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## RESEARCH ARTICLE

### EFFECT OF PHOTOTHERAPY ON SERUM CALCIUM LEVEL IN TERM NEONATES

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#### ABSTRACT

Hyperbilirubinemia is one of the most common problems in neonates. Observed as an abnormal physical finding in the first week of life in approximately 60% of term neonates and 80% of preterm neonates. Photo therapy is one of the routine management of jaundice. It has been hypothesized that photo therapy leads to increased calcium absorption by the bones through irradiating the pineal gland and reducing melatonin level. Our study done in Alkarkh maternity hospital NICU from January 2017 till December 2017, 100 Neonates with hyper bilirubinemia admitted to our NICU and treated with photo therapy. Serum calcium level estimation was done before photo therapy and after 48 hours of phototherapy and compared. Out of 100 neonates studied 65 babies has a decrease in serum calcium level after 48 hours of phototherapy. None of them were symptomatic. There was no significance between reduction in serum calcium level and birth weight. There is significant reduction in serum calcium level after photo therapy but risk of hypocalcemia is low in healthy full term neonates.

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#### INTRODUCTION

Hyperbilirubinemia is the most common abnormal finding in the first week of the life and is observed in approximately 60% of term neonates and 80% of preterm neonates (Stoll and Piazza, 2004). Although most jaundiced neonates are otherwise perfectly healthy. They make us anxious because bilirubin is potentially toxic to the central nervous system (Jenson, 2007). Photo therapy play a significant role in the treatment and prevention of hyperbilirubinemia in neonates this relatively common therapy decreases the serum bilirubin level by trans forming bilirubin into water soluble isomers that can be eliminated without conjugation in the liver (Maisels, 2006). However this treatment may itself result in the development of some complications (Stokowski, 2006). Among these are erythematous macular rash retinal injury. Loose stools, overheating, benign condition called bronze baby syndrome in cholestasis (Ehsanipoor *et al.*, 2008). Redistribution of blood flow, genotoxicity, opening of PDA in LBW and hypo calcemia (Egh balian, 2002). Hypocalcemia is one of the lesser known but potential adverse effect of photo therapy. Neonatal hypocalcemia is defined as total serum calcium concentration of  $> 7\text{mg dl}$ , or ionized calcium concentration of  $< \text{Hmg dl}$ . Ionized calcium is crucial for many biochemical processes.

Including blood coagulation, neuromuscular excitability, cell membrane integrity and function and cellular enzymatic and secretory activity. Hypo calcemia increase cell membrane excitability (Singh, 2004) it can cause serious complications like convulsion apnoea. Stridor, irritability and jitteriness (Camilla R-martin, 2008).

#### MATERIALS AND METHODS

This study was conducted from January 2017 to December 2017 at alkarkh maternity hospital NICU. All full term neonates with hyperbilirubinemia undergoing double surface phototherapy for aduration at least 48 hours with blue light were included in this study. Some babies not included in the study as infants of diabetic mothers, babies with sepsis. Those with mothers having history of taking anti convulsants. Those with low APGAR score, those with serum calcium less than  $7\text{mg idL}$  before phototherapy. We commence phototherapy once TSB is greater than the appropriate reference range for neonates gestation, weight and presence of risk factor. Neonates should be nursed naked apart from a nappy under phototherapy in an isolated incubator. Phototherapy unit should be positioned no more than 30.5 cm from the baby. Eyes of baby must be covered unit appropriate opaque eye covers. Ensure eye covers are removed 4-6 hourly for eye care. Ensure that phototherapy unit is turned off during collections of blood for TSB levels.

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As both conjugated and un conjugated bilirubin are photooxidized. When exposed to white or ultra violet light. Our study was done in 100 term neonates. Complete history and appropriate physical examination was done. Birth weight, age in hours at the time of diagnosis of hyper bilirubinemia, while taking blood for routine investigations, serum calcium estimation was also done before phototherapy all neonates were subjected to double surface phototherapy using blue light 420- 470 nm. Those babies who need less than 48 hours phototherapy were excluded from the study. After 48 hours of phototherapy serum calcium estimated and compared with earlier value to find out any significant difference in serum calcium value. Serum calcium value of < 7mg idL is considered as hypocalcemia

## RESULTS

Study done in 100 term neonates. Out of these 65 babies were males and 35 were females 79 babies born via normal vaginal delivery and 21 via cesarean section.

**Table 1. Frequency distribution table of serum calcium values before phototherapy**

S.ca before PT	frequency	Percent
7.0 – 7.9	2	2
8.0 – 8.9	33	33
9.0 – 9.9	48	48
10.0 – 10.9	17	17
Total	100	100

**Table 2. Frequency table showing comparison of distribution before and after phototherapy**

S.ca before	S. ca after PT					Total
	6.0-6.9	7.0-7.9	8.0-8.9	9.0-9.9	10.0-10.9	
7.0 – 7.9	2					2
	35.30%					2.00%
8.0 – 8.9	2	8	22	1		33
	66.70%	88%	51%	10%		38.00%
9.0 – 9.9			28	20		48
			54%	60%		48.00%
10.0 – 10.9			8	4	5	17
			16.10%	15.10	90%	17.00%
Total	4	8	58	25	5	100

Majority of babies 49% had a birth weight between 2.606 – 3.00 kg and most of them (60%) developed jaundice at 25 – 48 hours of age. Even though 67% of babies has reduction in calcium value only 3% of babies developed hypocalcemia (serum calcium < 7mg idL).

## DISCUSSION

Neonatal jaundice is one of the leading cause of NICU admission, and phototherapy is one of the best and safe method as treatment option in neonatal jaundice as described by Cremeretation 1953 every safe method has its own side effect and so also phototherapy.

One of the known side effect of phototherapy is hypocalcemia. In present study it was found that after phototherapy about 67% babies has a decrease in serum calcium level from the initial value out of these 32% babies has a 5-9% reduction and 20% babies had >10% reduction in serum calcium value. This reduction in serum calcium level was found to be statically significant. There is significant reduction in serum calcium level after phototherapy but risk of hypocalcemia is low in healthy full term neonates. No significant association was found between reduction in serum calcium and body weight. Therefore we do not recommend using prophylactic calcium in healthy full term neonates with jaundice during phototherapy. However we recommend monitoring serum calcium concentration during and after phototherapy in all term babies.

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