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EFFECT OF MASSAGE ON HEALTH STATUS OF NEONATES WITH HYPERBILIRUBINEMIA

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ABSTRACT

Background

Hyperbilirubinemia affects 60% of term and 80% of preterm infants in the 1st week of life. Massage is a non-invasive therapeutic technique. It does not require any special technology or equipment; can easily be carried out alongside classical medicine and can result in a lowering of treatment costs, shortening of the length of the disease and its side-effects. **The aim** of this study was to assess the effect of massage on the health status of neonates with hyperbilirubinemia.

Methodology

A quasi-experimental design was utilized in this study, a purposeful sample of 64 neonates with hyperbilirubinemia in El Monira Pediatric Hospital of Cairo University admitted to the Neonatal Intensive Care Unit.

Results

Mean of Total Serum Bilirubin (TSB) level in the 2nd, 3rd, and 4th day of the study was decreased among the study group than the control group with statistically significant differences. During 72 hours of admission, more than half of the study group and only six percent of the control group were discharged with a highly statistically significant difference.

Conclusions

Applying massage therapy combined with phototherapy in neonates with hyperbilirubinemia is effective in reducing TSB levels, and hospital stays. Recommendation: apply baby massage as a routine care for full term neonates with hyperbilirubinemia under phototherapy.

KEYWORDS: Health Status, Hyperbilirubinemia, Massage, Neonates

INTRODUCTION

Hyperbilirubinemia is the most common problem in the newborn period requiring hospitalization and medical attention (Alkalay, Breesee and Simmons, 2010). Approximately 60% of all newborns develop some degree of jaundice in the 1st week of life (Bhutani, Stark and Lazzeroni, 2013).

Massage is a non-invasive therapeutic technique. It does not require any special technology or equipment; can easily be carried out alongside classical medicine and can result in a lowering of treatment costs, shortening of the length of the disease and its side-effects. It can also lead to a better emotional relationship – which could have been disturbed by hospitalization –between mother and infant. It has been linked to several benefits, including stimulation of the vagus nerve, increasing gastric fluids, aiding digestion, increasing appetite, increasing blood flow and stimulating of the lymphatic system. It aids in the collection, excretion of waste products from the body, and early defecation stimulation (Click et al. 2013).

Early defecation may decrease entero-hepatic bilirubin circulation, which may translate into decreased rate and severity of neonatal hyperbilirubinemia (Bagshaw and Fox, 2005). Baby massage may improve quality of care provided by the nurses and decrease length of hospital costs.

Operational Definition

Health status was assessed through the level of hyperbilirubinemia, hospital stay, stool frequency, and weight gain.

Significance of the Study

Ministries of Health (MOH) survey done during 2005 in 21 hospitals in 12 governorates. All admissions over 15 months were collected, it was reported that 31.39% of the final diagnosis of hospitalized neonates were having neonatal jaundice in Egyptian governmental NCUs (Fahmy, 2007)

According to health statistics of Neonatal Intensive Care Unit (NICU) at the Cairo University Pediatric Hospital (EL Monira Pediatric Hospital) (2014), number of neonates admitted with hyperbilirubinemia was 624 cases (69.5%) from the 898 total number of admissions.

Aim of the Study

To assess the effect of massage on the health status of neonates with hyperbilirubinemia.

RESEARCH HYPOTHESES

- Applying massage to neonates with hyperbilirubinemia will decrease bilirubin level in the study group than the control group.
- Applying massage to neonates with hyperbilirubinemia will decrease hospital stay duration in the study group than the control group.

SUBJECT AND METHODS

Research Design

A quasi-experimental design was utilized for this study.

Setting

This study was conducted at the Neonatal Intensive Care Unit (NICU) in El Monira Pediatric Hospital of Cairo University.

Sample

A purposeful sample of 64 neonates with hyperbilirubinemia admitted to NICU. Neonates were divided into two equal groups (study & control groups). The determination of the sample size based upon the following sample calculation formula

$$N = \frac{t^2 \times p\,(1-p)}{m^2}$$

$$N = \frac{(1.96)^2 \times 0.69\,(1-0.69)}{0.05^2}$$

N = 32 neonates

Inclusion criteria

- Full term neonates with unconjugated hyperbilirubinemia,
- Bilirubin level above 12 mg/dl,
- Under phototherapy, & not requiring exchange transfusion
- Birth weight ≥ 2.500 kg.

Tool for Data Collection

Neonatal characteristics sheet developed by the researcher included two parts:

- Part I: Personal data of the neonate were included: code, gender, birth weight, mode of delivery, onset and history of hyperbilirubinemia.
- Part II: Medical data: total serum bilirubin level (TSB), hospital stay, stool frequency and daily weight.

Tool Validity and Reliability

Validity

The tool was submitted to a panel of five experts in Pediatric Nursing and Medicine neonatologist to confirm its validity.

Reliability

Reliability of the tools was performed to confirm validity of tool and was calculated statistically. Reliability of the study's tool was done by alpha Cronbach test 0.82.

Pilot Study

The pilot study was done on 10% of the sample size (6 neonates). Neonates who shared in the pilot were included in the study sample.

Ethical Consideration

Acceptance of ethical committee at Faculty of Nursing, Cairo University was gained. The confidentiality of information was assured and the parents had the right to withdraw from the study at any time during the study without any effect on the care provided for their infants.

DATA COLLECTION PROCEDURE

The official permissions were obtained from the Director of the Pediatric Hospital and the Head of Neonatology Unit, up on letters issued from the Faculty of Nursing, Cairo University. A formal written consent was obtained from one of the parents of the neonates who were admitted to the unit and fulfilling the inclusion criteria.

Data were collected between June to November, 2015. The neonates in the study group were received Vimala Massage Technique, "International Association of Infant Massage" (IAIM) (McClure, 2012) by the researcher for 15- 20 minutes twice/ day, 1- 2 hours in the morning shift (11.00 am – 12.00 pm) and midday feed (2.00 – 3.00 pm).

The neonates were following the routine care of the unit. Every morning, TSB, hospital stay, stool frequency, and daily weight were measured as the routine care until discharge up to 7 days for both groups as illustrated in Figure 1& 2.

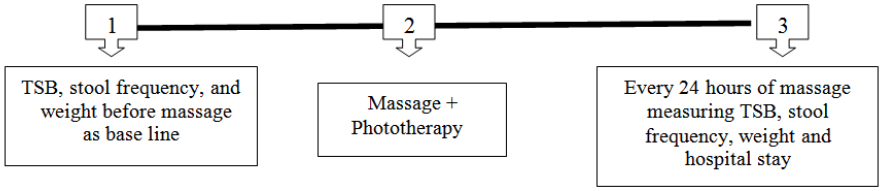

Figure 1: For the Study Group (Massage Group)

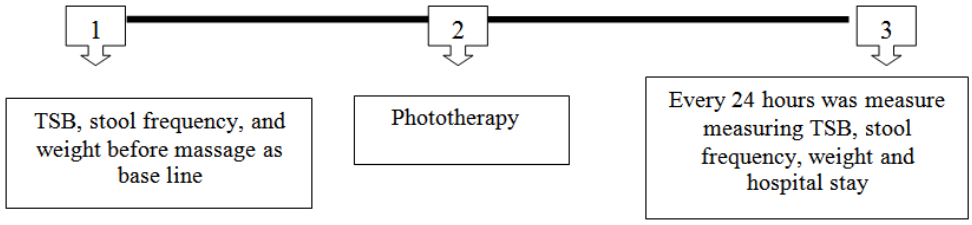

Figure 2: For the Control Group (Routine Care)

STATISTICAL ANALYSIS

Data were summarized, tabulated, and presented using descriptive statistics in the form of frequency distribution, percentages, means and the standard deviations as a measure of dispersion.

A statistical package for the social science (SPSS), version (20) was used for statistical analysis of the data, as it contains the test of significance given in standard statistical books. Numerical data were expressed as mean and SD. Qualitative data were expressed as frequency and percentage. For quantitative data, comparison between two variables was done using student's t-test. Probability (*P*-value) is the degree of significance, less than 0.05 was considered significant.

RESULTS

Table 1 described the characteristics of the neonates participating in this study. It was found that, more than half of neonates of the study group and half of neonates of the control group were males (56.2 %, 50% respectively), the mean birth weight of study and control groups was 3.04 ± .48 Kg & 3.02 ± .43 Kg respectively. 68.8% of the study group compared to 75% of the control group delivered by caesarian section. The mean onset of hyperbilirubinemia in study and control groups was 2.9 ± .56 day & 2.9 ± .49 day respectively. There was no statistically significance differences between study and control groups as regards neonatal characteristics.

Table 2 determinates that, mean of TSB between study and control groups before the study denoted near to equal mean scores related to TSB level between both groups (22.1 ± 1.9 vs 22.5 ± 1.8 respectively). No statistical significant differences between both groups (t = -.841=, p = .404), while the mean TSB level in the 2nd, 3rd, and 4th day of the study was decreased among the study group than the control group (15.9 ± 1.5 vs 18.5 ± 1.9, 11.6 ± 1.2 vs 16.1 ± 2.0 and 9.8 ± .6 vs 13.2 ± 2.2 respectively) with statistical significant differences between both groups (p = .0001 respectively).

Table 3 demonstrated during 72 hours of admission, more than half (56.3%) of the study group compared to only six percent (6.2%) of the control group were discharged with highly statistically significant difference (t = 8.194, p = .000).

Table 4 showed the mean number of stool frequency increased among study group than the control group (5.8 ± .8 vs 4.1 ± .8 and 6.0± 1.0 vs 4.2 ± 1.7 respectively) with statistical significant differences between both groups (p = .0001 respectively) in the 2nd, and 3rdday of the study.

Table 5 illustrated before the study no association was detected between total serum bilirubin level & stool frequency among both groups, while in the 2nd, 3rd, 4th day of the study there was negative significant association among the study group (r = -.388, p = .03*, r = -.399, p = .02* & r = -.495, p = .02* respectively), and no significant association was detected among the control group.

No statistical significant differences between both groups regarding weight gain as observed in table 6

Table 1: Characteristics of the Study & Control Groups as Regards Personal Data of the Neonates (N= 64)

Characteristics of the neonates	Groups				Test	*P*
	Study (n=32)		Control (n=32)			
	No	%	No	%		
Gender						
Male	18	56.2	16	50	χ^2 = .251	.616 NS
Female	14	43.8	16	50		
Birth weight /kilogram						
2.500-	14	43.8	14	43.8	t=.110	.792 NS
3.000-	10	31.2	12	37.5		
3.500- 3.999	8	25	6	18.8		
Mean ± SD	3.04 ± .48 Kg		3.02 ± .43 Kg			
Mode of delivery						
S.V.D	10	31.2	8	25	χ^2= .309	.578 NS
C.S	22	68.8	24	75		
Family history of hyperbilirubinemia						
+ ve	2	6.2	6	18.8	χ^2= 2.286	.131 NS
-ve	30	93.8	26	81.2		
Onset of hyperbilirubinemia / days						
2	6	18.8	6	18.8	t=.472	.686 NS
3	22	68.7	24	75		
4	4	12.5	2	6.2		
Mean ± SD	2.9 ± .56 days		2.9 ± .49 days			

NS= No Significant difference S.V.D = Spontaneous Vaginal Delivery

C.S = Cesarean Section

Table 2: Comparison of Daily Mean and Standard Deviation of Total Serum Bilirubin Between Study &Control Groups

TSB	Groups		*t*	*P*
	Study	*Control*		
	Mean ± SD	Mean ± SD		
Before study	22.1 ± 1.9	22.5 ± 1.8	-.841	.404
2nd day of the study	15.9 ± 1.5	18.5 ± 1.9	-5.8	.0001*
3rd day of the study	11.6 ± 1.2	16.1 ± 2.0	-10.8	.0001*
4th day of the study	9.8 ± .6	13.2 ± 2.2	-7.7	.0001*
5th day of the study	……	11.9 ± 1.9	……	……
6th day of the study	……	11.2 ± 1.2	……	……
7th day of the study	……	10.4 ± .9	……	……

*statistical significance difference

Table 3: Comparison of the Hospital Stay (Hours) Between Study &Control Groups (N= 64)

Hospital Stay / Hours	Groups				*t*	*P*
	Study (N= 32)		Control (N= 32)			
	No	%	No	%		
Length of hospital stay/hours						
48 -	18	56.3	2	6.2	8.194	.000*
72 -	12	37.5	4	12.5		
96 -	2	6.2	10	31.3		
120 -	0	0	12	37.5		
144- 168	0	0	4	12.5		
Mean ± SD	50.98± 1.74 hrs		96.76 ± 2.98 hrs			

*statistical significance difference

Table 4: Comparison of Daily Mean and Standard Deviation of Stool Frequency Between Study &Control Groups

Stool frequency	Groups		*t*	*P*
	Study	*Control*		
	Mean ± SD	Mean ± SD		
Before study	3.5 ± .9	3.0 ± .9	.458	.357
2nd day of the study	5.8 ± .8	4.1 ± .8	8.430	.0001*
3rd day of the study	6.0 ± 1.0	4.2 ± 1.7	8.522	.0001*
4th day of the study	4.2 ± 1.7	4.1 ± .4	.553	.583
5th day of the study	……	3.8 ± .9	……	……
Table 4: Condt.,				
6th day of the study	……	4.0 ± .8	……	……
7th day of the study	……	3.0 ± 1.2	……	……

*statistical significance difference

Table 5: Correlations Between Total Serum Bilirubin Level & Stool Frequency Between Study &Control Groups at Before, 2nd, 3rd, & 4th Day of Study

TSB Level	Stool Frequency			
	Study group		*Control group*	
	r	*P*	r	*P*
Before study	.220	.225	.182	.319
2nd day of the study	-.388	.03*	-.293	.104
3rd day of the study	-.399	.02*	-.311	.217
4th day of the study	-.495	.02*	.393	.197
5th day of the study			.487	.01*
6th day of the study			-.036	.889
7th day of the study			.353	.260

*Correlation is significant at the 0.05 level (2-tailed)

Table 6: Comparison of Daily Mean and Standard Deviation of Weight Gain between Study &Control Groups

Weight Gain	Groups		*t*	*P*
	Study	*Control*		
	Mean ± SD	Mean ± SD		
Before study	3.0 ± .476	3.0 ± .442	.212	.533 NS
2nd day	3.1 ± .472	3.0 ± .441	.186	.548 NS
3rd day	3.0 ± .471	3.0 ± .444	.246	.644 NS
4th day	3.0 ± .485	3.0 ± .434	.377	.455 NS
5th day	……	3.1 ± .437	……	……
6th day	……	3.1 ± .409	……	……
7th day	……	3.1 ± 350	……	……

NS= No Significant difference

DISCUSSIONS

There was no statistically significance differences between study and control groups as regards neonatal characteristics. This confirms that these two groups were homogenous groups during to the study.

Total serum bilirubin level on the 2nd, 3rd, and 4th day was lower among the study group than the control group with statistically significant difference. These results supported by Lin, et al. (2015), Kianmehr, et al. (2014), Basiri-Moghadam, et al. (2012), they found that, bilirubin level of the massage group neonates was significantly lower than that of the control group on the third and four day of massage therapy difference may be due to type of techniques used, time of starting massage techniques and person who did massage (experience).

There was no statistically significant difference in stool frequency (times\24 hours) between both groups before the study. On the 2nd, and 3rdday the stool frequency increased in the study group. Similar results were reached by Basiri-Moghadam, et al. (2015), Chen, et al. (2011), who reported that, the stool frequency increased from day 1- 4 after intervention. The increase in stool frequency in the newborns receiving massage could be due to the stimulation of the vagal nerve which can be caused by a stimulation of the peripheral nerves. The later reduces the re-absorption of conjugated bilirubin that is secreted in the intestines and thus prevents an increase in bilirubin.

Concerning about the potential effect of massage on gaining weight demonstrated no significant difference among the study and control groups. The same findings were reported by Lin, et al. (2015), Basiri-Moghadam, et al. (2012), Serrano, Doren, and Wilson, (2010), Yilmaz and Conk, (2009), and Lee (2006) who showed that, 5 days of massage therapy cannot cause significant differences in weight gain, while Diego, Field and Hernandez- Reif, (2014) and an Egyptian recent study conducted by El Said, et al. (2013), who illustrated that, babies with oil massage had significantly higher weight on day 4 (P = 0.02). These differences may be related to the age of neonates ranged between 4th to 5th day after life. In addition, it is possible that the duration of massage therapy was too short to increase weight gain and normally newborn lose 10% of total weight during 1st week of life.

After 72 hours of admission, more than half of the study group and only 6% of the control group were discharged with highly statistically significant difference in which p – value < .000. This result was in the same line with Zhang, (2012) who evaluated the effect of touching in infants with different degrees of hyperbilirubinemia, who are undergoing phototherapy, who mentioned that, touching together with phototherapy can significantly shorten the length of hospital stay in experimental groups ($P < 0.05$) and Underdown et al. (2006) also, Vickers, et al. (2004) found that, massage reduced the length of hospital stay by 4.5 days.

On 2nd day of the study there was a negative significant association between the study and control groups as regards TSB level and number of stool frequency. This finding supported and explained by Huang (2009) 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 re-absorption to blood via liver-port system resulting in a lower incidence of hyperbilirubinemia. Also, Semmekrot, de Vries, Gerrits, & van Wieringen, (2004) and Gourley, Kreamer, and Arend, (1992) who demonstrated that, there were a negative relationship between stool production and bilirubin levels in healthy term infants during the first 3 weeks of life.

In the light of study results, the researchers concluded that, applying massage therapy combined with phototherapy on neonates with hyperbilirubinemia effective in reducing TSB levels, hospital stay, and increase stool frequency.

RECOMMENDATIONS

Applying baby massage as a routine care for full term neonates with hyperbilirubinemia under phototherapy and evaluate efficacy of Vimala massage on preterm neonates with hyperbilirubinemia.

REFERENCES

1. Alkalay, A. L., Bresee, C. J., and Simmons, C. F. Decreased neonatal jaundice readmission rate after implementing hyperbilirubinemia guidelines and universal screening for bilirubin. *Clinical Pediatrics*. 2010;49(9), 830-833. doi: 10.1177/0009922810363728
2. Bhutani V.K, Stark A.R, and Lazzeroni L.C. Initial Clinical Testing Evaluation and Risk Assessment for Universal Screening for Hyperbilirubinemia Screening Group. Pre discharge screening for severe neonatal hyperbilirubinemia identifies infants who need phototherapy. *J Pediatr*. 2013;162(3):477-482.
3. Click. R., Dahl‐Smith, J., Fowler, L., Du Bose, J., Deneau‐Saxton, M., and Herbert, J. An osteopathic approach to reduction of readmissions for neonatal jaundice. *Osteopath Fam Physician. 2013*; 5:17‐23.
4. Bagshaw, J., and Fox, I. Baby massage for dummies: the wonderful world of massage, *Wiley publishing*; 2005; (1), 7- 17
5. Fahmy,N. (2007). Magnitude of the problem of Neonatal Jaundice among Hospitalized Egyptian Neonates. In Neonatal Hyperbilirubinemia in Egypt Shedding light on Improving Outcomes for an Old problem, An Egypt-US Workshop, CAIRO, EGYPT, March 11- 15

6. McClure V., (2012). International Association of Infant Massage
7. Lin C., Yang H., Cheng C., and Yen C. Effects of infant massage on jaundiced neonates undergoing phototherapy. *Italian Journal of Pediatrics*, BioMed Central. 2015; 41: 94. DOI 10.1186/s13052-015-0202-y
8. Kianmehr M, Moslem A, Basiri Moghadam K, Naghavi M, Pasban- Noghabi S, and Basiri Moghadam M. The effect of massage on serum bilirubin levels in term neonates with hyperbilirubinemia undergoing phototherapy. *NAUTILUS*. 2014; 128: 36-41.
9. Basiri-Moghadam M. B., Basiri-Moghadam K. B., Kianmehr M., Jomezadeh A, and Davoudi F. Effects of massage on weight gain and jaundice in term neonates with hyperbilirubinemia. *J Isfahan Med.2012*; 30:1–8.
10. Basiri-Moghadam M. B., Basiri-Moghadam K. B., Kianmehr M. and Jani S. The effect of massage on neonatal jaundice in stable preterm newborn infants: a randomized controlled trial, *J Pak Med Assoc*, 2015; 602- 606
11. Chen, J., Sadakata, M., and Ishida M. Baby massage ameliorates neonatal jaundice in full-term newborn infants. *Tohoku JExp Med.2011*; 223: 297–102
12. Serrano MS, Doren FM, and 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 Nursing*. 2010; 24:172–81.
13. Yılmaz H.B, and Conk Z. The effect of massage by mothers on growth in healthy full term infants. IJHS. 2009; 6:969–77.
14. Lee H.K. The effects of infant massage on weight, height, and mother-infant interaction. *Taehan Kanho Hakhoe Chi*. 2006; 36:1331–9.
15. Diego MA, Field T, and 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.
16. El Said, W., Rezk, M., Abdel – Hady, H., Ahmed, M., and Ali., M. *Oil Massage in Full Term Infants with Neonatal Hyperbilirubinemia: A Randomized Controlled Trial*, Master thesis, Benha University, Egypt. 2013
17. Zhang, Z. *The Effect of Touching Together with Phototherapy for Full Term Neonatal Hyperbilirubinemia*, Master thesis, China. 2012
18. Underdown A, Barlow J, Chung V, and Stewart-Brown S. Massage intervention for promoting mental and physical health in infants aged under six months. *Cochrane Database Syst Rev*. 2006;(4): CD005038.
19. Vickers A, Ohlsson A, Lacy JB, and Horsley A. (2004). Massage for promoting growth and development of preterm and/or low birth-weight infants (Cochrane review). *Cochrane Database of Systematic Reviews*, Issue 4. [DOI: 10.1002/ 14651858.CD000390.pub2]
20. Huang L. Critical review of massage therapy employed for newborns. *Journal of Acupuncture and Tuina Science*. 2009; 7 (6):379-84.

21. Semmekrot B.A, de Vries M.C, Gerrits G.P, and van Wieringen P.M. Optimal breastfeeding to prevent hyperbilirubinaemia in healthy, term newborn. Ned Tijdschr Geneeskd. 2004; 148:2016–19.
22. Gourley G.R, Kreamer B, and Arend R. The effect of diet on feces and jaundice during the first 3 weeks of life. *Gastroenterology*. 1992; 103:660–67.