

## **ELECTROLYTE CHANGES IN NEONATES >35WKS GESTATION RECEIVING PHOTOTHERAPY FOR JAUNDICE PROSPECTIVE STUDY CONDUCTED AT TERTIARY CARE CENTRE**

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**ABSTRACT:** Jaundice is one of the most common problem that can occur in the newborn. The study group included 100 neonates and control group included 100 neonates. All had hyperbilirubinemia. The controls were fully matched with the study group. All the neonates included in the study group required management with phototherapy. The neonates in the control group were managed without phototherapy. Measurement of serum calcium level, serum sodium levels was done before and after 48 hours of institution of phototherapy in study groups and controls. Before phototherapy, there was no statistical significant difference in mean serum calcium level, serum sodium level in neonates of both study & control group. After 48 hours of phototherapy in study group, a significant fall in calcium level in 38-40 wks 5.08% & 14.6% 35-37 wks neonates was observed, significant fall in serum sodium levels 38-40 wks 5.08% and 35-37wks 7.3%. Whereas, no difference was observed in control group. It is suggested that electrolytes levels be assessed in neonates treated with phototherapy for more than 48 hours and managed accordingly.

**KEYWORDS:** Hyperbilirubinemia, Phototherapy, Hypocalcemia.

### **INTRODUCTION:**

- Jaundice is an important problem in the 1<sup>st</sup> week of life.
- It is a cause of concern for the physician & source of anxiety for the parents.
- Approximately 5-10% of them have clinically significant hyper bilirubinemia in whom the use of phototherapy becomes mandatory.
- The commonly known side effects of phototherapy are loose. Stools, hyperthermia, dehydration, skin burn, photo retinitis, low platelet counts, increased red cell osmotic fragility, bronze baby syndrome, DNA damage.
- A lesser known side effect, but potential complication of phototherapy is hypocalcemia.<sup>1</sup>

**AIMS & OBJECTIVES:** To evaluate the electrolyte changes in neonates receiving phototherapy for neonatal jaundice at King George Hospital, a tertiary care hospital at Visakhapatnam.

**DURATION OF STUDY:** The study was conducted during the year January 2014 – June 2014, total duration of six months.

### **INCLUSION CRITERIA:**

- In born Neonates  $\geq 35$  weeks Gestation receiving phototherapy for unconjugated hyper bilirubinemia after 24 hrs of life without any co-morbidities.<sup>2</sup>

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## EXCLUSION CRITERIA:

- Neonates with evidence of Hemolysis, Onset of jaundice <24 hrs & received exchange transfusion.
- Neonates with Conjugated Hyperbilirubinemia.
- Neonates who receive I.V fluid and intensive care.
- Neonates with formula feeding.
- Neonates with co-morbidities like birth asphyxia, septicemia, acute renal failure and others.
- Abnormal electrolyte status detected Pre phototherapy.

## CONTROLS:

- Stable breastfed neonates without any morbidity during hospital stay who are not exposed to phototherapy.
- A total of 200 babies are studied, out of which 100 were in study group and 100 were in the control group.

## METHODS:

- All babies with neonatal jaundice receiving phototherapy are evaluated and investigated as per standard protocols.
- Phototherapy is given as per standard AAP guidelines.
- Blood samples of all cases and controls are sent for estimations of serum electrolytes (sodium, potassium, calcium) pre & post phototherapy and were tabulated.
- Data collection, compilation, tabulation was done & analysed by proper statistical method.
- Henceforth, this study was carried out to know the effect of phototherapy on serum electrolytes.

## ETHICAL ISSUES:

- Total serum bilirubin and serum electrolytes estimation was a routine procedure in our hospital for all those babies receiving phototherapy for neonatal jaundice.
- No special consent was required for estimation of TSB and serum electrolytes as it is a part of patient care. There were no ethical issues involved and apart from blood sampling no other invasive procedure was carried out on newborns as a part of the study.
- Data was analyzed using standard statistical methods (CHI-SQUARE TEST) and probability tables.

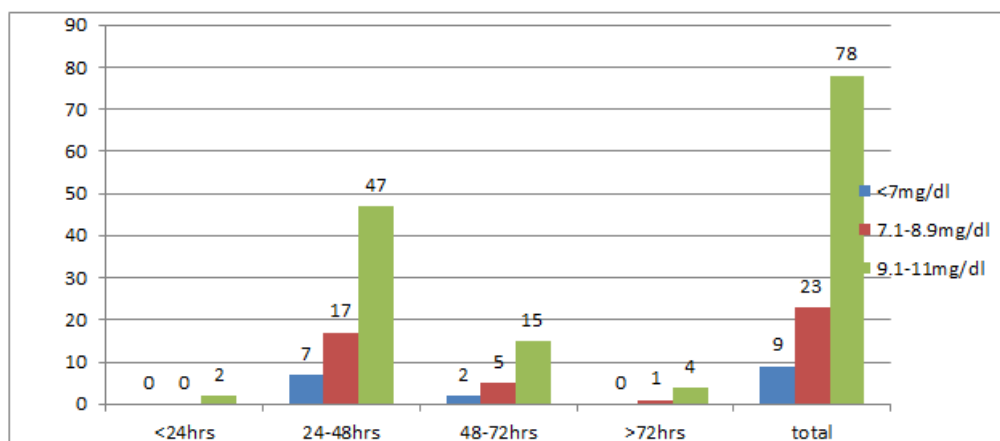
## Investigations:

Serum bilirubin	- total - direct
Serum sodium, Serum potassium Serum calcium	Pre & post phototherapy

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## RESULTS:

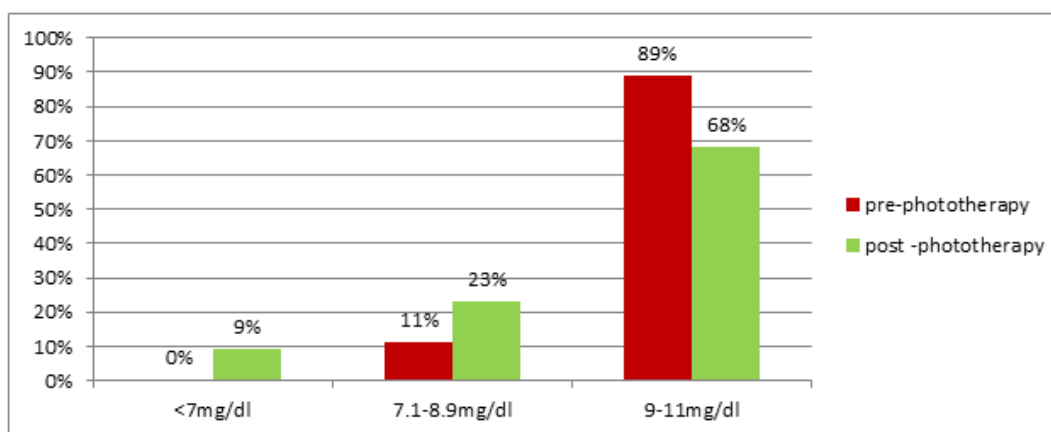
### DURATION OF PHOTOTHERAPY AND POST PHOTOTHERAPY CALCIUM COMPARISON:



Graph 1

Hypocalcaemia (serum calcium < 7mg/dl) was seen more in neonates receiving phototherapy for 24-48 hrs duration (9.85%),<sup>[3]</sup> than in 48-72 hrs duration(9.09%),<sup>[2]</sup> >72 hrs and <24 hrs duration. Values between 7.1-8.9 mg/dl are also more in neonates receiving phototherapy for 24-48 hrs duration (23.94%) than in 48-72 hrs (22.72%)<sup>[4]</sup> and >72 hrs(20%).<sup>[1]</sup>

### COMPARISON OF PRE AND POST PHOTOTHERAPY CALCIUM LEVELS:

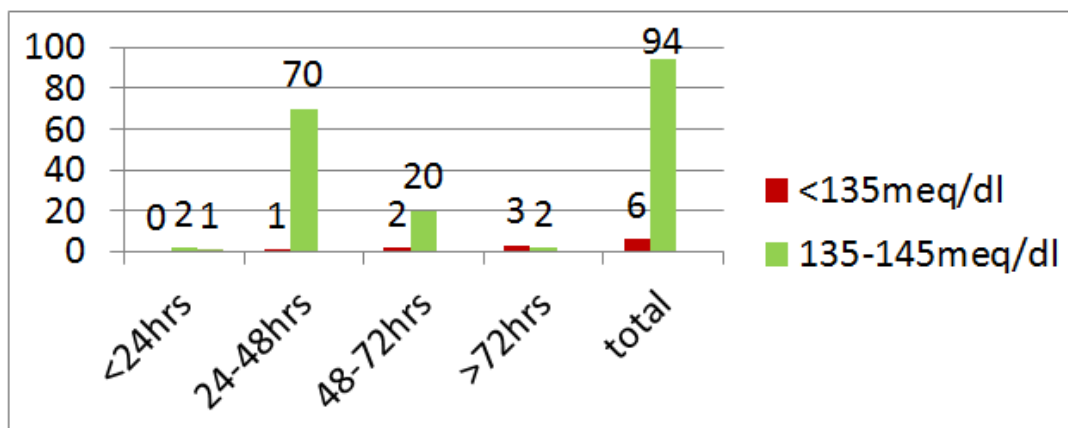


Graph 2

This is a comparison of pre and post phototherapy serum calcium values where the incidence of Hypocalcaemia is 9% (P value is 0.0021, by conventional criteria, this is considered to be very statistically significant).

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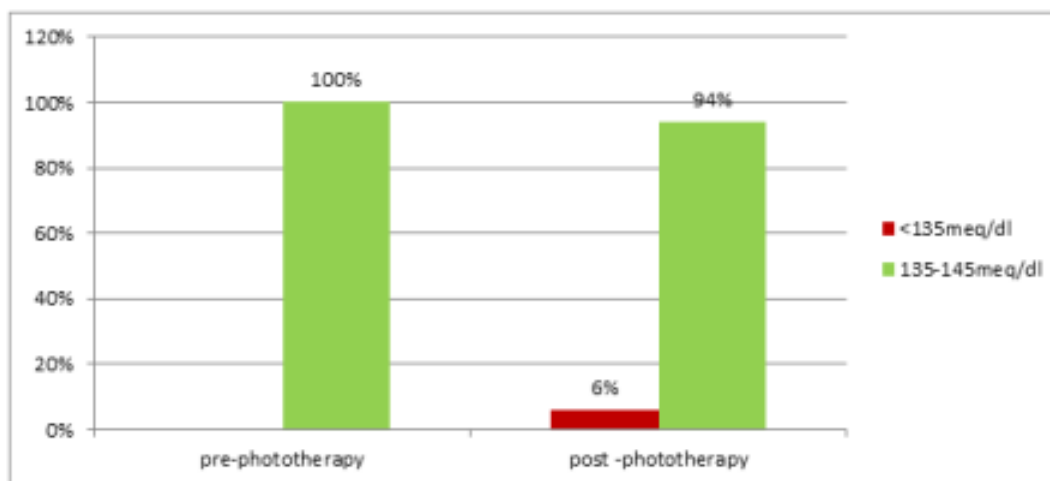
## DURATION OF PHOTOTHERAPY AND POST PHOTOTHERAPY SODIUM COMPARISON:



Graph 3

Hyponatremia (serum sodium <135 meq/dl) was seen more in neonates receiving phototherapy for >72 hrs duration (60%),<sup>[3]</sup> than in 48-72 hrs duration (9.09%),<sup>[2]</sup> 24-48 hrs (1.40%).<sup>[1]</sup>

## COMPARITIVE STUDY OF PRE AND POST PHOTOTHERAPY LEVELS OF SERUM SODIUM:



Graph 4

This is a comparative study of pre and post phototherapy serum sodium values where there is 6% incidence of Hyponatremia in our study (P value 0.0129 by conventional criteria, this is considered to be statistically significant).

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Sl. no	Parameter	Mean	Range
1	Mean birth weight	2.68kg	1.8kg – 3.3 kg
2	Mean gestational age	37.3wks	35 - 40wks
3	Age of onset of hyperbilirubinemia	56hrs	48 – 72 hrs
4	Average duration of phototherapy	47hrs	47 +/- 20 hrs
5	Sex ratio M:F	1.7:1	
6	Sex incidence of hypocalcemia	M-4.6%	F:16.6%
7	Incidence of hypocalcemia	9%	
8	Incidence of hypocalcemia 35-37wks	14.6%	
9	Incidence of hypocalcemia 38-40wks	5.08%	
10	Average duration of phototherapy causing hypocalcemia	49.3hrs	
11	Sex incidence of hyponatremia	M:6.25%	F: 5.55%
12	Incidence of hyponatremia	6%	
13	Incidence of hyponatremia 35-37wks	7.3%	
14	Incidence of hyponatremia 38-40wks	5.08%	
15	Average duration of phototherapy causing hyponatremia	68.6hrs	

Table 1

Sl. No	NAME OF THE STUDY	RESULTS
1.	Phototherapy induced Hypocalcemia Romangnoli C et al-1979 <sup>5</sup>	The Incidence of Hypocalcemia in preterm babies is 52.3 %.
2.	Hakanson & Bergstrom Et al-1981 <sup>6</sup>	Phototherapy produced significant fall in sr. calcium after exposure
3.	Gutcher et al 1982 <sup>4</sup>	Phototherapy produced significant fall in sr. calcium after exposure

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4.	Phototherapy induced hypocalcemia Sethi H et al -1993 <sup>7</sup>	The Incidence of Hypocalcemia in preterm babies is 90 %, and in term babies is 75%.
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Table 2

Sl. No	NAME OF THE STUDY	RESULTS
5.	Jain B.K.etal - 1998 <sup>(3)</sup>	The Incidence of Hypocalcemia in preterm babies is 55%, and in term babies is 30%
6.	Eghbalian F etal,2002 <sup>(8)</sup>	Phototherapy in icteric newborn lowers serum calcium significantly
7.	Effect of phototherapy on serum electrolytes D.R Dabai et al -1998	The Incidence of Hypocalcemia in preterm babies is 11.7%, and in term babies is 8.5%, and total incidence of 9.6%. The Incidence of Hyponatremia is 5.7%
8.	Our Study	The incidence of Hypocalcemia in preterm babies is 14.6%, and in term babies 5.08%, and total incidence of 9%. The incidence of hyponatremia is 6%.

Table 3

## CONCLUSIONS:

- Phototherapy induces significant fall in serum calcium levels & sodium levels.
- In 35-37wks of gestation babies at higher occurrence of hypocalcemia induced phototherapy.<sup>9</sup>
- Risk is also seen in full term babies.

## RECOMMENDATIONS:

- To conduct further studies.
- Serum electrolytes should be monitored regularly under phototherapy.

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