

Exploring management of neonates hyperbilirubinemia in Benghazi children hospital

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Abstract: Jaundice is one of the most common problem that occur in the newborn. The present study included 100 full term neonates; all had hyperbilirubinemia that required management with phototherapy. Measurement of total serum calcium was done before and every 12 hours of institution of phototherapy. Before phototherapy there was no significant difference in the main serum calcium level. After 24 hours of phototherapy a significant fall in serum calcium level in 65% of neonates was observed. So we suggested that serum calcium level should be assessed in neonates treated with phototherapy for more than 24hours and managed accordingly.

Keywords: Jaundice, hyperbilirubinemia, phototherapy

INTRODUCTION

Jaundice is an important problem in the first week of life [1]. It is a cause of concern for the physician and a source of anxiety for the parents. High bilirubin level may be toxic to the developing central nervous system and may cause neurological impairment [2]. The effectiveness of phototherapy in the management of neonatal hyperbilirubinemia has been demonstrated in many controlled clinical trials. Phototherapy may lead to complications including skin rash, diarrhea, hyperthermia, also dehydration, damage to DNA of lymphocytes [3] and retinal degeneration, bronze baby syndrome especially in cholestatic jaundice and PDA opening in LBWs [4].

A lesser known side effect, but potential complication of phototherapy is Hypocalcemia [5].

Neonatal hypocalcemia

Is defined as total serum calcium concentration of less than 7.5 mg/dl or ionized calcium concentration of less than 4mg/dl (<1mol/L). Ionized calcium is crucial for many biochemical processes, including blood coagulation, neuromuscular excitability, cell membrane integrity and function, and cellular enzymatic and secretory activity [3].

Aim of the Study

The Evaluation of Effect of Phototherapy on Serum Calcium Level in full term babies.

MATERIAL AND METHODS

The study was carried out in the Neonatal Intensive Care Unit (NICU) of the pediatric hospital in Benghazi city from first of October 2013 To April 2014. The Study group included 100 neonates all the neonates included in the study group had hyperbilirubinemia which required management with phototherapy. Phototherapy was provided with four blue light fluorescent lamps (Phillips), placed at 40 cm distance from newborns. Complete history and

thorough physical examination was carried out for all the cases of study. These neonates were completely normal on physical examination, and we exclude neonates with any underlying disease or risk factors of hypocalcemia. Besides routine investigations, total serum calcium and total serum bilirubin. Levels, before and after 12 hours of phototherapy were estimated. Total serum bilirubin and total serum calcium were estimated by integrated multi-sensor technology by using Dimension *RXL Max clinical chemistry system*. We considered hypocalcemia as a total serum calcium of less than 7.5 mg/dl. Data on age, sex, weight, blood group, hemoglobin, reticulocyte count, platelet count, bilirubin and maternal blood group were recorded.

RESULT

The present study include 100 neonate patients who report to Benghazi children hospital, with 65% male and 35% female, after exposure those neonate to phototherapy for twelve hours, we found in the study group about 65 of patients had decrease in their serum calcium level and 35 patients had no change in their serum calcium level, 39 patients from male sample and 26 from female sample had decreasing of serum calcium during phototherapy. (Table 1)

Majority of patients with age less than 7 days, those with decrease in serum calcium level 83.1% of less than 7days of age. We found the group of patients weighting between 2500-3500gm had the higher percentage of decreasing serum calcium level as 72.3%, while patients with less than 2500gm count for 10.8% and more than 3500gm about 16.9%.

According to the address of patients, we found 78.5% were from inner-Benghazi city and 21.5% of them from outside Benghazi city, had decreasing in calcium level during phototherapy. (table-1)

The patients who had decreasing calcium level their mothers blood group was O+ve as 64.6%, while the level for neonate was 29.2% for the same blood group. (table-2)

The higher percentage of decreasing serum level was seen when bilirubin level of patients was 20.1 - 30mg/dl as 49.2%. and the higher length of patients staying in hospital was as less than 7 days, (table 3). Considering the level of serum calcium at admission, was found to high majority at \Rightarrow 7.5mg/dl. (table 4).

Table-1: Distribution of patients according to level of serum calcium and characteristics.

Sex		Decreasing of serum calcium during phototherapy				Total
		Yes		No		
		No.	%	No.	%	
Male		39	60.0	21	60.0	P=1.00
Female		26	40.0	14	40.0	
Age/days	≤7	54	83.1	30	85.7	P=0.731
	>7	11	16.9	5	14.3	
WT/kg	< 2500	7	10.8	8	22.9	P=0.256
	2500- 3500	47	72.3	21	60.0	
	>3500	11	16.9	6	17.1	
Address	Benghazi	51	78.5	25	71.4	P=0.432
	Outside Benghazi	14	21.5	10	28.6	

Table-2: Distribution of patients according to level of serum calcium of babies and mother's blood group.

blood group	Decreasing of serum calcium during phototherapy							
	Mother's				Babies			
	Yes		No		Yes		No	
	No.	%	No.	%	No.	%	No.	%
O+ve	42	68.9	19	31.1	19	73.1	7	26.9
A+ve	8	61.5	5	38.5	17	68	8	32
B+ve	8	72.7	3	27.3	20	66.7	10	33.3
AB+ve	0	0	1	100	1	50	1	50
O-ve	2	28.6	5	71.4	3	60	2	40
A-Ve	5	83.3	1	6.7	3	60	2	40
B -ve	0	0	1	100	2	40	3	60
AB-ve	0	0.00	0	0.00	0	0	2	100
Total	65	100	35	100	65	65	35	35

p= 0.150 for mothers and p=0.508 (not Significant).

Table-3: Distribution of patients according to level of serum calcium and serum bilirubin level

Serum bilirubin level/mg	Decreasing of serum calcium during phototherapy			
	Yes		No	
	No.	%	No.	%
≤ 10	3	100	0	0
10.1- 20	28	63.6	16	36.4
20.1 – 30	32	64	18	36
> 30	2	66.7	1	33.3
Length of hospital stay/ day				
<7	63	67	31	33
≥7	2	33.3	4	66.7

P=0.642 for Serum bilirubin level and P=0.093 for Length of hospital stay/ day

Table-4: Distribution of patients according to level of serum calcium at admission

Level of serum calcium at admission/dl	No.	%
<7.5	5	5
≥7.5	95	95
Total	100	100

DISCUSSION

There are few studies on hypocalcaemic effect of phototherapy Tan, 1991; Sethi *et al.* 1993; Hakanson & Bergstrom, 1981 Romagnoli *et al.* 1979 [3]. The first to suggest the association of hypocalcaemia and phototherapy in preterm babies was Hakinson [4] and Hunter [5] they hypothesized that phototherapy inhibits pineal secretion of melatonin which blocks the effect of cortisol on bone calcium. So cortisol increases bone uptake of calcium and induces hypocalcaemia. Kim suggested decreased secretion of parathormone as the cause of hypocalcemia [6]. In Hooman's study the urinary calcium excretion was significantly higher in phototherapy group [7]. Yadav observed that, 66% of term and 80% of preterm babies developed hypocalcemia after phototherapy [8]. The prevalence of hypocalcemia in Jain's study was 30% in full term neonates [9], and in Ehsanipoor's 15% [10]. In our study 65 (65%) newborns had decline in serum calcium level. In Jain's study the frequency of hypocalcemia was higher in patients with high level of serum bilirubin [9]. In Eghbalian's study, one of hypocalcemic newborns had apnea [11]. In Yadav's study 80% of hypocalcemic term neonates became symptomatic, the most common sign was jitteriness [8]. In Karamifar's study, none of the patients developed symptoms [12].

CONCLUSION

The study shows :1-neonate under phototherapy at high risk of hypocalcemia 2-all babies who already have hypocalcemia or at risk of hypocalcemia receiving phototherapy should be closely observed for hypocalcemia 3- serum calcium should be monitored in all neonates receiving phototherapy.

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