Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(2), 1832-1834 | ISSN:2251-6727

A Study on Electrolyte Changes in Neonates Receiving Phototherapy for Neonatal Hyperbilirubinaemia

Dr.M.Nivetha[1*], Dr.K.V.Pugalendhi Raja[2], Dr.K.Rangasamy[3]

[1*]Postgraduate Student, Department Of Paediatrics, Vinayaka Mission's Kirupananadha Variyar Medical College, Salem
[2]Associate Professor, Department Of Paediatrics, Vinayaka Mission's Kirupananadha Variyar Medical College, Salem
[3]Professor And Head Of The Department, Department Of Paediatrics, Vinayaka Mission's Kirupananadha Variyar Medical College, Salem

***Corresponding Author :** Dr.K.V.Pugalendhi Raja,
[*]Postgraduate Student, Department Of Paediatrics, Vinayaka Mission's Kirupananadha Variyar Medical College, Salem
Email:- Drkvpraja@Gmail.Com

Received: 06 December 2023 Revised: 23 January 2024 Accepted: 11 February 2024

KEYWORDS

electrolytes, phototherapy, neonatal hyperbilirubinemia

ABSTRACT:

Background :
Hyperbilirubinemia is the most common ailment requiring medical attention in newborns. Neonatal hyperbilirubinemia nearly affects 60% of term & 80% of preterm neonates during the first week of life. Neonatal jaundice has much higher incidence in premature babies and often requires therapeutic intervention. Neonatal physiological jaundice could result either due to increased breakdown of fetal erythrocytes or low concentrations of hepatic glucuronyl transferase. Hypocalcaemia is one of the known adverse effects of phototherapy. 90% of the preterm and 75% of the full-term neonates develop hypocalcaemia post phototherapy. We intended to study the effects of photo therapy on serum electrolytes.

Methods :
It is a prospective Hospital based comparison study. Neonates who were born or admitted to VMKV MCH, Salem, a tertiary care center from the month of November 2021 to November 2022 receiving phototherapy for Unconjugated Hyperbilirubinemia after 24 hrs of life without any co- morbidities were studied .

Results :
Serum Potassium and serum sodium levels decrease with increasing duration of phototherapy. The comparative correlation between the preterm and term neonates considering the change in calcium level before and after phototherapy shows more change in values in term neonates.

Introduction

Hyperbilirubinemia is the most common ailment requiring medical attention in newborns. Neonatal hyperbilirubinemia nearly affects 60% of term and 80% of preterm neonates during first week of life. This is a normal physiologic phenomenon in most infants. However excessively elevated serum bilirubin can be detrimental as unconjugated bilirubin is neurotoxic and can cause residual neurologic sequelae or even death in some and hence is a cause for concern in Pediatricians . Neonatal jaundice has much higher incidence in premature babies and often require therapeutic intervention. Neonatal physiological jaundice could result either due to increased breakdown of fetal erythrocytes or low concentrations of hepatic glucuronyl transferase. When additional factors like immune or non-immune hemolytic anemia, polycythemia, several metabolic and endocrine disorders accompany the basic mechanisms ,pathological neonatal jaundice ensues. Incidence of neonatal jaundice is higher in eastern world. Various genetic influences are known to increase the incidence, especially mutations/polymorphisms in the genes that code for enzymes and proteins involved in bilirubin metabolism. Recent data suggests a correlation between higher levels of epidermal growth factors both in breast milk and infants with neonatal jaundice. Incidence is also higher in premature infants, infants with low birth weight, infants of mothers with diabetes and congenital infections. Main treatment modalities in neonatal jaundice include Phototherapy, exchange transfusion and intravenous immunoglobulin.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(2), 1832-1834 | ISSN:2251-6727

Phototherapy is the primary treatment in neonates with unconjugated hyperbilirubinemia. Phototherapy isomerizes the bilirubin into water- soluble forms by photo oxidation, isomerization, and structural isomerization. These photo isomers of bilirubin are excreted in bile and urine thereby reducing the serum bilirubin levels. Adverse effects of phototherapy include feed intolerance, loose stools, bronze baby syndrome, hypocalcaemia etc.Although many studies were carried out, to depict the other side effects those relating to dyselectrolytemia there have been very few studies, especially those relating to serum sodium and potassium. 90% of the preterm and 75% of the full term neonates develop hypocalcaemia post phototherapy. We intended to study the effects of photo therapy on serum electrolytes (Na+, K+).

Aims and Objectives

1. To study the electrolyte changes in neonates receiving phototherapy for neonatal jaundice at the Intensive Care Unit (NICU) at VMKVMCH, a tertiary care center in Salem from November 2021 to November 2022.
2. To assess the effect of Phototherapy on Serum Sodium, Serum Potassium levels.

Methods

It is a prospective Hospital based comparison study. After Obtaining clearance from institutional ethical committee the study was conducted. Neonates who were born or admitted in VMKVMCH from November 2021 to November 2022 receiving Light Emitting Diode (LED) phototherapy for unconjugated hyperbilirubinemia after 24 hrs of life without any comorbidities were studied. All the investigations were done in the central laboratory VMKVMCH.

Results

The study sample consisted of a total of 100 neonates out of which 57 were males and 43 were female as shown in table 1 . Incidence of males in this study is 57% and females is 43%.Male to female ratio was 1.32:1

Table 1: Gender distribution of neonates

Gender	No. of neonates	Percentage
Male	57	57.0
Female	43	43.0
Total	100	100.0

Table 2: Weight distribution of neonates

Weight (kg)	Gender		Total
	Male	Female	
LBW (<2.5)	31	24	55
Normal Wt	26	19	45
Total	57	43	100

Table 3: Gender wise distribution of gestational age in neonates

Gestational age	Gender		Total
	Male	Female	
<37 weeks	30	21	51
>37 weeks	27	22	49
Total	57	43	100

Table 4: Comparison of mean total bilirubin and serum electrolyte before and after phototherapy with birth weight

Variables	Before phototherapy	After Phototherapy	difference	t value	P value
LBW(N=55)					
• Total bilirubin	14.74	9.913	4.827	53.143	<0.001**
• Sodium	140.15	134.18	5.97	27.475	0.001**
• Potassium	4.338	3.596	0.742	13.872	0.001**
Normal Weight (N=45)					
• Total bilirubin	13.604	9.36	4.244	44.064	<0.001**
• Sodium	139.62	136.55	3.07	10.829	0.001**

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(2), 1832-1834 | ISSN:2251-6727

• Potassium	4.389	3.993	0.396	7.749	0.001**

Table 5: Comparison of mean total bilirubin and serum electrolytes before andafter phototherapy with gestational age

Variables	Before phototherapy	After Phototherapy	difference	t value	P value
GA <37 weeks(n=51)					
● Total bilirubin	16.618±0.79	9.775±0.6841	6.843	55.207	<0.001**
● Sodium	139.76±2.754	134.37±1.708	5.39	20.175	<0.001**
● Potassium	4.427±0.600	3.647±0.391	0.78	13.407	<0.001**
GA 37-40 weeks(n=49)					
● Total bilirubin	13.831±0.531	9.549±0.614	4.282	42.392	<0.001**
● Sodium	140.06±2.569	136.16±2.889	3.9	11.537	0.003**
● Potassium	4.92±0.6140	3.908±0.556	1.012	9.849	<0.001**

Conclusion

The Incidence of hyponatremia in our study is 46%. Incidence is higher in preterm (60.5%) and LBW (63.6%) babies as compared to term (30.6%) and normal weight babies (24.4%). Its statistically more significant in preterm with a p value of <0.001 than in term with a p value of 0.003.Incidence of hypokalemia in our study is 31%. Incidence is higher in preterm (37.3%) and LBW (45.5%) babies as compared to term (24.5%) and normal weight babies (13.3%). Incidence of hyponatremia and hypokalemia is more in babies who received PT for longer durations like more than 48hrs than in babies who received for less than 48hrs. Thus, preterm and LBW babies are at a higher risk of electrolyte imbalances following phototherapy. Newborns who are exposed to phototherapy for longer durations of more than 48hrs are more at risk of electrolyte disturbances than newborns who receive PT for lesser durations.

References

1. Singh M. Care of the Newborn. 7th ed. New Delhi: Sagar Publications; 2010.p. 254-74.
2- Maisels MJ. Jaundice. In: Avery GB, Fletcher MA, MacDonald MG (eds). Neonatology: Pathophysiology and Management of the Newborn. 5th ed. Lippincott Williams and Wilkins: Philadelphia; 1999. p. 765–820.
3- cloherty and stark's manual of neonatal care, 8th ed. 2018; p.no 335.
4- Narayana S, Aggarwal, Upadhyay A, Deorari AK, Sindh M, Paul VK. Survival & Morbidity in Extremely Low Birth Weight (ELBW) Infants. Indian Pediatrics, 2003; 40(2):130 – 5.
5- Maisels MJ, Kring E. Length of stay, jaundice, and hospital readmission. Pediatrics 1998; 101:995–998.
6- Duman N, Ozkan H, Serbetçioglu B, Ogun B, Kumral A, Avci M. Long-term follow-up of otherwise healthy term infants with marked hyperbilirubinaemia:should the limits of exchange transfusion be changed in Turkey?ActaPaediatrica. International Journal of Paediatrics.2004;93(3):361–367.
7- Ogunlesi TA, Dedeke IO, Adekanmbi AF, Fetuga MB, Ogunfowora OB. The incidence and outcome of bilirubin encephalopathy in Nigeria: a bi-Centre study. Nigerian Journal of Medicine. 2007; 16(4):354–359.
8- Boo NY, Oakes M, Lye MS, Said H. Risk factors associated with hearing loss in term neonates with hyperbilirubinaemia. Journal of Tropical Pediatrics.1994;40(4):194–197.
9- Boo NY, Rohani AJ, Asma A. Detection of sensorineural hearing loss usingautomated auditory brainstem-evoked response and transient-evoked otoacoustic emission in term neonates with severe hyperbilirubinemia. Singapore Medical Journal.2008;49(3):209–214.
10- Meharban S: Jaundice. In: Care of newborns. 7th Edn.; Sagar Publication, New Delhi. 2010; pp. 254-273.
11- Kaplan M, Wong RJ, Sibley E. Neonatal jaundice and liver disease. In:Fanaroff and Martin's Neonatal-Prenatal Medicine, editor. Diseases of the Fetus and Infant Medicine. 9th edn. Mosby; 2011. 1443–81.