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Effect of Phototherapy on Serum Sodium and Potassium in Neonates with Hyperbilirubinemia

Anik Kumar Majumder[1], Gayatri Bezboruah[2]

Department of Pediatrics, Gauhati Medical College and Hospital, Guwahati, India
Corresponding author: *Anik Kumar Majumder*

Abstract: ***Introduction: Neonatal hyperbilirubinemia is the leading cause of NICU readmission and also the most common abnormal physical finding during the first week of life for which most of the neonates are admitted to NICU. Hence appropriate management of this is of paramount importance. Phototherapy plays a significant role in treatment. However, this treatment modality has side effect on the serum electrolytes. Aims and Objectives: To evaluate the changes in serum sodium and potassium in neonates receiving phototherapy and to find the high risk neonates for the changes and to compare the effect in between preterm and term neonates receiving phototherapy. Methods and materials: A prospective hospital based observational comparative study conducted on 206 eligible neonates admitted in NICU from 1st July 2017 to 31st June 2018. Serum bilirubin and Sodium (Na), Potassium (K) were determined before (controls) and after termination of phototherapy or 48 hours of phototherapy whichever is earlier and analyzed and compared by using SPSS (Version 21.0). Results: Out of 206 neonates, 127 were term, 8 were post term and 71 were preterm.80 neonates (38.83%) were LBW and out of them 45 were male and 35 were female. The mean weight was 2.61±0.5141kg. In our study, mean TSB after and before phototherapy was 18.13±2.414 and 13.73±1.955 with a significant fall in the TSB level after phototherapy (p <0.0001).71.84% of neonates had a reduction of S. sodium from the initial value, in which 67.96% had a reduction of <5% and 3.88% had a reduction of 5-10% from the base value which was significant (p<0.0001). A reduction of S. potassium (64.08% cases) following phototherapy but the incidences of having hypokalemia were not statistically significant.18.75% of LBW and 18.31% preterm neonates had developed hyponatremia compared to only 10.32% of normal birth weight and 11.02% term neonates had developed hyponatremia following phototherapy. A significant reduction of mean serum potassium levels were found after phototherapy but no association was found between incidence with gestational age or birth weight. Conclusion: Phototherapy causes significant imbalances in serum sodium level and reduction in serum potassium level. Preterm and LBW neonates are found to be high-risk group in our study and they need continuous close monitoring.***

Keywords: Hyperbilirubinemia

1. Introduction

Neonatal hyperbilirubinemia is a common cause of concern for the parents and pediatricians. Jaundice (also known as hyperbilirubinemia) is a yellowish-greenish pigmentation of the sclera and skin caused by an increase in bilirubin.1 The term “jaundice” comes from the French word *jaune*, which means “yellow”. **Significant Hyperbilirubinemia** in infants ≥35 weeks gestation is defined as a TSB >95th percentile on the hour-specific Bhutani’s nomogram.2 Neonates have immature liver, more number of RBCs, short life span of fetal RBC, increase enterohepatic circulation which are the main cause for developing jaundice. The clinical symptom of jaundice is yellowish discoloration of the skin, sclera and nail beds due to deposition of unconjugated bilirubin. Clinically jaundice appears in the neonates when bilirubin level goes >7mg/dL.3

Incidence of hyperbilirubinemia is much higher in preterm neonates (80%) than term neonates (60%) [4]. In most of the cases of NHB no intervention is needed and only 5-10% of them develops significant jaundice and need treatment[5]. Excess unconjugated bilirubin enters to the brain and deposit in the neurons and cause bilirubin encephalopathy, with devastating permanent neurodevelopment handicaps[6, 7].

NHB is treated by phototherapy, exchange transfusion or pharmacological agents. Among these three, phototherapy is the mainstay of treatment for NHB and it also decreases the incidence of exchange transfusion and bilirubin encephalopathy. Phototherapy is non-invasive, cheap and easy method of treating NHB. As any treatment has its adverse effects, it has also some side effects but they are not harmful or severe. Among all adverse effects electrolytes change is most silent and less severe.

Along with hypocalcemia there are also changes seen in other electrolytes, but only few studies have been done till now to see the effects. Some studies showed increase chances of hyponatremia and hypokalemia following phototherapy.[4, 7] The reason for hyponatremia and hupokalemia is not well known but it might be due to prolong phototherapy as Curtis MD et al[8] hypothesized that prolong phototherapy causes diarrhea which impair absorption of electrolytes mainly potassium, chloride, sodium.

Since there are only few studies published till now, more studies are required to reach a conclusion against the effect of phototherapy on serum sodium, potassium. So this study is designed to evaluate the effect of phototherapy on sodium and potassium mainly and find the high-risk neonates for imbalances of these. We also compared the effect in between preterm and term neonates receiving phototherapy.

2. Materials and Methods

It was a prospective hospital based observational comparative study. It was done on Neonatal Intensive Care Unit (NICU) of Gauhati Medical College and Hospital (GMCH) for a study period of 1 year from 1st July 2017 to 30th June 2018. We included all icteric stable neonates (term

or preterm) who were on breastfeeding and standard formula feeding. We excluded the neonates who had developed jaundice in the first 24 hrs, who had birth asphyxia, congenital malformation, sepsis, hypothyroidism, ABO/Rh incompatibility, G6PD deficiency. IUGR, infant of diabetic mother, those on IV therapy or already with electrolyte imbalances and neonates with conjugated hyperbilirubinemia were also excluded.

After taking proper consent from the parents we put the eligible neonates under double surface phototherapy with a wavelength of 425-475nm at a distance of 25-30 cm away from the skin and continued the phototherapy till the TSB level came 2-3 mg/dl below the age-specific level on the nomogram. Before starting phototherapy we sent venous blood sample for serum sodium, potassium (first sample) and it was considered as control. A second venous blood sample (for serum sodium, potassium) was sent at 48 hours of phototherapy or at discontinuing the phototherapy, whichever is earlier. TSB was measured daily. We also sent all the other baseline investigations (G6PD, Blood group to exclude ABO/RH incompatibility) to exclude any observational error.

Total bilirubin was measured by Diazo method. S. calcium, magnesium were measured by reflectance spectrophotometry and formazen dye method and sodium and potassium were measured by potentiometric method (autoanalyzer VITROS 4600 machine). Blood group of the newborn was analyzed by antisera method.

We compared these two samples and the data were analyzed using the appropriate computer software, Statistical Package for Social Sciences (SPSS) (Version 21.0). Data were expressed in frequency and percentage as well as mean and standard deviation.

3. Results

In our study we took 206 eligible neonates among them102 (49.51%) were male and 104 (50.49%) were female. Male and female ratio was 0.98: 1.

Table 1: Gender distribution of neonates:

Gender	No. of neonates (n)	% (Percentage)
Male	102	49.51
Female	104	50.49
Total	206	100

Out of 206 neonates, 80 neonates (38.83%) were low birth weight (LBW) (<2.5 kg. birth weight). Among the LBW, 45 neonates were male and 35 neonates were female. Among 126 neonates with normal birth weight (>2.5 kg. birth weight), 57 neonates were male and 69 neonates were female. The mean birth weight was 2.61±0.5141kg.

Table 2: Weight distribution of neonates:

Weight (kg)	Gender		Total n (%)
	Male	Female	
LBW (<2.5 kg)	45 (44.12%)	35 (33.65%)	80 (38.83%)
Normal	57 (55.88%)	69 (65.35%)	126 (61.17%)
Total	102 (100%)	104 (100%)	206 (100%)

In our present study, 71 were preterm neonates (34.47%), 127 were term neonates (61.65%) and 8 were post-term neonates (3.88%).

Table 3: Gestational age distribution of neonates:

Gestational	Gender		Total n (%)
	Male	Female	
<37 weeks	40 (39.22%)	31 (29.81%)	71 (34.47%)
37-42 weeks	59 (57.84%)	68 (65.38%)	127 (61.65%)
>42 weeks	3 (2.94%)	5 (4.81%)	8 (3.88%)
Total	102 (100%)	104 (100%)	206 (100%)

The mean value of S. bilirubin for the 206 neonates before phototherapy was 18.13±2.414 mg/dL and after phototherapy was 13.73±1.955 mg/dL. Along with this S. bilirubin other parameters (serum electrolytes) were also decreased significantly following phototherapy.

Table 4: Conclusive comparative evaluation of study variables before and after phototherapy in neonates:

	Values before phototherapy (Mean ± Standard deviation)	Values after phototherapy (Mean ± Standard deviation)	Difference	t value	P value
Total S. Bilirubin	18.13±2.414	13.73±1.955	4.404	30.357	<0.0001
S. Sodium	141.97±2.795	140.66±4.751	1.311	5.234	<0.0001
S. Potassium	5.01±0.683	4.63±0.666	0.379	6.6890	<0.0001

Mean value of S. Sodium before phototherapy was 141.97±2.795 mmol/dL and after phototherapy was 140.66±4.751 mmol/dL with a difference of 1.311. So the decline in mean S. sodium level following phototherapy was statistically significant (p <0.0001).

This table 4 also shows that, S. potassium level also declined after phototherapy which was statistically significant (p <0.0001). The difference between the mean values of S. potassium before phototherapy and after phototherapy was 0.379.

Table 5: Frequency distribution showing change in serum sodium value after phototherapy:

Effect of phototherapy on S. Sodium		Frequency	Percent (%)
No change		6	2.92
Increase		52	25.24
Decrease	< 5%	140 (67.96%)	71.84
	5-10%	8 (3.88%)	
	Total	148	

Table 6: Frequency table showing comparison of distribution of S. Sodium before and after phototherapy:

S. Sodium: before phototherapy	S. Sodium: After phototherapy			Total
	< 135	135-145	>145	
135-145	28 (100%)	137 (88.4%)	14 (60.9%)	179 (86.9%)
>145	0 (0%)	18 (11.6%)	9 (39.1%)	27 (13.1%)
Total	28 (13.6% of total)	155 (75.2% of total)	23 (11.2% of total)	206 (100%)
Chi-square: 18.204: P <0.0001				

In our study, we found that after phototherapy 148 neonates (71.84%) had a decrease in serum sodium level from the

initial value. Out of these 140 neonates (67.96%) had <5% reduction and 8 neonates (3.88%) had a 5-10% reduction in serum sodium value from the initial value. This reduction of serum sodium was found statistically significant (p <0.0001). Only 52 neonates (25.24%) had an increase in S. sodium value after phototherapy and 6 neonates (2.92%) show no changes after phototherapy.28 neonates (13.6%) had developed hyponatremia following phototherapy in our study, which was statistically significant.

Table 7: Frequency distribution showing change in serum potassium value after phototherapy

Effect of phototherapy on S. Potassium	Frequency	Percent (%)
No change	11	5.34
Increase	63	30.58
Decrease	132	64.08

Table 8: Frequency table showing comparison of distribution of S. potassium before and after phototherapy:

S. Potassium: before phototherapy	S. Potassium: After phototherapy			Total
	< 3.5	3.5-5.5	>5.5	
3.5-5.5	12 (85.7%)	140 (76.9)	9 (90%)	161 (78.2%)
>5.5	2 (14.3%)	42 (23.1%)	1 (10%)	45 (21.8%)
Total	14 (6.80% of total)	182 (88.3% of total)	10 (4.9% of total)	206 (100%)
Chi-square: 1.452: P < 0.484				

After phototherapy, 132 neonates (64.08%) had a reduction of serum potassium value from the initial value.63 neonates (30.58%) showed an increment of serum potassium value after phototherapy. And only 11neonates (5.34%) show no changes. Table-7 and table-8 show that, reduction of serum potassium level occur in most of the neonates following phototherapy but the incidence of having hypokalemia is not statistically significance (p <0.484) as most of the neonates were having lower initial value before starting the phototherapy. The reduction of mean S. potassium level following phototherapy is statistically significant but the incidence of having hypokalemia is not statistically significant.

Table 9: Conclusive comparison of different study variables before and after phototherapy with birth weight

LBW (n= 80)	Values before phototherapy (Mean ± Standard deviation)	Values after phototherapy (Mean ± Standard deviation)	Difference	t value	P value
Total S. Bilirubin	18.26±2.317	13.75±1.931	4.509	20.535	<0.0001
S. sodium	141.52±2.408	139.26±4.170	2.262	6.459	<0.0001
S. potassium	4.92±0.714	4.64±0.724	0.280	3.130	0.002
Normal (Birth weight > 2.5 kg) (n=126)					
Total S. Bilirubin	18.05±2.480	13.71±1.978	4.336	22.550	<0.0001
S. sodium	142.25±2.990	141.55±4.89	0.706	2.117	0.0363
S. potassium	5.07±0.659	4.62±0.63	0.442	6.362	<0.0001

There was a significant decline seen in the mean S. sodium level following phototherapy in both the groups but it was more in LBW (p<0.0001) than normal neonates (p<0.0363). In our study, the decline in the mean S. potassium level was found in both the groups. The decline was noted more statistically significant in normal neonates (p<0.0001) than LBW (p<0.002). The mean decline in S. magnesium level after phototherapy was found in both the groups but more significant in normal neonates.

Table 10: Correlation of post phototherapy serum electrolytes with birth weight:

	Weight (kg)		Total (n=206)	p value
	LBW (n= 80)	Normal (n= 126)		
Sodium				0.0456
< 135	15 (18.75%)	13 (10.32%)	28 (13.59%)	
135-145	59 (73.75%)	96 (76.19%)	155 (75.24%)	
>145	6 (7.5%)	17 (13.49%)	23 (11.17%)	
Potassium				
< 3.5	8 (10%)	6 (4.76%)	14 (6.8%)	0.033
3.5-5.5	67 (83.75%)	115 (91.27%)	182 (88.35%)	
>5.5	5 (6.25%)	5 (3.97%)	10 (4.85%)	

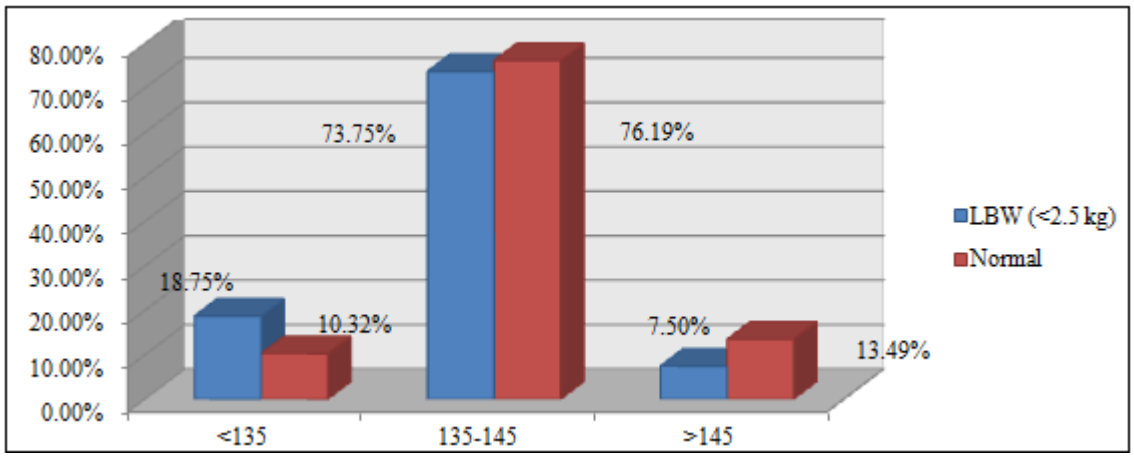

Figure 1: Correlation of S. sodium with birth weight following phototherapy

Table-10, Figure-1 show that the incidence of hyponatremia (S. sodium <135 mmol/L) following phototherapy was more in LBW neonates (18.75%) than normal birth neonates (10.32%). Thus it infers that LBW neonates are at more risk of having hyponatremia following phototherapy than normal neonates. The p-value was also statistically significant (p-value 0.0456) which strongly proved the fact.

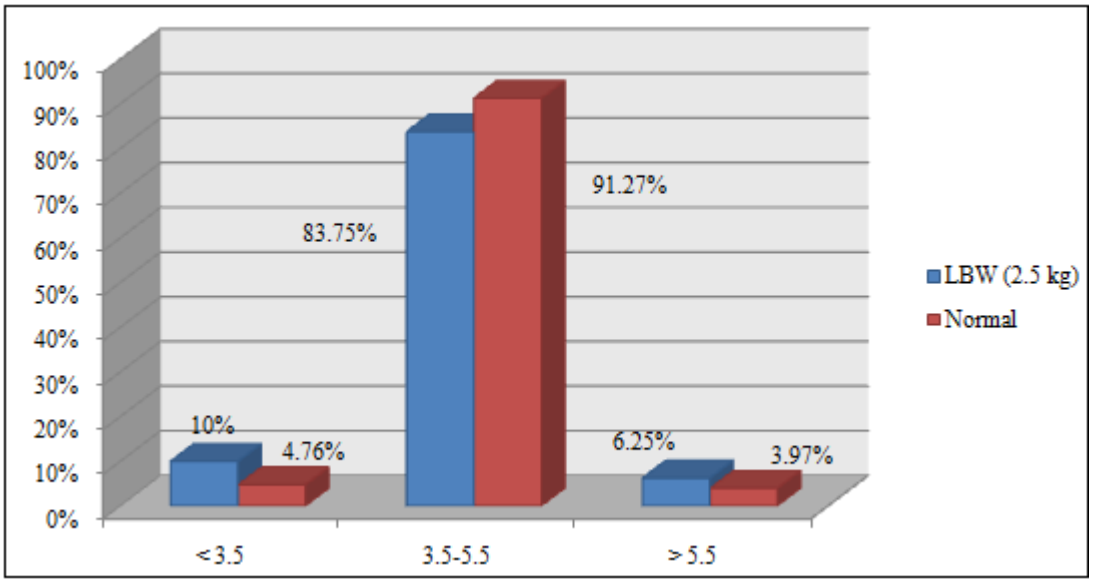

Figure 2: Correlation of S. potassium with birth weight following phototherapy

The incidence of hypokalemia (S. potassium <3.5 mmol/L) after phototherapy was more in LBW neonates than (10%) normal neonates (4.76%) (Figure-2). Thus these data show that, LBW neonates are at more risk of having hypokalemia than normal neonates. By using chi-square test the p-value obtained was 0.033 which was significant. Though LBW neonates are at more risk of having hypokalemia, the degree of reduction in mean S. potassium value following phototherapy was more in normal neonates than in LBW (showing in Table-9).

Table 11: Comparison of different study variables before and after phototherapy with gestational age:

Preterm neonates (n=71)	Values before phototherapy (Mean ± Standard deviation)	Values after phototherapy (Mean ± Standard deviation)	Difference	t value	P value
Total S. Bilirubin	18.59±2.353	13.90±1.995	4.691	18.825	<0.0001
S. sodium	141.54±2.551	139.20±4.024	2.338	6.685	<0.0001
S. Potassium	4.94±0.746	4.53±0.704	0.410	4.323	<0.0001
Term neonates (n=127)					
Total S. Bilirubin	17.95±2.392	13.71±1.929	4.239	23.359	<0.0001
S. Sodium	142.23±2.920	141.40±4.953	0.827	2.439	0.0161
S. Potassium	5.06±0.653	4.69±0.647	0.369	5.251	<0.0001
Post term (n=8)					
Total S. Bilirubin	16.93±2.806	12.44±1.734	4.486	5.061	0.001
S. Sodium	141.75±2.659	141.87±4.94	-0.125	-.104	0.920
S. Potassium	4.95±0.542	4.66±0.578	0.287	1.007	0.348

In our study, the decline in the mean S. sodium level following phototherapy was noted only in preterm and term neonates. But in case of post-term neonates, there was increment in mean S. sodium value after phototherapy. This decline was found more statistically significant in preterm neonates (p <0.0001) than normal term neonates (p= 0.0161). This infers that preterm neonates are more prone to have hyponatremia than term neonates.

There was a decline in the mean S. potassium level after phototherapy in both the preterm and term neonates which was statistically significant. There was also a decline in the mean S. potassium level after phototherapy in post-term neonates which was not statistically significant (p 0.348). In our study, we found that term n

Table 12: Correlation of post phototherapy serum electrolytes with gestational age:

	Gestational age			Total (n=206)	*p value*
	<37 weeks (n= 71)	37-42 weeks (n=127)	>42 weeks (n=8)		
Sodium					
< 135	13 (18.31%)	14 (11.02%)	1 (12.5%)	28 (13.59%)	*0.032*
135-145	54 (76.06%)	96 (75.59%)	5 (62.5%)	155 (75.24%)	
>145	4 (5.63%)	17 (13.39%)	2 (25%)	23 (11.17%)	
Potassium					
< 3.5	8 (11.27%)	6 (4.73%)	0 (0%)	14 (6.8%)	*0.325*
3.5-5.5	60 (84.51%)	115 (90.55%)	7 (87.5%)	182 (88.35%)	
>5.5	3 (4.22%)	6 (4.72%)	1 (12.5%)	10 (4.85%)	

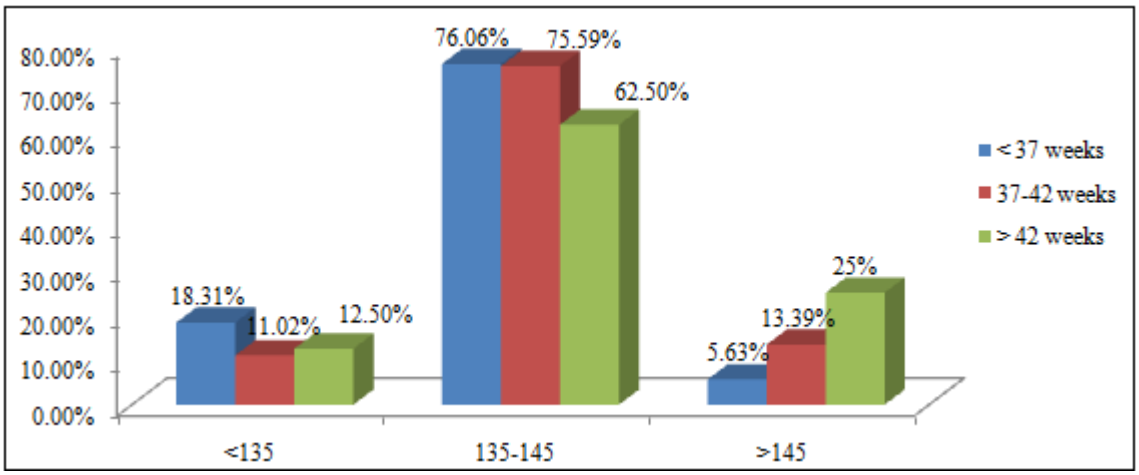

Figure 3: Correlation of S. sodium with gestational age following phototherapy

The incidence of hyponatremia following phototherapy was found more in preterm neonates (18.31%) than term (11.02%) and post-term (12.05%) neonates. Thus it infers that preterm neonates are at more risk of having hyponatremia following phototherapy than other neonates.

By using Chi-square test the p-value obtained was 0.032, which was statistically significant. So these values give an idea that preterm neonates are at risk of having electrolyte imbalance after phototherapy.

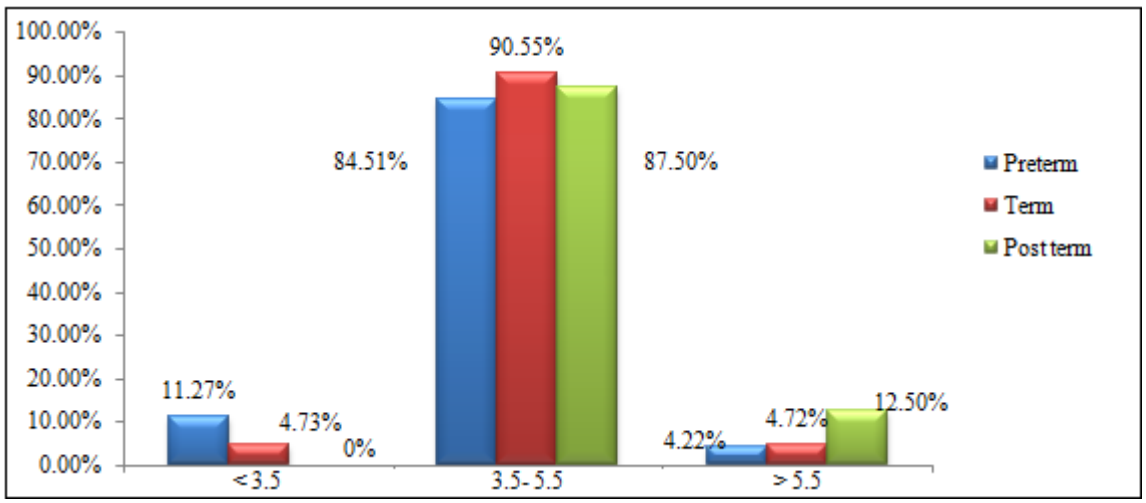

Figure 4: Correlation of S. potassium with gestational age following phototherapy

The incidence of hypokalemia following phototherapy was more in preterm neonates than term and post-term neonates but it was statistically insignificant (p= 0.325). But the decline in the mean S. potassium level following phototherapy was significant in all the groups and more in term neonates.

4. Discussion

Neonatal jaundice is the leading cause of NICU readmission. Neonatal hyperbilirubinemia is the most common abnormal physical finding during the first week of life for which most of the neonates are admitted to NICU and treated by phototherapy. Phototherapy is the current therapy of choice for treatment of NHB. As any treatment has its own side effects, phototherapy also has its side effects but it is not fatal and has no long-term effects. One of the side effects is electrolytes imbalances after giving phototherapy.

A few studies in the recent past had stressed on the incidence of hypocalcemia and changes of mean calcium value after phototherapy but only very few studies till now had concentrated over the changes of other electrolytes following phototherapy. Hence our study was designed to determine the effect on serum sodium and potassium changes after phototherapy.

Table 6.1: Comparison of gestational age groups with other studies:

Study	Year	Study group	Preterm	Term
Reddy et al[9]	2015	252	51	201
Kumar S et al[10]	2015	252	51	194
Nishant et al[11]	2016	84	-	84
Rozario CI et al[12]	2017	100	-	100

In our study, we took 206 neonates who met the inclusion criteria and among them 71 neonates were preterm and 127 were term and 8 were post-term neonates. Kumar S et al[10] were took 252 neonates among them 51 were preterm.

Table 6.2: Comparison of mean birth weight with other studies:

Study	Year	Preterm	Term
Reddy et al[9]	2015	2.224±0.340 kg	2.980±0410 kg
Our study		2.11±0.265kg	2.89±0.396kg

The mean birth weight in our study was 2.61±0.5141kg. In our study mean birth weight of preterm neonates was 2.11±0.265 kg and mean birth weight of term neonates was 2.89±0.396 kg. The mean birth weights of preterm and term neonates were respectively 2.224±0.340 and 2.980±0.410 kg in Reddy et al[9], 2.84±0.51kg in Kumar S et al[10].

Comparison of Serum sodium before and after phototherapy in neonates with other studies:

Study	Year	S. sodium before phototherapy (Mean ± Standard deviation)	S. sodium after phototherapy (Mean ± Standard deviation)	P value
Kumar S et al[10]	2015	139.01± 3.119	138.15± 3.35	<0.0001
Reddy et al[9]	2015	139.02±3.12	138.16±3.36	<0.0001
Suneja et al[13]	2018	159.38±22.7	148.80±10.9	0.001
Our study		141.97±2.795	140.66±4.751	<0.0001

There are very few studies present till now which had stressed and concerned over the changes of electrolytes following phototherapy. Curtis MD et al[8] (1981) study stated that, absorption of water, sodium, potassium and chloride was significantly impaired in the neonates receiving phototherapy. In our study, we found that there was a decline in the mean S. sodium level following phototherapy which was similar to other studies. The mean values of S. sodium before and after phototherapy were 141.97±2.795 mmol/dL and 140.66±4.751 mmol/dL which were in consonance to Kumar S et al[10] (139.01± 3.119 and 138.15± 3.35) and Reddy et al[9] (139.02±3.12 and 138.16±3.36). In Suneja et al [13] the mean values were much higher than the other studies and our study. So our study has observed that there was a significant decline in the mean S. sodium values following phototherapy same as other studies.

Table 6.5: Comparison of Serum potassium before and after phototherapy in neonates with other studies

Study	Year	S. potassium before phototherapy (Mean ± Standard deviation)	S. potassium after phototherapy (Mean ± Standard deviation)	P value
Reddy et al[9]	2015	4.59±0.51	4.69±0.53	0.23
Suneja et al[13]	2018	6.095±1.4	5.28±1.08	0.001
Our study		5.01±0.683	4.63±0.666	<0.0001

In our study we found a significant decline in the mean S. potassium level following phototherapy. In Reddy et al[9], Krishna et al[14] there was no decline in the mean S. potassium level following phototherapy but Suneja et al[13] had shown a significant decline in the mean S. potassium level which was in consonance with our study. The actual relationship between S. potassium following phototherapy has to be evaluated with a larger sample.

Table 6.13: Comparison of mean S. sodium value before and after phototherapy in preterm neonates with other studies:

Study	Mean ±SD S. sodium level		P value
	Before phototherapy (mmol/dL)	After Phototherapy (mmol/dL)	
Our study	141.54±2.551	139.20±4.024	<0.0001
Kumar S et al[10]	138.35±3.03	136.37±3.40	<0.0001

In our study, we found that the mean value of S. sodium in preterm before and after phototherapy was 141.54±2.551 mmol/dL and 139.20±4.024 mmol/dL which is in consonance with other studies. There was a significant decline in the mean S. sodium level following phototherapy.

Table 6.14: Comparison of mean S. sodium value before and after phototherapy in term neonates with other studies:

Study	Mean ±SD S. sodium level		P value
	Before Phototherapy (mmol/dL)	After Phototherapy (mmol/dL)	
Our study	142.23±2.920	141.40±4.953	<0.0001
Kumar S et al[10]	139.26±3.14	136.56±3.18	0.003

There was a significant decline in the mean S. sodium level following phototherapy also seen in the term neonates but the decline was more in preterm neonates than in term neonates. So it infers that preterm neonates are at a risk of having sodium imbalances following phototherapy.

Table 6.15: Correlation of hyponatremia following phototherapy with gestational age and compare with different studies:

Study	Year	Cases	Hyponatremia after phototherapy		P value
			Preterm (n)	Term (n)	
Reddy et al[9]	2015	252	17.6% (9)	3.1% (6)	<0.001
Kumar S et al[10]	2015	252	17.5% (9)	3.1% (6)	<0.001
Our study		206	18.31% (13)	11.02% (14)	<0.0001

We found 18.31% of preterm neonates had developed hyponatremia following phototherapy and only 11.02% of term had developed hyponatremia. Other studies have also shown that incidence of hyponatremia following phototherapy were more in preterm neonates than term and post-term neonates. So it infers that preterm neonates are at more risk of having dyselectrolytemia.

In our study, only 11.27% of preterm and 4.73% of term neonates had developed hypokalemia but no correlation was found between the gestational age and S. potassium following as p-value was not statistically significant. Other studies Reddy et al[9] (p 0.876), Suneja et al[13] also did not found any correlation. However our study had shown that there was a statistically significant reduction in the mean S. potassium value following phototherapy in both the age group but more found in term neonates, as because preterm had a lower initial value. The actual relationship between S. potassium following phototherapy has to be evaluated with a larger sample study.

Table 6.17: Correlation of hyponatremia following phototherapy with birth weight and compare with different studies

Study	Year	Cases	Hyponatremia after phototherapy		P value
			LBW (n)	Normal birth weight (n)	
Reddy et al[9]	2015	252	17.2% (10)	2.6% (5)	<0.001
Kumar S et al[10]	2015	252	17.2% (10)	2.6% (5)	<0.001
Our study		206	18.75% (15)	10.32% (13)	<0.0001

In our study, we found the mean S. sodium value before and after phototherapy were 141.52±2.408 mmol/dL and 139.26±4.170 mmol/dL respectively in LBW neonates. In normal birth weight neonates values were 142.25±2.990mmol/dL and 141.55±4.89mmol/dL respectively before and after phototherapy.

Our study showed 18.75% of LBW had developed hyponatremia following phototherapy which was much higher than the normal birth weight neonates. This was statistically significant and similar to other studies. So it infers that LBW neonates are at risk for dyselectrolytemia. So continuous monitoring is necessary for them.

Our study also found a decline in the mean S. potassium level following phototherapy and 10% of LBW neonates had developed hypokalemia and only 4.76% of normal weight neonates had developed hypokalemia. This was statistically significant (p<0.033). This infers that LBW are at risk of having hypokalemia than normal birth weight neonates.

From our study and other studies, it is evident that preterm and LBW neonates are the high-risk neonates. And also it is evident that preterm neonates are developing more changes of serum sodium and potassium level than term neonates.

5. Conclusion

The incidence of hyponatremia following phototherapy is 13.59% and is higher in preterm (18.31%) and LBW (18.75%) than term (11.02%) and normal birth weight neonates (10.32%). serum sodium levels were also significantly decreased following phototherapy in most of the neonates. In our study, we found a significant reduction in the mean s. potassium value following phototherapy and incidence of hypokalemia is more in LBW (10%) than normal birth weight (4.76%). we found no correlation between the incidences of hypokalemia with the gestational age. In our study, we found that preterm and LBW neonates were having more electrolytes imbalances than normal neonates but the actual relationship between these neonates and phototherapy has to be evaluated with a larger sample. This is because metabolic imbalances are more common in preterm and LBW neonates. Therefore we have concluded that phototherapy causes significant electrolyte imbalances and preterm and LBW neonates are in high-risk group. Therefore these neonates require continuous close monitoring. So we recommended proper monitoring of serum electrolytes during and after phototherapy to prevent dyselectrolytemia and related complications in the neonates.

Competing interest: None

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Author Profile

Dr. Anik Kumar Majumder, Department of Pediatrics, GMCH
majumderdranik1[at]gmail.com,
anikkumarmajumder[at]rediffmail.com
7086351852, 9126526073

Dr. Gayatri Bezboruah, Professor, Department of Pediatrics, GMCH
drgbezboruah[at]gmail.com
9435013645, 9706013645