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Evaluate the effectiveness continuous versus intermittent phototherapy in reduction of level bilirubin level among babies with hyperbilirubinemia in Rajarajeswari Medical College and Hospital at Bangalore

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INTRODUCTION:

Neonatal jaundice is a very common condition in newborns, resulting from the accumulation of unconjugated bilirubin due to increased red blood cell breakdown and immature liver function. Although it is usually a normal transitional process, excessive bilirubin levels can become dangerous, as unconjugated bilirubin is neurotoxic and may lead to kernicterus—a severe condition associated with neurological damage, hearing loss, and even death.

Phototherapy is the standard and most effective treatment for neonatal hyperbilirubinemia. It works by using blue light to convert bilirubin in the skin into water-soluble photoisomers that can be excreted without liver conjugation. This therapy has been widely used for decades and has significantly reduced the need for exchange transfusion, with no major long-term adverse effects reported.

Both continuous and intermittent phototherapy methods are practiced. While continuous therapy is commonly used to maximize effectiveness, intermittent therapy can also be equally effective due to the rapid breakdown of bilirubin and the slower rate at which new bilirubin reaches the skin.

Overall, early identification, monitoring of risk factors, and timely initiation of phototherapy are essential to prevent complications and ensure better neonatal outcomes.

NEED FOR STUDY:

Neonatal jaundice occurs in about 80% of preterm and 60% of full-term infants within the first three days of life. It is more common in breastfed babies, and in some cases (1–2%), substances in breast milk can prolong jaundice. Risk is higher among Asian male infants and babies who are small or large for gestational age.

Physiological jaundice, affecting over 50% of newborns, is usually harmless and resolves within 1–2 weeks. However, high bilirubin levels (>25 mg/dl) can lead to severe complications such as deafness, cerebral palsy, and brain damage. In some cases, jaundice may indicate underlying conditions like infection or thyroid disorders.

Kernicterus, a serious but preventable complication, results from bilirubin deposition in the brain and can cause permanent neurological damage. Early screening and monitoring, as recommended by the American Academy of Pediatrics, are essential.

Phototherapy is the primary and effective treatment for reducing bilirubin levels. It helps convert bilirubin into forms that can be easily excreted, thereby preventing complications.

Clinical observations indicate a high prevalence of neonatal hyperbilirubinemia, highlighting the crucial role of nurses in early detection, timely intervention, and prevention of complications. Hence, this study is essential to improve neonatal outcomes through effective management strategies.

OBJECTIVES OFSTUDY:

- To assess pretest level of bilirubin among 2 groups of term babies with hyperbilirubinemia before phototherapy
- To determine the effectiveness of continuous phototherapy among term babies with hyperbilirubinemia in group-I
- To determine the effectiveness of intermittent phototherapy among term babies with hyperbilirubinemia in group-II
- To compare the effectiveness of intermittent and continuous phototherapy in reduction of Bilirubin level among 2 groups of term babies
- To find association between post test score of continuous phototherapy and with their selected demographic variables of term babies
- To find association between post test score of intermittent phototherapy and with their selected demographic variables of term babies

METHODOLOGY

This study adopted an evaluative research approach with an experimental design to compare the effectiveness of continuous versus intermittent phototherapy in reducing bilirubin levels among neonates with hyperbilirubinemia. The study was conducted in the NICU of Rajarajeswari Medical College and Hospital, Bangalore, which reports a high number of cases monthly. The independent variables were continuous phototherapy (experimental

group I) and intermittent phototherapy (experimental group II), while the dependent variable was the level of serum bilirubin. Extraneous variables included weight, sex, gestational age, type of delivery, and feeding method.

A total of 60 neonates with hyperbilirubinemia were selected using simple random sampling, with 30 in each group. Inclusion criteria included term babies (>37 weeks), weight >2000 g, bilirubin levels >12 mg/dl, and NICU admission. Seriously ill babies, those with congenital anomalies, and cases without parental consent were excluded.

Data were collected using a serum bilirubin scale, supported by demographic variables. The tool was validated by experts and showed high reliability (r = 0.9). A pilot study confirmed feasibility.

Data collection was conducted over a defined period, with pre- and post-assessment of bilirubin levels. Continuous phototherapy (2 hours on/1 hour off) and intermittent phototherapy (1 hour on/1 hour off) were administered accordingly. Data analysis was performed using descriptive and inferential statistics, including percentage distribution, t-test, and chi-square test to determine effectiveness and associations.

RESULTS

Table 1 shows that in the continuous group, 46.67% of babies were >73 hours old, 46.67% had birth weight 2000–2500 g, 53.33% were female, and 53.33% had vaginal delivery, while in the intermittent group, 40% were >73 hours, 46.67% weighed 2000–2500 g, 70% were male, and 66.67% had vaginal delivery, with most babies in both groups being 37–40 weeks (80% and 76.67%) and predominantly breastfed (76.67% and 66.67%).

Table 2 reveals that before phototherapy, 46.67% of babies in both groups had severe jaundice (18–20 mg/dl), 36.67% (continuous) and 40% (intermittent) had moderate jaundice (15–17 mg/dl), and 16.66% and 13.33% had mild jaundice, with no normal values. Table 3 indicates that after phototherapy, 60% (continuous) and 66.67% (intermittent) achieved <12 mg/dl, while 40% and 33.33% remained in mild range, with no moderate or severe cases.

Table 4 shows that continuous phototherapy reduced mean bilirubin from 17±1.94 to 15.34±1.65 (t=11.86), 14.51±1.75 (t=18.7),

and 13.63±2.12 (t=17.4), with improvements of 1.66±0.76, 2.49±0.74, and 3.37±1.05, all significant at p<0.01. Table 5 shows that intermittent phototherapy reduced mean bilirubin from 17.16±2.05 to 15.13±1.85 (t=13.77), 14.20±1.75 (t=18.25), and 12.95±2.18 (t=21.9), with improvements of 2.03±0.80, 2.96±0.89, and 4.21±0.77, all significant at p<0.01. Table 6 compares both groups and shows no significant difference with pre-test (t=0.32), post-test I (t=0.44), post-test II (t=0.37), and post-test III (t=1.2), indicating equal effectiveness (p>0.05).

Table 7 shows that in continuous phototherapy, birth weight (χ^2=10.62) and type of delivery (χ^2=6.21) were significant, while age (χ^2=0.54), gender (χ^2=2.32), gestation (χ^2=0.19), and feeding (χ^2=0.13) were not. Table 8 shows that in intermittent phototherapy, birth weight (χ^2=6.14) and type of delivery (χ^2=6.69) were significant, while age (χ^2=0.36), gender (χ^2=0.4), gestation (χ^2=0.4), and feeding (χ^2=0.13) were not significant.

Table I: Percentage Frequency Distribution of Demographic Variables among Hyperbilirubinemia Babies In Experimental Group I and II (N=60)

S. No	Demographic variables	Continuous phototherapy (n=30)		Intermittent phototherapy (n=30)	
		No	%	No	%
1	**Age of the baby**				
	a. 24--48 hours	6	20	8	26.67
	b. 49--72 hours	10	33.33	10	33.33
	c. > 73 hours	14	46.67	12	40.00
2	**Birth weight of the baby**				
	a. 2000-2500 gms	14	46.67	14	46.67
	b. 2501-3000gms	10	33.33	9	30.00
	c. >3000 gms	6	20.00	7	23.33
3	**Gender**				
	a. Male	14	46.67	21	70

	b. Female	16	53.33	9	30
4	**Type of Delivery**				
	a. Spontaneous vaginal delivery	16	53.33	20	66.67
	b. Forceps	0	0.00	0	0
	c. Ventouse Extraction	0	0.00	0	0
	d. Caesarean section	14	46.67	10	33.33
5	**No of gestational weeks**				
	a. 37--40 weeks	24	80.0	23	76.67
	b. >40 weeks	6	20.0	7	23.33
6	**Feeding method**				
	a. Breast feeding	23	76.67	20	66.67
	b. Formula	0	0.00	0	0.00
	c. Breast feed and formula	7	23.33	10	33.33

Table 2: To assess the pretest level of bilirubin among two groups of term babies with hyperbilirubinemia before phototherapy

Level of Jaundice (mg/dl)	**Method of Phototherapy**			
	Continuous (n=30)		**Intermittent (n=30)**	
	No	%	No	%
< 12	0	0	0	0

12—14	5	16.66	4	13.33
15-17	11	36.67	12	40.00
18-20	14	46.67	14	46.67
Total	30	100	30	100

Table 3: To assess the post est level of bilirubin among two groups of term babies with hyperbilirubinemia before phototherapy

Level of Jaundice (mg/dl)	Method of Phototherapy			
	Continuous (n=30)		Intermittent (n=30)	
	No	%	No	%
< 12	18	60.00	20	66.67
12—14	12	40.00	10	33.33
15-17	0	0.00	0	0.00
18-20	0	0.00	0	0.00
Total	30	100	30	100

Table 4: Effectiveness of Continuous Phototherapy (Group I, n = 30)

Continuous Phototherapy	Mean	SD	Paired 't' Value	p-Value
Pre-test	17	1.94	11.86**	$p < 0.01$
Post-test I	15.34	1.65		
Improvement	1.66	0.76		

Pre-test	17	1.94	18.7**	p < 0.01
Post-test II	14.51	1.75		
Improvement	2.49	0.74		
Pre-test	17	1.94	17.4**	p < 0.01
Post-test III	13.63	2.12		
Improvement	3.37	1.05		

Table 5: Effectiveness of Intermittent Phototherapy (Group II, n = 30)

Intermittent Phototherapy	Mean	SD	Paired 't' Value	p-Value
Pre-test	17.16	2.05	13.77**	p < 0.01
Post-test I	15.13	1.85		
Improvement	2.03	0.80		
Pre-test	17.16	2.05	18.25**	p < 0.01
Post-test II	14.20	1.75		
Improvement	2.96	0.89		
Pre-test	17.16	2.05	21.9**	p < 0.01
Post-test III	12.95	2.18		
Improvement	4.21	0.77		

**** Significant at 1% level**

Table 6: Comparison of Continuous vs Intermittent Phototherapy (N = 60)

Domain	Continuous (n=30)		Intermittent (n=30)		Unpaired 't' Test	p-Value
	Mean	SD	Mean	SD		
Pre-test	17	1.94	17.16	2.05	0.32 (NS)	p < 0.75

Post-test I	15.34	1.65	15.13	1.85	0.44 (NS)	p < 0.66
Post-test II	14.51	1.75	14.20	1.74	0.37 (NS)	p < 0.78
Post-test III	13.63	2.12	12.95	2.18	1.20 (NS)	p < 0.23

NS – Not Significant at p < 0.05 level

Table 6: Association between effectiveness of continuous phototherapy and with their demographic variables of babies

S.No	Demographic variables	Sample		Level of Effectiveness				Chi square
				< Median (17)		≥ Median (13)		
		No	%	No	%	No	%	
1	Age of the baby							
	a. 24--48 hours	6	20	4	66.7	2	33.3	0.54
	b. 49--72 hours	10	33.33	6	60.0	4	40.0	df 2
	c. > 73 hours	14	46.67	7	50.0	7	50.0	N.S
2	Birth weight of the baby							
	a. 2000-2500 gms	14	46.67	11	78.6	3	21.4	10.62
	b. 2501-3000gms	10	33.33	6	60.0	4	40.0	df 2
	c. >3000 gms	6	20	0	0.0	6	100.0	S
3	Gender							
	a. Male	14	46.67	10	71.4	4	28.6	2.32
	b. Female	16	53.33	7	43.8	9	56.3	df 1 N.S
4	Type of Delivery							
	a. Spontaneous vaginal delivery	16	53.33	10	62.5	6	37.5	6.21
	b. Forceps	0	0	0	0.0	0	0.0	df 1
	c. Ventouse Extraction	0	0	0	0.0	0	0.0	S

	d. Caesarean section	14	46.67	7	50.0	7	50.0	
5	No of gestational weeks							
	a. 37--40 weeks	24	80	15	62.5	9	37.5	0.19
	b. >40 weeks	6	20	2	33.3	4	66.7	df 1 N.S
6	Feeding method							
	a. Breast feeding	23	76.67	13	56.5	10	43.5	0.13
	b. Formula	0	0	0	0.0	0	0.0	df 1
	c. Breast feed and formula	7	23.33	4	57.1	3	42.9	N.S

Table 7: Association between effectiveness of intermittent phototherapy and demographic variables of babies

S.No	Demographic variables	Sample		Level of Effectiveness				Chi square
				< Median (16)		≥ Median (14)		
		No	%	No	%	No	%	
1	Age of the baby							
	a. 24--48 hours	8	26.67	5	62.5	3	37.5	0.36
	b. 49--72 hours	10	33.33	5	50.0	5	50.0	df 2
	c. > 73 hours	12	40	6	50.0	6	50.0	N.S
2	Birth weight of the baby							
	a. 2000-2500 gms	14	46.67	9	64.3	5	35.7	6.14
	b. 2501-3000gms	9	30	5	55.6	4	44.4	df 2
	c. >3000 gms	7	23.33	2	28.6	5	71.4	S
3	Gender							
	a. Male	21	70	12	57.1	9	42.9	0.4
	b. Female	9	30	4	44.4	5	55.6	df 1 N.S
4	Type of Delivery							
	a. Spontaneous vaginal delivery	20	66.67	14	70.0	6	30.0	6.69
	b. Forceps	0	0	0	0.0	0	0.0	df 1
	c. Ventouse Extraction	0	0	0	0.0	0	0.0	S
	d. Caesarean section	10	33.33	2	20.0	8	80.0	
5	No of gestational weeks							

	a. 37--40 weeks	23	76.67	13	56.5	10	43.5	0.4
	b. >40 weeks	7	23.33	3	42.9	4	57.1	df 1 N.S
6	Feeding method							
	a. Breast feeding	20	66.67	10	50.0	10	50.0	0.13
	b. Formula	0	0	0	0.0	0	0.0	df 1
	c. Breast feed and formula	10	33.33	6	60.0	4	40.0	N.S

DISCUSSION

The study results showed that both groups were comparable at baseline. Most neonates had moderate to severe hyperbilirubinemia before intervention, indicating the need for treatment. Following phototherapy, the majority of babies in both groups improved to normal bilirubin levels, demonstrating effectiveness of the intervention. There was a statistically significant reduction in bilirubin levels within each group across all post-test periods ($p<0.01$). Although intermittent phototherapy showed a slightly higher reduction, the difference between continuous and intermittent methods was not statistically significant ($p>0.05$), indicating that both are equally effective. Birth weight and type of delivery showed significant association with treatment effectiveness, while age, gender, gestational age, and feeding method had no significant association.

CONCLUSION

The study concludes that both continuous and intermittent phototherapy are effective in significantly reducing serum bilirubin levels among neonates with hyperbilirubinemia. There is no statistically significant difference between the two methods, indicating that both are equally effective. However, intermittent phototherapy showed slightly greater reduction in bilirubin levels. Birth weight and type of delivery were found to influence treatment effectiveness, while other demographic variables had no significant impact. Overall, both methods can be safely and effectively used in the management of neonatal hyperbilirubinemia.

REFERENCES

1. American Academy of Pediatrics. (2004). Management of

hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. *Pediatrics, 114*(1), 297–316.

2. Bhutani, V. K., Johnson, L., & Sivieri, E. M. (1999). Predictive ability of a predischarge hour-specific serum bilirubin for subsequent significant hyperbilirubinemia in healthy term and near-term newborns. *Pediatrics, 103*(1), 6–14.
3. Maisels, M. J., & McDonagh, A. F. (2008). Phototherapy for neonatal jaundice. *New England Journal of Medicine, 358*(9), 920–928.
4. Rennie, J., Burman-Roy, S., & Murphy, M. S. (2010). Neonatal jaundice: Summary of NICE guidance. *BMJ, 340*, c2409.
5. Kumar, P., & Chawla, D. (2014). Phototherapy for neonatal jaundice: Recent advances and controversies. *Indian Pediatrics, 51*(6), 495–499.
6. Stokowski, L. A. (2011). Fundamentals of phototherapy for neonatal jaundice. *Advances in Neonatal Care, 11*(5), S10–S21.
7. Hansen, T. W. R. (2011). Kernicterus in term and near-term infants—The specter walks again. *Acta Paediatrica, 100*(9), 1153–1157.
8. Ebbesen, F., Andersson, C., Verder, H., Grytter, C., Pedersen-Bjergaard, L., Petersen, J. R., & Agati, G. (2002). Extreme hyperbilirubinaemia in term and near-term infants in Denmark. *Acta Paediatrica, 91*(6), 665–670.
9. Maisels, M. J. (2006). Neonatal jaundice. *Pediatrics in Review, 27*(12), 443–454.
10. Kaur, S., Chawla, D., Pathak, U., & Jain, S. (2011). Predischarge non-invasive risk assessment for prediction of significant hyperbilirubinemia in term and late preterm neonates. *Indian Pediatrics, 49*(7), 539–544.