



Effect of Vimala Massage on Physiological Jaundice in Infants: A Randomized Controlled Trial

Alehe Seyyedrasooli¹, Leila Valizadeh², Mohammad Bager Hosseini³, Mohammad Asgari Jafarabadi⁴, Masoome Mohammadzad^{5*}

¹Department of Medical-Surgical Nursing, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran

²Department of Pediatric Nursing, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran

³Department of Pediatrics, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran ⁴Department of Statistic and Epidemiology, Faculty of Health, Tabriz University of Medical Sciences, Tabriz, Iran

⁵Department of Statistic and Epidemiology, Faculty of Health, Fabriz University of Medical Sciences, Fabriz, Iran ⁵Department of Pediatric Nursing, Faculty of Nursing and Midwifery, Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

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ABSTRACT

Introduction: Considering the prevalence of Jaundice in newborn infants and the risk of developing acute Bilirubin encephalopathy, in early weeks after birth. the importance of Infancy, as well as positive effects of giving massage on physical and behavioral growth and evolution of infants, the current study has been aimed to investigate the effects of Vimala massage on neonatal physiological Jaundice.

Methods: This is a single blind clinical trial study, 43 healthy term infants, with 1st day Bilirubin levels of less than 5mg/dl, carried out in Tabriz Al-Zahra hospital. Newborns were selected through convenience sampling and then randomly assigned to intervention and control groups. Control group received routine care, while newborns of intervention group received four days of Vimala massage starting from the first day of their birth. Main variables of study include transcutaneous Bilirubin and frequency of defecation. Collected data were analyzed by SPSS Ver.13 through Chi-square and Mann–Whitney tests.

Results: There were no statistical significant differences between two groups for skin bilirubin, however the number of defecations in the intervention group exceeded than of control group, and was statistically significant.

Conclusion: The Results show that Vimala massage within four days has no effect on increasing process of bilirubin, yet can affect the incidence rate of physiological Jaundice and care of infants by increasing defecation frequency.

Introduction

Sense of touch is developed in the fetus just before the 34th week. Nature begins massaging of fetus in the uterus prior to the birth. Initially the fetus moves and floats in the uterus environment, and as time passes, the ambient hold it tighter adding to its endearment, and gradually convert to contractions which induce pressure and stimulation of its skin and other body organs.

As soon as the birth, newborn feels the need for the tactile stimulation and sequential movements which has become used to.¹ Emotional relation between a

mother and her newborn formed during pregnancy, further promotes with eye contact, smelling and mother-infant touch after the birth. The quality of this parentinfant relation has a significant effect on mental, social and emotional well-being of both mother and infant. In fact, this early connection between the mother and newborn leaves long-term effects on the growth and development of infant.²

The study of Al-windi showed that massage is one of the complementary traditional medicines, being practiced by the majority of people.³ As one of the oldest complementary therapies with its 2000 years

* Corresponding Author: Masoome Mohammadzad (MSc), E-mail: mohammadzad.m@gmail.com. This research is registered in the Iranian Registry of Clinical Trials with the IRCT201204116918N8 code.

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of history, massage is using for preserving well-being or accelerating recovery process.

In fact there are two approaches for having massage: either to retain health or to speedup recovery and relief of symptoms of diseases. Study of Field⁴ have proved the extraordinary effects of massage on the growth and development of newborns.

According to the investigations of Diego et al., massage is effective on increasing bowel movements in newborns.5 Many studies have been done on the effects of massotherapy, including Jump et al. study, about effect of massage on mother-infant attachment, axelin et al., about the effects of massage in reducing stresses arising from painful procedures, Field's study about the effects of massage in reducing teething pain, constipation and colic, and Chen's study concerning the effect of massage on Jaundice in newborn infants, in most massage techniques, frictional and stretching actions are employed.6 However, there's no unique guideline for newborn massage. Among different techniques of massage Indian, Chinese, Japanese and Swedish massages can be noted. Vimala Schneider McClure the founder of the International Association of Infant Massage, combined Indian and Swedish massages, and invented a massage for infants, which was simpler and could be done by parents and amateurs. This massage is performed on term infants from head to toe and from center to periphery.7 Considering the importance of infancy and its role on the health of toddlers in the years to come, nurses aid to the mental and physical growth and development of infants, by providing developmental care through noninvasive methods such as infant massage and by parents education.

Physiological Jaundice is noticed in 60% of the infants, during 1st week after the birth.⁸

The most common reason for the infant hospitalizations is sever Jaundice.⁹ A large amount of bilirubin is found in meconium.

Meconium contains about 1mg/dl of bilirubin, indicating appreciable activities of

fetal hepatic bilirubin conjugation. Bilirubin is excreted primarily through bowel. Hence, bilirubin reabsorption in intestine decreases right after the first defecation. The short life cycle of the RBC, increase in bilirubin production and bilirubin reabsorption in the liver, are the factors causing Jaundice.

Insufficient intake of liquids and calorie, considerable weight loss, delayed defecation, dispose infants to high risks of Jaundice.

Massage can probably be helpful in lowering the occurrence rate of Jaundice. ¹⁰

Doreen et al., have shown in 2011 that abdominal massage in patients suffering from MS (Multiple Sclerosis) has positive effects in reducing constipation as well as increasing bowel movements.¹¹ Few studies are carried out on whether massage can decrease infant Jaundice or not. In fact referring to the well-organized review paper of Anderdown et al., between 1970 and 2005, on the effects of massage on mental and physical growth of newborns below six months of age, just two out of the mentioned 23 studies were focused on the effect of massage on infant Jaundice.¹²

In other recently published studies, such as those reports from countries like China concerning the influence of massage on infant Jaundice,^{13,14} the utilized method of massage is either not explicitly mentioned or a modified form of Field's technique is to massage, and it is not clear if Vimala massage can be effective in treating physiological infant Jaundice. Therefore, considering the high incidences of infant re-hospitalizations due to Jaundice, and taking into account nurses' role in providing noninvasive care services, has taken us to investigate the effect of Vimala massage method on physiological Jaundice of newborns.

Materials and methods

This is a single blind randomized and controlled clinical trial study, carried out in Tabriz Al-Zahra teaching hospital during 6 months from September 2013 up to February 2014. The study population consists of healthy term newborns weighting 2500-4000 gr, delivered in Tabriz Al-Zahra hospital.

Study inclusion criteria includes: first day skin bilirubin level less than 5mg/dl, breastfed, unprohibited to massage (for example: edema, tissue damages, skin infections and skin rashes). Infants receiving bilirubin reducers and which required phototherapy for their increased levels of bilirubin, were excluded. To determine the sample size, initial data including mean and standard deviation of the main variable of the study (skin bilirubin level) was gathered based on a pilot study and five infants at each different groups measured at different times.

Consequently, and by considering the confidence level of 95%, power test at 80%, the minimum sample size was evaluated as 10, using Gpower software package (test Repeated Measure between factors, ANOVA, statistical test, Family=f test). Also by considering a 40% sample attrition, minimum sample size was raised to 14 infants per group, and sampling further continued until reaching 26 sample for intervention group and 28 samples for control group (taking into account the probability of starting phototherapy), to ensure achieving results.

Right after delivery, the newborns were transferred to caesarean and midwifery department of Tabriz Al-Zahra teaching hospital, and by successfully passing an initial eligibility, were selected through convenience sampling. As a following step, subjects were allocated to either of control and intervention groups, using size-2 random blocks and based on a 1:1 allocation ratio. Corresponding random numbers were generated using "Random Software Allocation" software. (Figur1)

After applying for and receiving the required ethical approval (code 9163) from the ethics committee of Tabriz University of Medical Sciences, and registering by Iranian Registry of Clinical Trials and in coordination with the authorities at Tabriz Al-Zahra educational hospital, during the first meeting, the study purpose were thoroughly explained to the mothers in both groups, informed them about breastfeeding and Jaundice and finally collected the signed informed consent. The infants of control group would receive routine care (cord care, audiometry, vaccination,...). Intervention group infants, in addition to the normal routine care, received a four days moderate pressure massage using nerbal, three sessions a day, 15 minutes per each session, performed based on Vimala massege.⁷

Infants were massaged by the researcher staring from the first day until the discharge, while the mother was also present and each time were practically trained face-to-face to learn the massage procedure. Mothers were subsequently asked to perform massage on their babies themselves, and their performance was evaluated for correct implementation of Vimala massege.

Pamphlet and educational compact disks were also presented to the mothers to further help them to perform correct massages at home. After discharge, all infants would receive massage at home until their 4th day of birth. Massage was performed in a warm room, and after washing and warming of hands.

Massage was carried out in two phases. During the first phase, infant was put in supine position and massaged in the follow order: 1- face: from the center of forehead to the sides of face. Locations in front of ears and jaw were then massaged in a rotary scheme. 2- Chest: Center of the chest to the sides, across ribs. 3- Arms and hands: from shoulder to wrist, and from wrist to the fingers via rotating movements (Indian milking) in both hands. 4- Abdomen: ('I love you" method). Massage is performed starting from left-upper abdomen location right under the ribs downwards, then starting from right-upper abdomen exactly beneath the ribs to its opposite point, then down, and starting from right side under abdomen upward and continuously following the previous procedures. 5- Feet: from thighs to the knees to the legs (Indian milking) in both feet. During the second phase, infant was put in prone position, and neck to the waist and vice versa was massaged with both hands in positioned in tangential position to his/her back, with movements in opposite directions.

The primary outcomes of infant bilirubin study (Transcutaneous Billirubin=TCB), were meconium frequencies and the timing of first meconium excretion. Every morning of these four days, the skin bilirubin of infants in both groups were measured during 9-10 AM by the researcher using KJ-8000 Jaundice meter (China). Until discharge, the skin bilirubin would be measured in the caesarean and midwifery department of Tabriz Al-Zahra teaching hospital, after which parents would take them to hospital every morning during 9-10AM for bilirubin check, until the fourth day of birth. The accuracy of transcutaneous bilirubin meter instrument had been approved by testing serum bilirubin during stages.15 earlier The instrument was calibrated based on factory regulations. The first TCB test was made before the first day's massage. To ensure regular massages, and recording of defecation frequency and the first meconium excretion time, a note sheet was handed to mothers to write down the requested details every day and to report them back during follow up by phone. The defecation frequency in first day and first meconium excretion time (as reported by mothers) and daily TCB levels were recorded in the specific data collection sheets. To achieve scientific validity, the method of content validity was employed and data collection tools were validated based on comments from 10 members of faculty academic board. In this study, blinding was achieved by having the co-researcher who was unaware of massage technique of the intervention group, to control infants for Billy-check, and thus blind to the goals of study. From among 54 eligible infants, 28 subjects were allocated to the control group and 26 to the intervention group. Figure 1 illustrates the selection scheme and status of

the infants participating in the study. Data was summarized for quantitative variables by mean (standard deviation) and median (percentile 25-75), and for qualitative variable by frequency (percent).¹⁶ Chi-Square test was also utilized to compare qualitative variables between intervention and control groups, whereas the Mann-Whitney test was employed for non-normal qualitative variables. Data analysis was performed using IBM SPSS software package (SPSS Statistics 13, IL. Chicago, USA) at P<0.05 significance level.

Results

Data from 43 healthy term newborns was eventually analyzed. Five infants from intervention group discharged from hospital at the second day, and 13 on the third day, and massage continued at home by their mother until the 4th day of birth. No significant difference existed among two groups with respect to sex, birth order, birth weight, mother's age, and mother's blood group. Two groups were therefore considered homogeneous. Demographic features of the studied infants of intervention and control groups are listed in Table 1.

Regarding TCB levels from 1st to the 4th day, no significant difference was noticed (P>0.05). Table 2 sorts the results of comparing TCB levels of the infants, according to the intervention days, in two intervention and control groups. There was a significant difference between two groups with respect to the defecation frequency on the 4th day (P=0.015), that is the frequency of defecation in the intervention group was higher. In Table 3, results of comparing defecation frequencies are sorted against intervention days in two groups.

Discussion

Findings of this study, revealed no significant statistical difference between two groups for transcutaneous bilirubin levels. Results of Effect of massage on physiological jaundice in infants



Figure 1. Flow chart of the study

	Table 1. Subject	characteristics	of cases	that	completed	the	trial
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Variables	Control(n=25) Mean (SD)	Case(n=18) Mean (SD)	Statistical indicators
Gender [†]			$\chi^2 = 0.567$, df=2, P= 0.753
female	11(44)	11(50)	
male	14(56)	11(50)	
Birth weigth (g)	3488 (317.96)	3336 (448.32)	t=-0.91, $df=41$, $P=0.473$
Gestational age (week)	38.6 (0.868)	38.8 (0.664)	t=0.68, $df=40$, $P=0.587$
Type of delivery [†]			$\chi^2 = 2.69$, df= 2, P= 0.858
C/S	15(60)	15 (68.2)	t=0.81, $df=41$, $P=0.936$
NVD	10 (40)	7 (31.8)	$\chi^2 = 0.567$, df= 2, P= 0.753
Mother age (year)	27.4 (5.8)	27.4 (6.2)	t= 0.81, df= 41, P= 0.936
[†] N (%)	. ,		

Variables	Control (25)	Intervention (18)	P *
Day 1	0.0 (0.0, 0.1)	0.0 (0.0, 1.1)	0.701
Day 2	4.1 (3.1, 5.6)	4.6 (2.9, 5.5)	0.834
Day 3	6.5 (5.8, 7.4)	6.5 (3.2, 7.8)	0.858
Day 4	8.2 (5.4, 10.3)	6.25 (3.0, 9.3)	0.449

Table 2. Comparision of daily measurement of transcutaneous bilirubin (mg/dl)

*All values are median (percentile 25-75). P- Value found by Mann-Whitney test

 Table 3. Comparision of daily defection frequency

Control (25)	Intervention (18)	P*
2 (1, 2)	2.5 (1.7, 3)	0.051
2 (2, 3)	3 (3, 4)	0.022
3 (2, 4)	4 (2.5, 4.5)	0.134
3 (2, 4)	4 (3.25, 5)	0.015
	Control (25) 2 (1, 2) 2 (2, 3) 3 (2, 4) 3 (2, 4)	Control (25)Intervention (18) $2(1, 2)$ $2.5(1.7, 3)$ $2(2, 3)$ $3(3, 4)$ $3(2, 4)$ $4(2.5, 4.5)$ $3(2, 4)$ $4(3.25, 5)$

All values are median (percentile25-75). P- Value found by Mann-Whitney test

this investigation, contradicts with other studies with respect to the effect of massage on infant Jaundice. The study carried out on the term infants by Chen et al.,13 has shown that a 5 days massage of infants using a technique induces modified Field's а significant reduction in increasing process of bilirubin. The study by Wel et al.,¹⁷ on term infants, indicated that Jaundice index from 2nd to 5th days of massage was significantly lower in touch therapy group compared to control group. Investigation reported by Zhang Meng et al.,¹⁸ on term infants, showed that the incidence of hyperbilirubinemia in the massage group was lower than control group, in their study, term infants suffering from hyperbilirubinemia, Basiri M et al.,19 reported that the average bilirubin level in the 4th day of study was significantly lower in the group receiving Field's massage group compared to control. It appears that, the lack of a significant relation between receiving massage and transcutaneous bilirubin level, can be due to utilizing a different method of since, either Field's massage massage, technique was used or the technique was not specified at all. In fact in our review of the existing literature, we could not find any study researching the existing differences caused by various newborn massage techniques. A variety of reasons can be pointed out for the absence of a significant

relation between TCB levels of the two groups, since the study of Field and Diego MA⁵ has indicated that the effects of massage was significantly higher in the infants receiving medium pressure massage compared to the infants receiving low pressure massage.

These reasons may be listed as: Application of a lower pressure massage by mothers despite of receiving a sufficient training, since they find their newborn very delicate.

Mothers being exhausted during several days after delivery. Parent's stress and anxiety caused by the strong earthquake in Azerbaijan region, simultaneously with the sampling stage. It should off course be note that, in studies "massage by mothers" is advised.

The study by Ferber et al.,²⁰ has shown that the weight gain in newborns after 10 days of intervention, was significantly higher in the infants massaged by nurses in contrast to the infants massaged by mothers, whereas both of these massage groups experienced higher weight gains compared to the control group.

Additionally, mothers who performed massage were experiencing less postpregnancy anxiety and depression. An study reported by Badie et al.,²¹ average increase in the weights of infants being massaged by nurses exceeded two groups, although the massaged-by-mother group also witnessed a significant weight gain compared to the control group.

In the current study, defection frequency in the intervention group was significantly higher than control group (P=0.015) in the 4th day of massage, which is in line with the results of Diego et al.,⁵ revealing that Vagal activity and bowel movements in the 5th day of the massaged group significantly increased with respect to the first day in the same group. The review study by Lin¹⁴ carried out in China, indicated that by adding to the bowel movements, massage facilitates the excretion of meconium, and shortens the bilirubin change time and its reabsorption to blood via liver-port system resulting in a lower incidence of hyperbilirubinemia. Meng Zh et al.,¹⁸ also showed that the first time of meconium excretion and color change was shorter in massaged group. The exact logic of why the increase in bowel movements has not ended in a statistically significant reduction of bilirubin level in this study is not known. A possible reason would be that, in our study by increasing of bowel movements achieved in 3rd day of massage, TCB level takes a decreasing trend on the 4th day. Therefore this suggests that, if the measurements of bilirubin had not stopped and continued in the following days, it might be possible to detect bilirubin reduction. The short time of intervention, discharge of infants from the hospital, nonsupervision continuous of massages performed by mothers, and concurrency with the strong earthquake in Azerbaijan region, were among the limitations of this study.

Considering the high incidence of physiological Jaundice in newborns, it is suggested to carry out further research with longer intervention times, longer bilirubin measurement, as well as home visits by nurses to ensure correct massage with adequate pressures to achieve the most significant results.

Conclusion

Although there was no significant difference between two groups with respect to TCB levels, yet based on the comparison of two groups according to the TCB throughout four medians days of intervention (Table 2), the trend of increase in bilirubin was lower in the intervention group in contrast to the control group, most probably due to the increase in stool frequency of the intervention group, which in turn results in an increase of the bilirubin excretion from infants' bowel.

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Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

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