice in India, her knowledge of Swedish massage and reflexology along with her knowledge of yoga postures, which she had already adapted for babies, served to make her the foremost authority on infant massage. The International Association of Infant Massage (IAIM) had its origins in 1980 and was incorporated in 1986 by McClure and her original seven trainers. As of 2004, there were over 30 countries that have chapters of IAIM and over 15,000 certified instructors have been trained in the United States.

Various techniques are used in infant massage, with the different strokes specific to a particular therapy. Special handling is used for treating a baby with gas and colic. Some of the strokes are known as Indian milking, which is a gentle stroking of the child's legs; and the twist and squeeze stroke, a gentle squeeze of the muscles in the thigh and calf. The light strokes often employed in regular Swedish massage are applied at the end of a massage. The procedure is not unlike certain forms of adult massage, but with extra care taken for the fragility of the infant.

There are also specific Chinese techniques of pediatric massage, including massage of children with special needs. In China, these forms of massage can be given by medical professionals, but parents are often taught how to do the simpler forms for home treatment of their children.

Following are the benefits of the massage:

1) Relaxes and soothens: Not only the baby but also the mother or (caregiver). Touch has been shown to decrease levels of Cortisol in the body
2) Deepens Bonding: Essential one-on-one time that will enhance your intimacy, understanding and ability to nurture.
3) Improves Communication: Increases the confidence and sensitivity to the baby's cues.
4) Contributes to Development: Stimulates growth and healthy development of your baby's body, mind and spirit.
5) Empowers: Enhances the ability to understand the babys special needs
6) Helps Baby Sleep Better! Helping the baby release stress which builds daily from new experiences means more rest for baby and mother.
7) Insulation: Prevents heat loss
8) Nutrition: Through the absoption of heat loss

MATERIAL AND METHODS

A non blinded randomized controlled trial was conducted in the form of a structured baby massage from day 3 onwards.

Inclusion Criteria

- Neonates delivered at N.S.C.B. M.C.H. during the proposed 1 year period with weight in the range of <2.5 kg. to >1 kg. (i.e. L.B.W. and V.L.B.W.)
- Apar score >7at 1 and 5 min. with no resuscitation required at birth.
- Medically stable with no requirement of drugs (other than mineral and vitamin supplementation.) or any intervention and procedures..

Exclusion Criteria

- Sick babies or those with congenital anomalies or neuromuscular disorders.
- Babies with birth asphyxia
- Early neonatal septicemia
- Pathological hyperbilirubenemia (i.e. that requiring exchange transfusion.

Babies born during the period of study were enrolled prospectively and assigned into 1 of the following subgroups. The parents of babies who agreed to enroll were sequentially allotted to groups 1, 2 and 3 as follows –

Group 1- in which the caregivers are educated about the correct technique of massage.

Group 2 – in which the caregivers are advised to massage the newborns with olive oil with the correct technique (approx.40 – 50 ml per sitting)

Group 3 - in which the caregivers are advised to use mustard oil for massage (approx. 40 – 50 ml per sitting)

Informed consent was taken from all mothers. A detailed obstetric history was taken at the onset of the study using the Obstetric Complications Scale (OCS) of Littman and Parmalee (9) for comparison between the two groups. A social history was also taken. Gestational assessment was done by the New Ballard Score within 12 hours of delivery.

METHOD-

Massage done 3 times a day each of 10 min. duration. Session began 30-45 min. after a feed in the morning, afternoon, and evening. Stimulation was given as follows-

The total duration of each session was 15 minutes (excluding time for recording physiologic parameters). If the baby started crying or passed urine or stools during the session it was temporarily stopped till the baby was comfortable again. Stimulation was given as follows:

Phase I*:* This was done in the prone position. Twelve firm strokes with palms of the hands of 5 seconds each, were provided in each area as follows: (a) Head from forehead hairline over scalp down to neck with alternate hands; (b) Neck from midline outwards with both hands simultaneously; (c) Shoulders from midline outwards with both hands simultaneously; and (d) Back from nape of neck down to buttocks with firm, long stroke with alternate hands.

Phase-II: This was done in the supine position. Twelve firm stroke with palms of the hands, of 5 seconds each, were provided in each area as follows: (a)

Forehead - From midline, outwards with both hands simultaneously; (b) Cheeks - From side of nose, with both hands simultaneously in rotating and clockwise direction; (c) Chest - 'butterfly' stroking from midline upwards, outwards, downwards and inwards back to initiating point; (d) Abdomen - From the appendix, in a clock wise direction around abdomen avoiding the epigastrium and probes, with gentle strokes; (e) Upper limbs (each separately) - from shoulders to wrist using alternate hands for stroking; (f) Lower limbs (each separately) - from hips to ankles using alternate hands for stroking; (g) Palms - from wrist to finger tips using alternate hands for stroking; and (h) Soles - from heel to toe tips using alternate hands for stroking.

***Phase-III**:* This was done in the supine position and consisted of passive flexion and extension movements of the limbs at each large joint (shoulder, elbow, hip, knee and ankle) as 5 events of 2 seconds each in each area.

- The control infants were not given any specific stimulation.
- Weight of infants was taken without clothes on an electronic weighing scale (Philips) with an accuracy of ± 5 gm.

Babies were monitored daily during their entire period of hospital stay (if any)and the findings during this monitoring period was also recorded in the observations as was the cause of this stay.

Adverse effects due to the massage were also looked for but none so happened. There were 22 drop out's during the period of study who did not respond to repeated reminders of follow-up. 3 children developed features of late onset septicemia (poor feed acceptance, lethargy, abnormal tone and reflexes) and were admitted in the N.I.C.U. and thus consequently omitted from study. 1 child was later found to be having congenital anomalies (V.S.D., low set ears and epicanthus) and was thus also omitted from study.

STATISTICAL ANALYSIS

The data's related to 90 L.B.W. and V.L.B.W. babies who completed the study as per protocol was tabulated and fed into computer for validation and securitization. Statistical analysis was done with the help of SPSS and Epi software. The univariate and bivariate analysis was carried out using student's t –test and z test (standard normal distribution)**.**

RESULTS

The present study was a non blinded trial which studied the effect of massage on weight gain of low birth weight and very low birth weight babies and also whether that the type of oil has any effect on the beneficial effects. A total of 90 neonates completed the study. There were 12 drop out's during the period of study who did not respond to repeated reminders of follow-up.

3 children developed features of late onset septicemia (poor feed acceptance, lethargy, abnormal tone and reflexes) and were admitted in the N.I.C.U. and thus consequently omitted from study. 1 child was later found to be having congenital anomalies (V.S.D., low set ears and epicanthus) and was thus also omitted from study.
The study subjects were randomly distributed into 3 groups.
Group 1 – Massage without Oil.
Group 2 - Massage with olive oil

Group 3 – Massage with mustard oil
The mean birth weight of the study subjects was 2.0039 (± 0.15286) kg
Weight was recorded at 7th and 28th post natal days and it was seen that
Group 1 - Mean weight at 1st P.N.D. = 1.995 (± 0.1615) kg.
Mean weight at 28th P.N.D. = 2.3667 (± 0.4866) kg.
This represents mean gain in weight of 371.7 (± 141.3) gms or a **percentage gain in weight of 1.2323 %**
The gain in weight ranges from 0 to 980 gms. Weight gain in gms/ kg. birth weight =282 (±044) Weight gain in gms/ kg. Birth weight/ day over the entire study period = 10.07(± 006). The above figures are expressed as an average.
Group 2 -Mean weight at 1st P.N.D. = 2.047 (± 0.1500) kg.
Mean weight at 28th P.N.D. = 2.4074 (± 0.42261) kg
This represents a mean gain in weight of 360.8 (± 132.4) gms or a **percentage gain in weight of 1.2027 % The** gain in weight ranges from 217 to 977 gms. Weight gain in gms / kg. birth weight = 293 (± 87)**.** Weight gain in gms / kg.birth weight /day = 9.35 (± 004)
Group 3 - Mean weight at 1st P.N.D. = 1.9717 (± 0.1418) kg
Mean weight at 28th P.N.D. = 2.3250 (± 0.34957) kg
This represents a mean gain in weight of 353.3 (± 15) gms. Or a **percentage gain in weight of 1.1766%** The gain in weight ranges from 203 to 915 gms. Weight gain in gms / kg.birth weight = 285.745 (± 47) Weight gain in gms / kg.birth weight / day = 8.455 (± 004)**.** Thus there was a weight gain in all the 3 groups but not a significant effect of the oil type used for massage.

DISCUSSION:

Massage of infants is widely prevalent since time immemorial. It has shown to be beneficial in a number of ways. Many studies have been done which either use massage only as a form of tactile stimulation or massage with some type of vegetable oil. Oil may in addition act as a source of warmth and nutrition.

The present study was undertaken to evaluate the effect of massage with or without oil on the weight gain of healthy low birth weight and very low birth weight neonates and also to evaluate whether the type of oil has any bearing on the effects of massage as far as weight gain is concerned. Many other studies done earlier used several other outcome variables to study the effects of massage on parameters like anthropometric data (height, weight, head circumference, chest circumference etc.
Mostly the studies done were initiated in neonatal care units on healthy preterm neonates after initial stabilization.

In our study non blinded trial is conducted in the form of a structured baby massage from day 3 onwards and weight was recorded on the day of birth and on the 7th and 28th day. The subjects enrolled in the study were otherwise healthy, stable babies having birth weight >1000 gm and <2500gm with Apgar score >7 at 1 and 5 minute with no resuscitation required at birth. This is comparable to other trials except that done by Field et al (enrolled babies more mature i.e.20 days) and Agrawal et al (enrolled term babies of 6 weeks age)

In our study the mean birth weights of the babies in the 3 groups were on an average 2(±0.15286) on the 1st day.

Weight of Baby
Compared in Diff. Groups.

GROUP	Mean
1	2.1417 (± 0.42231)
2	2.1876 (± 0.32163)
3	2.1411 (± 0.35262)
TOTAL	**2.1570 (± 0.36778)**

All the babies were breast fed at the time of enrollment and were otherwise healthy except for their weight.

In all the studies done earlier a standardized massage technique has been described in only few trials as those by Field, Mathai, Kramer's etc. In our study we used the standard massage technique as per the W.H.O. guidelines and it was this technique which was advised to the caregivers in all the 3 groups.

Duration of intervention is usually short in all the trials (1o-14 days) except for 6-8 week in the Mathai trial.

The trials using oil massage in preterm infants did not have any standardized massage technique. They described the cutaneous application of oil in a fixed amount or for a fixed duration. The type of oils used were corn oil, soyabean oil, sunflower, safflower or seasame oil.

2 studies had adequate sample size(20-25 in each group). **Field et al** showed a weight gain in the experimental group over a period of 10 days. **Mathai et al** showed a 4.24 gm/day or 22% more weight gain by the experimental group over a period of 6-8 weeks.

Oil massage also showed weight gain in the trial by **Soriano and Dabi.** The difference was 5 gm /kg /day in the trial by Dabi and 2gm /kg/day by Soriano. The duration of intervention was nearly 45 min, /day for 20-30 days

This is comparable to the present trial. Massage is seen to have good effect on weight gain. However intra oil group comparison shows a statistically insignificant difference (p>.0.05)

Most of the earlier studies done have used only weight gain as their outcome variable as in the present study the trial by Soriano reported a significantly greater increment in length (3.6 ±0.2) vs. (3 ± 0.5). midarm circumference (3.3 ±0.6) vs (3.1 ±0.6). Difference in head circumference was not significant.

Agrawal et al conducted trial on 125 term healthy infants using 5 groups-herbal oil seasame, mustard mineral oil, and 5th acted as the control group. Improved gain in weight length midarm and midleg circumference was noted in the massaged infants w.r.t to the controls. However the gains were significant only for sesame oil group for length midarm and midleg circumference.

In the present study it was found that a statistically significant increase in weight is noted in the massaged neonate group which is in concordance with the earlier studies.

In the study by **Field et al** it was found that the massage-therapy infants gained more weight despite a lack of difference in formula intake from the rocking group. Their temperament also improved. Their levels of norepinephrine, epinephrine, and cortisol decreased while serotonin levels increased, suggesting that the infant's stress level decreased. These finding indicate that depressed mothers may be able to help their infant's development through the use of massage therapy.

Jones, et al. (1998) did a study to find a relationship between the right frontal EEG and massage therapy in infants of depressed mothers. Depressive symptoms in infants of depressed mothers have been found to be associated with right frontal EEG asymmetry. The mothers were first assessed to see if they were depressed. If the mother was depressed, the infant was brought in to undergo massage therapy. The amount of EEG asymmetry was measured before, during, and after the massage therapy. The right frontal EEG asymmetry significantly decreased during and after the massage, suggesting a decrease in depressive symptoms. Further research is needed to determine the long-term effects of right frontal EEG asymmetry.

In the study by **Onozowa et al** testing the effect of massage therapy on mother child interaction in depressed mothers. The parents were observed in a play-interaction two times during the course of the study (once at the beginning and another time at the end). These video tapes were observed and scored on a variety of dimensions related to infant-mother relationship. The mothers in the massage group experienced greater decreases in depression levels than the mothers in the support only group. This seems to indicate a benefit for the depressed mother who is acting as the "massage therapist" for the infant. This study had several limitations though. Due to drop-out, the sample size was small. Also, during massage class, the mothers were instructed on how to read their baby's body language and how to massage their infant; therefore, it cannot be certain whether the decrease in depression can be attributed to the body-language instruction or the massage instruction.

Field, et al. (2004) explored the effects of moderate and light pressure massage on infant development during the first month of life. Mothers were first instructed on how to massage their infant with moderate pressure or light pressure. These mothers would then take these techniques home and massage their infant every night before bedtime. The infant's weight and length were measured before and after massage therapy. The Brazelton Neonatal Behavior Assessment Scale (BNBAS) was given to infants to assess their neurological reflex development. Also, their sleep-wake behavior was observed. Infants in the moderate-pressure massage group were increasingly alert while the infants in the light-pressure massage group were more excitable, agitated, and fussy. The moderate-pressure infants exhibited a greater weight gain and greater increase in body length. Moderate-pressure massage therapy seems to be an effective method to enhance weight gain and development in infants.

Massage of infants born to depressed mothers show that the massaged babies spent more time in active awke states, cried less and had lower stress levels. In contrast the rocked babies would often fall asleep during the rocking but would wake up when put to bed. These findings suggested that massage may be effective in inducing sleep.

Review study by **Field et al** also shows that just 5 days of massage causes 53 %greater daily weight gain and slept less in contrast to 10 days of massage in previous studies.

RCT by **Agrawal et al** showed that massage improved the post massage sleep the maximum being 1.62 hr. in the sesame oil group ($p<0.001>$). However the duration of sleep and the number of naps did not show any difference.

In the present study there is a significant increase in weight in the neonates massaged with oil but significant with respect is to those than not massaged at all. Adverse effects due to the massage were also looked for but none so happened. There were 22 drop out's during the period of study who did not respond to repeated

reminders of follow-up. 3 children developed features of late onset septicemia (poor feed acceptance, lethargy, abnormal tone and reflexes) and were admitted in the N.I.C.U. and thus consequently omitted from study. 1 child was later found to be having congenital anomalies (V.S.D., low set ears and epicanthus) and was thus also omitted from study.

Even the neonates in group 1 (in whom the technique of massage was advised) are seen to have good gain in weight. This can also be expected because infant massage being such a common household practice in our community, most of these families also couldn't be prevented from adopting it (ethical grounds also involved).

Since majority of the cases were belonging to rural community the possibility of use of oil during massage cannot be excluded, at least partly explaining the good gain in weight.

It is also seen from this (as well as previous studies which have been referenced to) that even without oil, massage alone is good enough to help in weight gain (and possibly in other anthropometric variables) due to a variety of mechanisms already discussed in otherwise healthy low birth weight and very low birth weight babies.

CONCLUSION

It may thus be concluded that the practice of oil massage per se has a good effect on weight gain in neonates. The type of oil does not have much bearing on the final weight at least as observed within the scope of this study.

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