

**CHANGES IN SERUM CALCIUM LEVEL IN TERM AND PRE-TERM NEONATES WITH NEONATAL JAUNDICE BEFORE AND AFTER GETTING PHOTOTHERAPY IN A DISTRICT HOSPITAL, BANGLADESH**Tamanna Yesmin<sup>1\*</sup> and Marlina Roy<sup>2</sup><sup>1</sup>Child Specialist, Combined Military Hospital, Chittagong, Bangladesh.<sup>2</sup>Gynaecologist, Bangladesh Navy Hospital, Potenga, Bangladesh.**\*Corresponding Author: Dr. Tamanna Yesmin**

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**ABSTRACT**

**Background:** Hyperbilirubinemia commonly seen in both term and preterm neonates who have jaundices which can be fatal. Though phototherapy can be used as effective techniques to reduction of Hyperbilirubinemia condition, where hypocalcemia cases were observed. **Objectives:** In this study our main goal is to evaluate the outcome of phototherapy in changing serum calcium level in preterm and term babies with neonatal jaundices. **Method:** This study was carried out at Combined Military Hospital, Chittagong from January 2019 to January 2020 among 50 full-term and pre-term jaundiced neonates. Before starting the treatments, a detailed antenatal, perinatal history and examination of the neonates was done. **Results:** During the study, 44% cases belong to 6-10 days age group followed by 60% were male. Among cases 65% were full-term and 35% were pre-term neonates. While during evaluating on the basis of causes of jaundice majority were belonging to breastfeeding jaundices, 65% followed by 25% cases were breast milk, 15% were physiological jaundices, 3% were Rh /ABO incompatibility and 2% were septic conditions. Before phototherapy. the mean  $\pm$  SD of total serum bilirubin was  $20.75 \pm 10$  mg / dl and after phototherapy was  $9.05 \pm 0.7$  mg / dl. The total serum bilirubin decreased significantly after phototherapy with a p value of 0.001. Whereas, the mean  $\pm$  SD of serum calcium before phototherapy was  $8.11 \pm 0.11$  mg / dl. and after phototherapy it was  $6.79 \pm 0.50$ . Levels of serum calcium decreased significantly after phototherapy when compared to values before phototherapy with p value 0.013. As neonates are asymptomatic neonates with serum calcium levels were treated with 2 ml/kg/dose of 10% calcium gluconate I/V slowly. After getting treatment, majority cases reach satisfactory level, 90%. **Conclusion:** From our study, we can say that, after treatment as no mortality was seen and majority reported as satisfactory level so, phototherapy can be used as an effective technique for treating Hyperbilirubinemia in neonates' jaundices.

**KEYWORDS:** Hyperbilirubinemia, Neonates' jaundices, Phototherapy.**INTRODUCTION**

In the first week of life in neonatal, jaundice is a common cause of morbidity. It is a major source of concern for the doctor and anxiety for the parents. An elevated bilirubin level may be harmful to the developing central nervous system and cause neurological damage in neonates. In the first week of life, around 60% of term babies appear noticeably jaundiced.<sup>[1-2]</sup>

Most of the time, it is harmless and no treatment is necessary. Approximately 5-10% of them have clinically severe jaundice, indicating the use of phototherapy.

In view of the response, phototherapy is the use of visible light to treat severe newborn jaundice.<sup>[3-4]</sup>

Approximately 60% of term newborns and 85% of pre-term babies will have clinically evident jaundice, which

typically appears on day 3, peaks on days 5-7, and disappears by 14 days of age in a term child and 21 days in a pre-term infant. Phototherapy is used to avoid the neurotoxic consequences of high blood unconjugated bilirubin levels. Phototherapy is a safe and effective strategy for lowering or avoiding the rise in serum unconjugated bilirubin levels in newborns, as well as reducing the requirement for exchange transfusion.<sup>[5-7]</sup> Though due to phototherapy condition like elevated calcium level were noted in neonates. The overall prevalence of hypocalcemia in neonates receiving phototherapy was suggested to be 8.7% in full-term newborn.<sup>[8]</sup> Another study reflects a little difference between pre and post phototherapy plasma calcium levels ( $p < 0.05$ ).<sup>[9]</sup>

The relation of hypocalcemia with phototherapy is an important aspect to be considered due to the potential complications of hypocalcemia.

### Objective

In this study our main goal is to evaluate the outcome of phototherapy in changing serum calcium level in pre-term and term babies with neonatal jaundices.

### METHODOLOGY

This cross-sectional descriptive study was carried out at Combined Military Hospital, Chittagong from January 2019 to January 2020. This study was conducted on 50 full-term and pre-term neonates with jaundice who received phototherapy for treatment of neonatal indirect hyperbilirubinemia (exaggerated physiological jaundice)

All cases chosen fulfilled the following criteria.

1. Icteric stable neonates.
2. Neonates who required management with phototherapy (exaggerated physiological jaundice).
3. Fed with full strength formula or breast fed.

We excluded any neonates suffering from birth asphyxia, congenital malformation, and hypothyroidism, infant of diabetic mother.

During the study, the most effective irradiance is delivered by a light source (such as special blue fluorescent lamps or LED systems) that was delivered irradiance predominately in the 430 to 490 nm band. Detailed information on phototherapy used which found in a recent technical report. The body surface area of the infant exposed to phototherapy (by placing a light source above head of the infant).

All collected data were coding and input in SPSS-25 for further analysis. Both descriptive and inferential statistics done. Descriptive statistics included frequency distribution, percent, mean, standard deviation; graph, tables, figures and inferential statistics.

### RESULTS

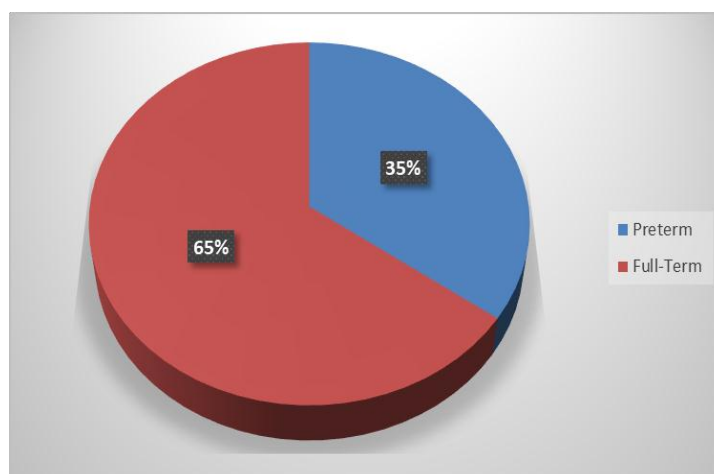
In table-1 shows sociodemographic characteristics of the neonatal where it was found that 44% cases belong to 6-10 days age group followed by 60% were male and 75% neonatal delivered by Cesarean section. The following table is given below in detail:

**Table 1: Sociodemographic characteristics of the neonatal.**

Age group, days	%
48 hours-5 days	35%
6-10 days	44%
11-15 days	21%
Gender	%
Male	60%
Female	40%
Mode of delivery	%
Normal	35%
Cesarean	75%

In figure-1 shows percentage of term and preterm neonates' cases where 65% were full-term and 35% were

preterm neonates. The following figure is given below in detail:



**Figure 1: Percentage of Term and Preterm neonates cases.**

In figure-2 shows distribution of neonatal on the basis of causes of jaundice where majority were belonging to breastfeeding jaundices, 65% followed by 25% cases

were breast milk, 15% were physiological jaundices, 3% were Rh /ABO incompatibility and 2% were septic conditions. The following figure is given below in detail:

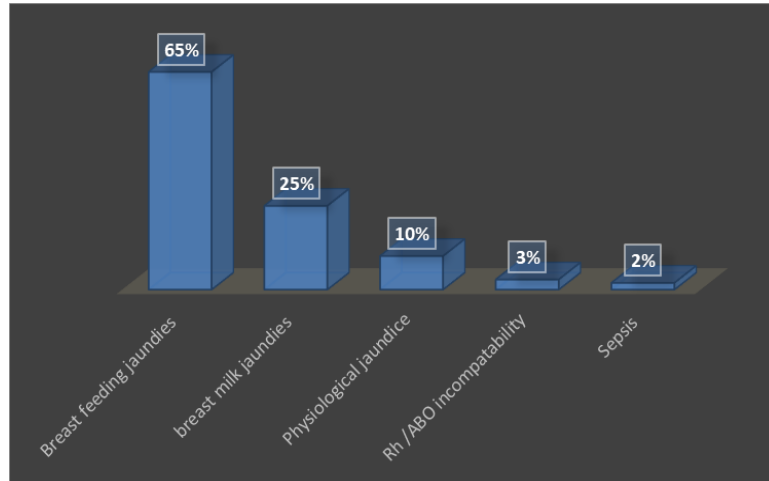


Figure 2: Distribution of neonatal on the basis of causes of jaundice.

In table-2 shows mean Serum bilirubin and serum calcium level before after phototherapy. It was found that the mean ± SD of total serum bilirubin before phototherapy was 20.75 ± 10 mg/dl and after phototherapy was 9.05± 0.7mg / dl. The total serum bilirubin decreased significantly after phototherapy with a p value of 0.001. The mean ± SD of serum calcium before phototherapy was 8.11 ± 0.11 mg / dl. and after phototherapy it was 6.79± 0.50. Levels of serum calcium

decreased significantly after phototherapy when compared to values before phototherapy with p value 0.013. As neonates are asymptomatic neonates with serum calcium levels were treated with 2 ml/kg/dose of 10% calcium gluconate by slow IV infusion over 30 minutes. And after treatment was finished their calcium states gets normal. The following table is given below in detail:

Table 2: Mean Serum Bilirubin and Serum calcium level before after phototherapy.

	Before phototherapy (Mean ± Standard deviation)	After phototherapy (Mean ± Standard deviation)	P value
Serum bilirubin (mg/dl)	20.75 ± 10	9.05± 0.7	0.001
Serum calcium(mg/dl)	8.11 ± 0.11	6.79± 0.50	0.013

In figure- shows prevalence of hypocalcemia in term and preterm babies where 70% of preterm neonates and 30% of full-term neonates developed hypocalcemia after

being subjected to phototherapy. The following figure is given below in detail:

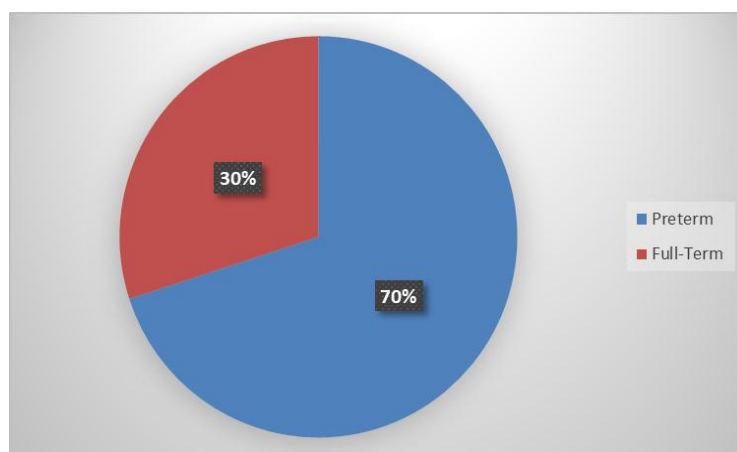


Figure 3: Prevalence of hypocalcemia in Term and Preterm neonates.

In table-3 shows overall outcome after phototherapy where majority cases reaches satisfactory level, 90%. The following table is given below in detail:

**Table 3: Overall outcome after phototherapy**

Overall outcome	%
Death	0%
Improved cases with satisfactory rate	90%

## DISCUSSION

In one study, included 25 boys (50%) and 25 girls (50%) with mean gestational age 38.28 weeks.<sup>[8]</sup> Whereas, in our study 60% were male and 40% were female and majority were delivered by caesarian section. Which was similar to other study.<sup>[9]</sup>

In one study, before phototherapy, there was no statistically significant difference between serum calcium level in cases (9.3 mg/dl) and in controls (9.18 mg/dl). However, after 48 h of treatment of cases with phototherapy, serum calcium level decreased to 8.5 mg/dl, and we found highly statistically significant difference between serum calcium level before and after exposure to phototherapy where P value was less than 0.01.<sup>[10]</sup> Where as in our study It was found that the mean  $\pm$  SD of total serum bilirubin before phototherapy was  $20.75 \pm 10$  mg / dl and after phototherapy was  $9.05 \pm 0.7$ mg / dl. The total serum bilirubin decreased significantly after phototherapy with a p value of 0.001.

After 48 hours of phototherapy, serum calcium level was decreased and causes hypocalcemia in neonates. Where The mean  $\pm$  SD of serum calcium before phototherapy was  $8.11 \pm 0.11$  mg / dl. and after phototherapy it was  $6.79 \pm 0.50$ . Levels of serum calcium decreased significantly after phototherapy when compared to values before phototherapy with p value 0.013. As neonates are asymptomatic neonates with serum calcium levels were treated with 2 ml/kg/dose of 10% calcium gluconate by slow IV infusion over 30 minutes. And after treatment was finished their calcium states gets normal. Which similar to many studies.<sup>[11-13]</sup>

In additionanother study noticed that 55% of pre-term neonates and 30% of full-term neonates developed hypocalcemia after being subjected to phototherapy<sup>[14]</sup> where as in our study 70% of preterm neonates and 30% of full-term neonates developed hypocalcemia after being subjected to phototherapy.

Besides that, after treatment majority cases reaches satisfactory level, 90% which found similarity to other studies.<sup>[15-16]</sup>

## CONCLUSION

During phototherapy, the baby's blood undergoes a process known as photo-oxidation, which adds oxygen to the bilirubin, allowing it to dissolve readily in water. This allows your baby's liver to break down and eliminate the bilirubin from their blood more easily. Based on our findings, phototherapy can be considered

an effective treatment for hyperbilirubinemia in infants with jaundice. Therefore, suggestions for possibly preventing hypocalcemia in phototherapy-treated newborns include either giving them oral calcium as prophylaxis or covering their heads and occipital area with a special hat during phototherapy, so that the light effect from phototherapy on newborns' pineal gland and, as a result, melatonin decreases and hypocalcemia can be avoided.

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