Original Article

The beneficial effects of infant's massage on jaundiced neonates receiving phototherapy

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Abstract:

Aim: To determine the effects of infant massage on newborns with jaundice who are on phototherapy. **Methodology:** We randomly assigned newborns(full-term) with jaundice to either a control group or a massage group while they were admitted for phototherapy. The medical data, including total feeding volume, weight, frequency of bowel movements, and level of bilirubin, was gathered and compared between two groups. **Results:** There were 25 neonates in the control group and 25 neonates in the test group. In comparison to the control group on the third day, the massage group showed significantly higher defecation frequency and significantly reduced bilirubin levels. There were no statistically significant differences in the two groups between body weights or food intake. **Conclusion:** The massaging of infant reduces bilirubin level and increases the frequency of faeces while they are receiving phototherapy for jaundice

Key words: Jaundice, Phototherapy, Bilirubin level, Massage.

Introduction:

The massage of newborn is a ritual that is widespread in India and many other nations. Babies are massaged shortly after birth. It has been documented in several studies that massaging of newborn increases weight, aids in growth and functioning of autonomic nervous system, as well as reduces colic and mortality rates.[1-6] Additionally, massage treatment helps lessen baby tension and foster strong emotional ties between parents and infants.[7,8] Increased serum bilirubin causes jaundice, which results in yellowish discolouring of skin and sclerae.[9] An excessive amount of hyperbilirubinemia might harm the brain permanently. Up to 60% of healthy newborns experience jaundice, which accounts for 75% of hospital admissions in the first week following birth.[10] The neonate liver is unable to remove bilirubin from the blood and this causes Unconjugated hyperbilirubinemia, which is the frequent form of jaundice. [10] Although it should be monitored, this type of jaundice, also known as physiological jaundice, is normally innocuous and is not likely to need treatment. However, some newborns experience abnormal or excessive physiological jaundice. To lessen the danger of developing acute bilirubin encephalopathy or kernicterus, phototherapy should be initiated for these cases or else they sometimes even require transfusions.[10,11]

Previous studies have documented that newborn massage reduces neonates' hyperbilirubinemia-related bilirubin levels and alleviates newborn jaundice. [12,13] According to a study, babies who completed total gestational period and received massage the, rapy had considerably reduced levels of transcutaneous and serum total bilirubin than those who did not.[12] Another study indicated that mean bilirubin levels could be significantly reduced in full-term infants by the fourth day of massage therapy, compared with infants not treated with massage. [13] Despite the fact that earlier clinical studies support the use of massage for reducing neonatal jaundice, the apparent correlation has not been extensively examined among neonates with jaundice who are receiving phototherapy.[14]

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We therefore sought to assess the impact of baby massage on newborns undergoing phototherapy for jaundice.

Methodology:

Healthy neonates (from birth to 5 days of age) receiving phototherapy for jaundice (bilirubin level greater than 15 mg/dL) were involved

Inclusion criteria

- Full term gestational neonates
- 2500–3600 g weightage infants
- Those with APGAR score 8-10
- Those receiving phototherapy for hyperbilirubinemia.

Exclusion criteria

- Rhesus and ABO incompatibility infants
- Those presenting with congenital anomalies,
- Infections
- A deficiency of glucose - 6 - phosphate dehydrogenase
- Gastrointestinal obstruction
- Biliary atresia

After taking institutional ethical committee approval, informed consent was taken from the parents of neonates and a detailed case history was recorded. The participants were divided into a control group or a massage group by non-blinded and simple randomization. After recording basic demographic data, total amount fed, body weight and frequency of defecation; and serum bilirubin level were also recorded

Data were collected from the initial to the third day of hospitalisation using the mothers' parenthood notebooks and nursing records, as well as evaluations of the infants' overall meal size, weight, and frequency of bowel movements. Bilirubin was measured using a microassay, which provides a rapid, dependable, simple, and precise estimation of both total and direct bilirubin.[14] The primary result was the end of phototherapy, and the secondary result was the patient's release following the end of the course of treatment.

Massage procedure

All enrolled infants in the intervention group got massage treatment from licenced therapists. Neonates in the control group did not receive massage therapy. Each massage treatment session, which was performed twice daily (between meals) for three days, began on the first day of phototherapy. There were three 15-to-20-minute sessions. Phototherapy was stopped for the 15 to 20 minutes when the babies received massage therapy.

The massage techniques approved by the International Association of Infant Massage (IAIM) were employed. The researcher thoroughly washed their hands, used massage oil (sweet almond oil, AEOMA, England), and then performed a skin test before starting the first massage therapy treatment. On the neonates inside wrist, we placed sweet almond oil for the skin test. We checked the skin for signs of an allergic reaction, such as redness, a rash, or other symptoms, after 30 minutes had passed.

In the massage group, none of the infants had any adverse effects or allergic reactions to the sweet almond oil. After the exam, we started massaging the leg and foot before moving on to the hands, abdomen, and back while using one hand to adjust the foot as we went. The same researcher massaged all of the infants taking part in the study, and the temperature in the room was regulated between 26 °C and 28 °C.

Phototherapy

Normal discharge times for healthy, full-term newborns were three days. When newborn jaundice was discovered, phototherapy was provided in the nursery and used there. If phototherapy was not available in the nursery, however, neonates with jaundice were discharged and sent to another hospital for extra care.

A halogen light was used to provide phototherapy at a distance of 45–60 cm from the newborn in accordance with the luminance. The baby's clothing was kept to a minimum in order to expose as little of the neonate's skin surface to the therapeutic light as feasible. But to prevent harm, the neonate's eyes and genitalia were covered. When the bilirubin level fell to less than 10 mg/dL, phototherapy was terminated.

Statistical analyses

IBM SPSS for Windows, Version 19.0 was used to analyse the data. Using Student's t-tests, the infants' food intake, body weight, bowel movement frequency, and the serum bilirubin levels were compared between the test and control groups. The distributions of the relevant parameters were examined using the Kolmogorov-Smirnov test, and it was found that they were all normally distributed. A chi-square test was used to compare the demographic information of babies in the test and control groups. Results were presented as mean standard deviation, and a p value of 0.05 was used to determine their significance.

Results:

In the control group we had 25 neonates (15 males and 10 females) and in the massage we had 25 neonates with jaundice (12 males and 18 females). In terms of feeding method, gestational age at birth, birth weight, weight on the date of admission, length of phototherapy, or physical weight loss, we found no statistically significant differences between the two groups.(Table 1)

Table 2: Feeding consumption between test and control groups

Parameter(ml)	Test (massage) group Mean ± SD	Control group Mean ± SD	t value	p value
Feeding amount on day 1	328.8 ± 113.2	334.3 ± 119.0	0.10	0.89
Feeding amount on day 2	510.6 ± 89.4	476.3 ± 99.0	0.23	0.79
Feeding amount on day 3	567.5 ± 77.4	518.9 ± 105.8	0.1	0.89

Total feeding amount: The food intake of all the neonates rose while they were in the hospital. On the second and third days of hospitalisation, food consumption was significantly higher in both groups than it was on the first day ($p < 0.001$). There was no significant difference noticed between the groups during hospitalization. (Table 2)

Table 1: Demographic variables

Variable	Item	Massage group	Control group	p value
Gender	Male	12 (48%)	15 (60%)	0.37
	Female	18 (72%)	10 (40%)	
Feeding method	Breast feeding	5 (20%)	5 920%)	0.81
	Infant formula	2 (8%)	3 (12%)	
	Mixed	18 (72%)	17 (68%)	
Hematoma	Yes	3 (12%)	2 (8%)	0.32
	No	22 (88%)	23 (92%)	
Mode of delivery	Vaginal	23 (92%)	24 (96%)	0.48
	Caesarean	2 (8%)	1 (4%)	
Gestational age (weeks)		38.74 ± 0.8	39.1 ± 0.9	0.39
Age		114 ± 49	117 ± 34	0.56
Height		52.9 ± 1.4	50.9 ± 1.6	0.91
Weight at birth		3049.3 ± 213.3	3176.5 ± 278.6	0.17
Weight on admission		2767.9 ± 267.8	3004.2 ± 2978.0	0.18
Physiologic weight loss		178.4 ± 101.3	178.2 ± 114.5	0.77
Percentage of physiologic weight loss (%)		5.8 ± 3.2	5.3 ± 3.4	0.35
Phototherapy duration (hours)		61.7 ± 14.6	68.4 ± 25.3	0.67
Serum bilirubin level on day 1		14.4 ± 1.3	16.1 ± 1.4	0.21
Serum bilirubin level on day 2		13.1 ± 1.1	13.5 ± 1.7	0.37
Serum bilirubin level on day 3		11.0 ± 1.1	11.8 ± 2.0	0.73
Serum bilirubin level at the end of phototherapy		9.4 ± 1.3	10.1 ± 1.8	0.16
Rebound serum bilirubin level		10.1 ± 2.4	10.6 ± 1.1	0.53
Hospital stays (hours)		78.5 ± 14.0	87.8 ± 24.0	0.07

Body weight: All newborns gained weight while in the hospital, with the third day of hospitalisation having a substantially higher body weight than the first ($p = 0.03$). The groups did not, however, significantly differ from one another. (Table 3)

Table 3: Body weight between the test and control group

Parameter (gms)	Test (massage) group Mean ± SD	Control group Mean ± SD	t value	p value
Body weight on day 1	2,788.9 ± 261.8	3,108.3 ± 318.0	-1.51	0.11
Body weight on day 2	2,967.4 ± 257.8	3,078.4 ± 313.0	-1.62	0.12
Body weight on day 3	3,087.7 ± 276.6	3,174.7 ± 352.2	-1.60	0.12

Defecation frequency: For all newborns, the frequency of defecation increased significantly while they were in the hospital ($p < 0.001$). On the first and second days of hospitalisation, there was no significant difference in the frequency of defecation between the control and massage groups; however, on the third day ($p = 0.04$), it was considerably greater in the massage group. (Table 4)

Table 4: Frequency of defecation between the test and control groups

Parameter	Test (massage) group Mean ± SD	Control group Mean ± SD	t value	P value
Frequency of defecation on day 1	3.3 ± 1.5	3.2 ± 2.1	0.1	0.93
Frequency of defecation on day 2	5.1 ± 1.3	4.4 ± 1.7	1.69	0.97
Frequency of defecation on day 3	4.5 ± 1.4	3.4 ± 1.7	2.03	0.03

Serum bilirubin level: For all infants who participated, the serum bilirubin level significantly dropped while they were in the hospital ($p < 0.001$). However, while comparing the serum bilirubin levels between the two groups, we removed infants who had intravenous infusions since they can promote bilirubin excretion and hence lower serum bilirubin levels. (Table 5)

Table 5: Neonatal serum bilirubin level without intravenous hydration

Parameter (mg/dL)	Test group Mean ± SD	Control group Mean ± SD	t value	p value
Serum bilirubin level on day 1	13.9± 0.7	14.5 ± 1.2	**-1.33**	**0.18**
Serum bilirubin level on day 2	12.1 ± 1.5	13.9± 0.8	**-1.34**	**0.17**
Serum bilirubin level on day 3	10.5 ± 0.8	13.1 ± 1.6	**-2.5**	**0.04**

Discussion:

According to our research, there was no appreciable difference in body weight between the test and control groups. This outcome is in line with a few results from earlier investigations.[15-17] After 4 weeks of treatment, Lee was unable to find any discernible changes increase of weight between infants who got massage and newborns in the control group. [18] But according to new research, preterm infants who undergo moderate-pressure massage for a period of 10 minutes, thrice daily for five days can gain more weight. [19]

The massaging of infant results in increased body weight and height after 2 and 14 weeks when compared to control group as reported by Serrano et al[20] and Yilmaz et al[21] also demonstrated that massaging of infants increases weight significantly more than control infants at 2 months of age.

Preterm newborns that received massage therapy for five days had larger gains in weight, insulin levels, and insulin-like growth factor-1 (IGF-1) levels, according to research by Field et al16. According to the authors of the latter study, weight gain after massage may have resulted from an elevation in insulin/IGF-1 levels or vagal activity, which may have reduced stress and motility of stomach and improved food absorption. [16]

The young age of our study participants (average age: 4.8 2.3 days in the massage group; 4.3 1.6 days in the control group) may have prevented a significant rise in body weight gain following massage. Additionally, it's likely that the massage therapy's brief duration made it unable to boost IGF-1 and insulin release.

According to the results of past studies, the defecation frequency was significantly greater in the massage group of this study on the third day of massage therapy than it was in the control group. In the Seyyed Rasooli et al. trial, infants receiving massage therapy experienced considerably more accidents by the fourth day of treatment than those in the control group.[22] Additionally, in Chen et al. trial[12], the mean defecation frequency of the massage group was significantly higher than that of the control group throughout the first two days of therapy. However, neither of these study populations included neonates receiving phototherapy for jaundice.

The majority of neonates initially pass faeces within 24 hours of delivery, despite the fact that massage therapy can promote the passing of meconium. [12] We observed a significantly higher frequency of defecation in the massage group by the third day of treatment, which may be related to this.

A neonate's enterohepatic circulation of bilirubin may be expected to be reduced by more frequent bowel movements, which would increase bilirubin excretion. [23] It has been demonstrated that massage therapy encourages bowel motions and meconium excretion. [22]

According to a previous study[24], early intravenous feeding may lessen baby jaundice by speeding bilirubin metabolism and urine clearance. Therefore, we did not include the neonates getting intravenous hydration when comparing the bilirubin levels between the massage and control groups. In our study, the neonates in the massage group had bilirubin levels that were significantly lower than those in the control group on the third day of massage therapy. This result is consistent with that of Chen et al.'s study, which revealed that bilirubin levels in the massage group were significantly lower than those in the control group on the fourth day of treatment for full-term babies with jaundice[12]. In addition, Moghadam et al. indicated that the mean bilirubin level of infants with jaundice in the massage group significantly decreased on the fourth day compared with the control group.[13]

Contrary to these assertions, a study[22] reported that transcutaneous bilirubin levels in healthy, full-term babies did not significantly change between the massage and control groups after 4 days of therapy. Variations in the massage technique and the lack of hyperbilirubinemia in their newborns may account for this variance. Early bilirubin levels that are decreased as a result of massage therapy may enable early release and shorter phototherapy sessions.

The most likely mechanism underlying the decline in neonatal jaundice in the massage therapy group is the stimulation of intestinal motility. As a result, the infant will pass more bilirubin-containing meconium and have more frequent feces.[12] This is consistent with the findings of Gourley et al., who discovered a link between blood bilirubin levels and stool output in healthy term neonates during the first week of life.[25] On the third day of therapy in our study, the defecation frequency was considerably higher in the massage group than in the control group. Therefore, increased defecation may account for the profound drop in bilirubin levels seen in the massage group.

The vagus nerve is also stimulated by massage therapy, which increases stool frequency and decreases bilirubin's enterohepatic circulation, increasing bilirubin excretion.[22] Physiological massage therapy can also promote the flow of blood, lymph, and tissue fluid in subcutaneous tissue, which enhances the absorption and excretion of wastes such bilirubin.[12]

Conclusion:

This study shows that neonates getting phototherapy for jaundice had a considerably higher frequency of defecation than the control group, which had not undergone massage therapy, after the third day of the intervention. The serum bilirubin levels in the massage group were also significantly lower on the third day, albeit this was only observed in those who did not receive intravenous hydration. A low-risk, cost-effective approach, massage therapy can promote mother-child interaction and connection.

References:

1. Smith SL, Lux R, Haley S, Slater H, Beachy J, Moyer-Mileur LJ. The effect of massage on heart rate variability in preterm infants. J Perinatol. 2013;33:59–64.
2. Kulkarni A, Kaushik JS, Gupta P, Sharma H, Agrawal RK. Massage and touch therapy in neonates: the current evidence. Indian Pediatr. 2010;47:771–6.
3. Field T. Massage therapy. Med Clin North Am. 2002;86:163–71.
4. Field T, Diego M, Hernandez-Reif M. Preterm infant massage therapy research: a review. Infant Behav Dev. 2010;33:115–24.
5. Moyer-Mileur LJ, Haley S, Slater H, Beachy J, Smith SL. Massage improves growth quality by decreasing body fat deposition in male preterm infants. J Pediatr. 2013;162:490–5.
6. Jane SW, Chen SL, Wilkie DJ, Lin YC, Foreman SW, Beaton RD, et al. Effects of massage on pain, mood status, relaxation, and sleep in Taiwanese patients with metastatic bone pain: a randomized clinical trial. Pain. 2011; 152:2432–42.

7. Bakermans-Kranenburg MJ, van IJzendoorn MH, Juffer F. Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. Psychol Bull. 2003;129:195–215.
8. Hernandez-Reif M, Diego M, Field T. Preterm infants sow reduced stress behaviors and activity after 5 days of massage therapy. Infant Behav. 2007; 30:557–61.
9. American Academy of pediatrics. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics. 2004;114:297–316.
10. Maisels MJ, McDonagh AF. Phototherapy for Neonatal Jaundice. N Engl J Med. 2008;358:2524–525.
11. Kaplan M, Bromiker R, Hammerman C. Severe neonatal hyperbilirubinemia and kernicterus: are these still problems in the third millennium? Neonatology. 2011;100:354–62.
12. Chen J, Sadakata M, Ishida M, Sekizuka N, Sayama M. Baby massage ameliorates neonatal jaundice in full-term newborn infants. Tohoku J Exp Med. 2011;223:97–102.
13. Moghadam MB, Moghadam KB, Kianmehr M, Jomezadeh A, Davoudi F. Effects of massage on weight gain and jaundice in term neonates with hyperbilirubinemia. J Isfahan Med. 2012;30:1–8.
14. Aman A, Ul Qader SA, Bano S. Estimation of total and direct serum bilirubin using modified micro assay method. Ital J Biochem. 2007;56:171–5.
15. Diego MA, Field T, Hernandez-Reif M. Vagal activity, gastric motility, and weight gain in massaged preterm neonates. J Pediatr. 2005;147:50–5.
16. Field T, Diego M, Hernandez-Reif M, Dieter JN, Kumar AM, Schanberg S, et al. Insulin and insulin-like growth factor-1 increased in preterm neonates following massage therapy. J Dev Behav Pediatr. 2008;29:463–6.
17. Massaro AN, Hammad TA, Jazzo B, Aly H. Massage with kinesthetic stimulation improves weight gain in preterm infants. J Perinatol. 2009;29:352–57.
18. Lee HK. The effects of infant massage on weight, height, and mother-infant interaction. Taehan Kanho Hakhoe Chi. 2006;36:1331–9.
19. Diego MA, Field T, Hernandez-Reif M. Preterm infant weight gain is increased by massage therapy and exercise via different underlying mechanisms. Early Hum Dev. 2014;90:137–40.
20. Serrano MS, Doren FM, Wilson L. Teaching Chilean mothers to massage their full-term infants: effects on maternal breast-feeding and infant weight gain at age 2 and 4 months. J Perinat Neonatal Nurs. 2010;24:172–81.
21. Yılmaz HB, Conk Z. The effect of massage by mothers on growth in healthy full term infants. IJHS. 2009;6:969–77.
22. Seyyed Rasooli A, Valizadeh L, Hosseini MB, Asgari Jafarabadi M, Mohammadzad M. Effect of vimala massage on physiological jaundice in infants: a randomized controlled trial. J Caring Sci. 2014;3:165–73.
23. Semmekrot BA, de Vries MC, Gerrits GP, van Wieringen PM. Optimal breastfeeding to prevent hyperbilirubinaemia in healthy, term newborn. Ned Tijdschr Geneeskd. 2004;148:2016–19.
24. Makay B, Duman N, Ozer E, Kumral A, Yeşilirmak D, Ozkan H. Randomized, controlled trial of early intravenous nutrition for prevention of neonatal jaundice in term and near-term neonates. J Pediatr Gastroenterol Nutr. 2007;44:354–8.
25. Courley GR, Kreamer B, Arend R. The effect of diet on feces and jaundice during the first 3 weeks of life. Gastroenterology. 1992;103:660–67.