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Clinical profile of neonates subjected for phototherapy

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Abstract
Neonatal hyperbilirubinemia is a reflection of liver‟s immature excretory pathway for bilirubin and is the most common reason for readmission of neonates in first week of life in current era of postnatal discharge from hospital. Neonatal hyperbilirubinemia is a cause of concern for the parents as well as for the pediatricians. Hyperbilirubinemia was found to be the most common morbidity. Neonates due for phototherapy were evaluated and samples were collected. Total serum bilirubin, Electrolytes and haematological parameters were checked at 0 hours (before starting phototherapy) 24hours and at 48 hours of phototherapy, daily weight checking and duration of phototherapy was noted by the researcher. In Continuous Phototherapy group, 66% were delivered by Normal vaginal delivery and 34% were delivered by LSCS and in intermittent Phototherapy group, 70% were delivered by Normal vaginal delivery and 30% were delivered by LSCS.

Keywords: neonatal hyperbilirubinemia, haematological parameters, phototherapy

Introduction
Neonatal hyperbilirubinemia (NH) is a very frequent abnormal finding during the first week of life. Over two third of neonates develop clinical jaundice. The physical finding such as yellowish discoloration of the skin and sclera in neonates is caused by accumulation of unconjugated bilirubin. In most infants, unconjugated hyperbilirubinemia reflects a normal physiological phenomenon [1]. Neonatal hyperbilirubinemia almost affects 60% of term and 80% of preterm neonates during first week of life. 6.1% of term newborn have a serum bilirubin over 12.9 mg%. Serum bilirubin over 15 mg% is seen in 3% of normal term neonates [1]. Nevertheless untreated, severe unconjugated hyperbilirubinemia is potentially neurotoxic. Conjugated hyperbilirubinemia results from conditions such as haemolytic disease of the newborn, sepsis, and inborn errors of metabolism. Supplementary feeding, percentage weight loss, ABO incompatibility and vacuum extraction significantly increase the risk of jaundice. Neonatal hyperbilirubinemia is a reflection of liver‟s immature excretory pathway for bilirubin and is the most common reason for readmission of neonates in first week of life in current era of postnatal discharge from hospital. Neonatal hyperbilirubinemia is a cause of concern for the parents as well as for the pediatricians. Hyperbilirubinemia was found to be the most common morbidity. Elevated levels of unconjugated bilirubin can lead to bilirubin encephalopathy and subsequently kernicterus, with devastating, permanent neurodevelopmental handicaps. Conjugated hyperbilirubinemia may suggest potentially serious hepatic disorders or systemic illnesses [2]. Thus appropriate management of neonatal hyperbilirubinemia is of paramount importance. Hyperbilirubinemia can be treated by different methods like phototherapy or exchange transfusion or pharmacologic agents. Since the 1950s, phototherapy has been the therapy of choice for the newborn with indirect hyperbilirubinemia. Phototherapy plays a significant role in both prevention and treatment of hyperbilirubinemia. The main established value of phototherapy is that it decreases the need for exchange transfusion [3]. Phototherapy converts the bilirubin through structural photoisomerization and photo-oxidation into excretable products. As any treatment has its side effects, phototherapy also have its adverse effects like hyperthermia, feed intolerance, loose stools, skin rashes, bronze baby syndrome, retinal changes, dehydration, weight loss, hypocalcemia, redistribution of blood flow and genotoxicity [4].
LED phototherapy with low irradiances does not cause significant hyperthermia similar to conventional phototherapy with blue fluorescent light. A randomised and controlled unicentric clinical trial in Brasil showed that blue LED phototherapy exhibited more

hypothermia (35-36.0°C) than patients treated with fluorescent phototherapy (23% vs. 9%; p = 0.02), so there is a greater need for more rigorous control of the room temperature [5, 8]. LED phototherapy with high irradiances (60-120 μW/cm2/nm) significantly increases body temperature in hyperbilirubinemic newborns compared to infants who received conventional phototherapy with fluorescent lamps (10-15 μW/cm2/nm) or LED phototherapy (26-60 μW/cm2/nm). Thus the increase in body temperature is a function of increase of irradiance rather than the type of the light source [5].

Although benign skin rashes are reported as less than 3% in studies conducted different aims, until recently, there has not been single systematic study of the putative association between phototherapy and the development of benign newborn rashes. In a recent study from Turkey reported that dramatic increased incidence with the frequency of skin eruptions was 36% in the conventional phototherapy group and 33% in the LED group (p = 0.83). The skin eruptions were macules in 22.4%, papules in 8.6%, and maculopapular rashes in 3.4% infants. Neonates with cholestatic jaundice who are receiving phototherapy may develop purpuric (probably circulating porphyrins are the causative factors) and bullous eruptions [6].

Methodology

Neonates due for phototherapy were evaluated and samples were collected. Total serum bilirubin, Electrolytes and haematological parameters were checked at 0 hours (before starting phototherapy) 24hours and at 48 hours of phototherapy, daily weight checking and duration of phototherapy was noted by the researcher. Comparative study were made between these two groups to determine the changes in weight, TSB, electrolytes, haematological parameters and the duration of phototherapy. Phototherapy were initiated as per AAP guidelines in term and late preterm neonates (born at or after 34 weeks of gestation)

All neonates subjected to phototherapy as per AAP criteria were randomised to one of two groups:

Group A- Phototherapy (PT) on continuous basis as per standard protocol

Group B- Phototherapy on intermittent basis consisting of 2hr PT followed by 1 hour of rest with mother

Inclusion criteria

1. All Term babies and late Preterm weighing more than 2500 gms with neonatal hyperbilirubinemia as defined by AAP charts (2004) requiring phototherapy

Exclusion criteria

1. Babies who were having congenital abnormalities
2. Babies with active hemolysis due to haemolytic diseases of newborn or needing exchange transfusion
3. Neonates on IV fluids, ventilators
4. Neonates not on breast feeding

Results

Table 1: Sex Distribution between two groups

		Continuous Phototherapy		Intermittent Phototherapy	
		Count	%	Count	%
Sex	Female	41	41.00%	39	39.00%
	Male	59	59.00%	61	61.00%
	Total	100	100.00%	100	100.00%

P = 0.9

There was no significant difference in sex distribution between two groups

Table 2: Mean Birth Weight Comparison between two groups

	Continuous Phototherapy		Intermittent Phototherapy		P value
	Mean	SD	Mean	SD	
Weight	2.88	0.18	2.85	0.19	0.25

Mean weight in Continuous Phototherapy group was 2.88 ± 0.18 Kgs and in Intermittent Phototherapy group was 2.85 ± 0.19.

Table 3: Mean GA Comparison between two groups

	Continuous Phototherapy		Intermittent Phototherapy		P value
	Mean	SD	Mean	SD	
GA	37.92	1.17	38.04	1.14	0.463

Mean GA in Continuous Phototherapy was 37.92 ± 1.17 weeks and in Intermittent Phototherapy group was 38.04 ± 1.14 weeks.

There was no significant difference in mean GA between two groups.

Table 4: Mean MBG Comparison between two groups

		Continuous Phototherapy		Intermittent Phototherapy	
		Count	%	Count	%
MBG	A+	32	32.00%	31	31.00%
	AB-	1	1.00%	1	1.00%
	AB+	12	12.00%	13	13.00%
	B+	27	27.00%	25	25.00%
	O-	3	3.00%	3	3.00%
	O+	25	25.00%	27	27.00%

χ 2 = 0.210. df = 5. p = 0.999

In Continuous Phototherapy group, majority of them blood group A+ve (32%) and in Intermittent Phototherapy group, majority of them had blood group A+ve (31%) and there was no significant difference in mother blood group between two groups.

Table 5: BBG Distribution between two groups

		Continuous Phototherapy		Intermittent Phototherapy	
		Count	%	Count	%
BBG	A-	1	1.00%	1	1.00%
	A+	18	18.00%	16	16.00%
	AB+	6	6.00%	6	6.00%
	B+	22	22.00%	22	22.00%
	O-	3	3.00%	3	3.00%
	O+	50	50.00%	52	52.00%

χ 2 = 0.157. df = 5. p = 1.000

In Continuous Phototherapy group, majority of babies had blood group of O+ve and in Intermittent Phototherapy group, majority of babies had blood group of O+ve (52%) and there was no significant difference in babies blood group between two groups.

Table 6: MOD Distribution between two groups

		Group					
		Continuous Phototherapy		Intermittent Phototherapy		Total	
		Count	%	Count	%	Count	%
MOD	LSCS	34	34.00%	30	30.00%	64	32.00%
	NVD	66	66.00%	70	70.00%	136	68.00%

χ 2 = 0.368. df = 1. p = 0.544

In Continuous Phototherapy group, 66% were delivered by Normal vaginal delivery and 34% were delivered by LSCS and in intermittent Phototherapy group, 70% were delivered by Normal vaginal delivery and 30% were delivered by LSCS.

Discussion

The present study included a total of 200 which comprised of 100 in continuous phototherapy (Group-A) and 100 in intermittent phototherapy (Group-B) study. Our study was conducted for the duration of two years which included all inborn as well as out born babies with neonatal hyperbilirubinemia as defined by AAP charts, who were meeting inclusion criteria as described in methodology.

The total number of sample in other studies varied depending on the duration of study from shorter duration in some studies to longer duration in others, total number of admissions to hospital is different in different geographical region, inclusion and exclusion were different in each studies.

In our study there was no significant difference between two groups in gender distribution, however by history more chances of hyperbilirubinemia in males compared to females. Both the groups were comparable in terms of percentage of sex distribution with other studies done by Abdul *et al.* [7] also showed male predominance. However though the difference in those studies were just as in the present study. This difference in gender was mostly due to bias of parents rather than due to gender rates.

Preterm babies will have 80% chances of developing jaundice compared to 60% term babies. However our study included both late preterm and term babies, number of term babies were more compared to late preterm in both the groups, but both groups were comparable in terms of number of late preterm and term neonates.

The present study had no significant difference between two groups in mean gestational age groups, which was comparable with Abdul *et al.* [7] study.

In our study there was no statistical difference between both the groups in mean baseline TSB before starting phototherapy, which was comparable with other studies done by Niknaf *et al.* [8], Khaliq A *et al.* [9], Suri D *et al.* [10], where no statistically significant difference two groups.

Conclusion

In our study both the groups were similar in demographic variables. In decreasing the percentage of bilirubin both were equally effective.

In our study, there was significant reduction in total bilirubin with phototherapy in both group A and group B neonates.

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