



BIOCHEMICAL ADVERSE EVENTS FOLLOWING BLOOD EXCHANGE TRANSFUSION FOR NEONATAL HYPERBILIRUBINEMIA IN A TERTIARY CARE CENTRE

Paediatric Medicine

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ABSTRACT

Background: Exchange transfusion (ET) for hyperbilirubinemia is associated with many complications. Among many nations and regions with poorly developed health infrastructure, Blood exchange transfusion remains a frequent rescue procedure because of absence of community based use of phototherapy, late referrals, sub optimal or ineffective phototherapy devices, delayed recognition of excessive bilirubin levels and higher prevalence of G6PD deficiency. **Aims and Objectives:** To assess the biochemical adverse effects following blood exchange transfusion. **Materials and Methods:** The present study was undertaken in the Department of Pediatrics, Jorhat Medical College and Hospital. The present study was a Prospective Observational study carried out from June 2021 to May 2022. Informed written consent about the study was taken from parents. Consecutive sampling technique was used for selection of neonates. Total 40 newborns were included in this study and following blood exchange transfusion relevant laboratory investigations sent. The data collected is presented in form of percentage and Chi square test is used to analyse the result. **Results:** Out of 40 newborns, 17(42%) showed biochemical adverse effects.

KEYWORDS

Adverse Events, Biochemical Adverse Events, Exchange Transfusion, Hyperbilirubinemia, Neonate

INTRODUCTION

Hyperbilirubinemia is yellowish discolouration of sclera, skin and mucosa due to elevated concentration of serum bilirubin in blood. A neonate appears jaundiced if serum bilirubin level is more than 5 mg/dl.¹ Approximately 60% of term newborn and 85% preterm infants develop visible jaundice.² It is the most common clinical condition in the first week of neonatal life. Elevated level of unconjugated bilirubin can lead to bilirubin encephalopathy which is a devastating brain injury potentially leading to permanent neurodevelopmental handicap.³ So it requires evaluation and treatment.

Phototherapy and exchange transfusion are two main interventions that are used to decrease total serum bilirubin in neonatal jaundice. Blood exchange transfusion (BET) is more efficient at reducing bilirubin levels and is often used when maximal phototherapy is unsuccessful or when hemolysis is excessive.

Although BET is considered safe, however can lead to complications such as coagulation abnormalities, thrombocytopenia, hypocalcemia, hyperkalemia, hypoglycemia, acid base abnormalities. The complications are underreported as most of the published studies on BET are retrospective. Hence in this study the biochemical adverse effects immediately following Blood exchange transfusion are prospectively assessed.

AIM and OBJECTIVE:

To assess the biochemical adverse effects following blood exchange transfusion for indirect neonatal hyperbilirubinemia in the Neonatal Intensive Care Unit (NICU) of Jorhat Medical College and Hospital.

MATERIALS AND METHODS:

Place Of Study:

Neonatal Intensive Care Unit, Department of Pediatrics, Jorhat Medical college and Hospital.

Duration Of Study:

One year (May 2021- April 2022)

Design Of The Study:

Hospital based Cross sectional study.

Study Population:

All the healthy term babies requiring exchange transfusion for neonatal hyperbilirubinemia admitted in the Department of Pediatrics, Jorhat Medical College and Hospital.

Sample Size:

Considering all the neonates undergoing BET for neonatal hyperbilirubinemia in Jorhat Medical College and Hospital in the study period that meets the inclusion and exclusion criteria of the study, the sample size was taken as 40.

Inclusion Criteria

All term babies with indirect hyperbilirubinemia undergoing exchange

Exclusion Criteria

1. Direct hyperbilirubinemia (conjugated bilirubin > 2mg/dL or a conjugated bilirubin > 15% of total serum bilirubin)
2. Babies with congenital malformation, TORCH infection, neonatal hepatitis.
3. Preterm babies
4. Babies whose parents refused consent for the study.
5. Documented cases of dehydration and electrolyte imbalance prior to BET.
6. Sick Neonates with comorbidities- respiratory distress needing supplemental oxygen or respiratory support, having critical hemodynamic status, sepsis or significant asphyxia were excluded from the study.

Procedure And Collection Of Data:

- All the babies fulfilling the inclusion criteria will be undergoing an umbilical vein double volume exchange transfusion using venous 1 line technique in which aliquots of patient blood is removed and replaced with donor blood.
- It is performed slowly over approximately 2 hours.
- Pre- and post- exchange blood samples sent for serum electrolytes with serum calcium in clot activated vials.
- The values were taken and filled in the proforma.

Biochemical Abnormalities Are Defined As Follows:

- Hypocalcemia was taken as < 7mg/dl and Hypercalcemia was taken as > 11mg/dl
- Hyponatremia was taken as < 135meq/L and Hypernatremia was taken as > 150meq/L
- Hypokalemia was taken as < 3.3meq/L and Hyperkalemia was taken as > 5.5meq/L

RESULTS AND OBSERVATIONS

Table 1: Gender Distribution of the neonates

Total babies	40
Male	22(55%)
Female	18(45%)

In our study, out of total 40 neonates, 22(55%) neonates were male and 18(45%) neonates were female

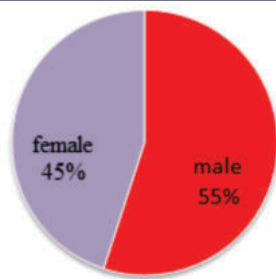
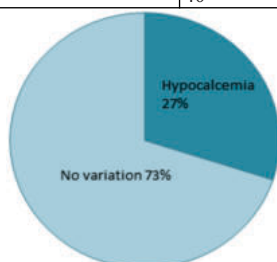


Table2: Variation in serum calcium level post exchange transfusion

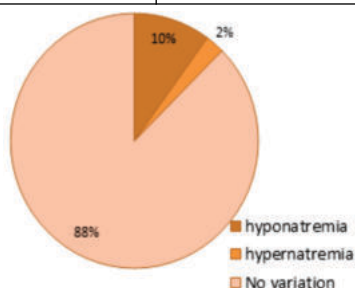
Variations in calcium level	No of neonates
Hypocalcemia	11(27%)
Hypercalcemia	0
No variation	28(73%)
Total	40



In our study, post blood exchange transfusion, 11(27%) had hypocalcemia and 29(73%) of neonates had serum calcium in normal range.

Table3: Variation in serum sodium level post exchange transfusion

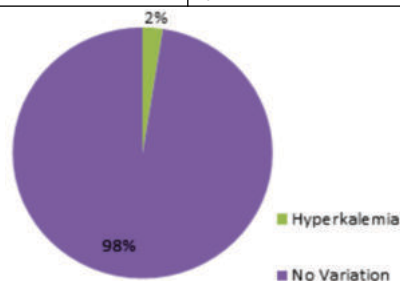
	No of neonate
Hyponatremia	4(10%)
Hypernatremia	1(2%)
No variation	35(88%)
Total	40



In our study, post blood exchange transfusion, 4(10%) neonates had hyponatremia and 1(2%) neonates had hypernatremia and 35 (88%) neonates had serum sodium in normal

Table 4: Variation in serum potassium level post exchange transfusion

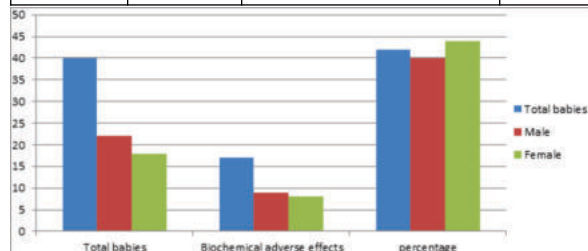
	No of neonates
Hypokalemia	0
Hyperkalemia	1(2%)
No variation	39 (98%)
Total	40



In our study, post blood exchange transfusion, out of 40 neonates, 1(2%) neonate have hyperkalemia and other 39(98%) neonates have potassium in normal range.

Table 5: Incidence and Gender Distribution of Biochemical Adverse Events

	Total babies	Biochemical Adverse Events	Percent
Total babies	40	17	42
Male	22	9	40
Female	18	8	44



DISCUSSION

Our study showed that Incidence of biochemical adverse events in babies is 42%(17 out of 40 neonates). Twenty two(55%) were male and Eighteen (45%) were female. And incidence of biochemical adverse effects was more in female(44%).

Among biochemical adverse events incidence of Hypocalcemia was highest(27%) followed by hyponatremia(10%) and then hypernatremia(2%) and hyperkalemia(2%).

In this study incidence of biochemical abnormalities following BET is lower (42%) than similar studies done by Chacham, Swathi, et al. where the incidence was 45% and Patra K, Storfer-Isser A, Siner B, Moore J, Hack M where the incidence was 74%.

In this study incidence of hypocalcemia(27%) is highest among the electrolyte abnormalities and other studies conducted by Patra K, Storfer-Isser A, Siner B, Moore J, Hack M also showed similar findings where the most common biochemical adverse event was hypocalcemia (29%). Also study done by Chacham, Swathi, et al. showed incidence of hypocalcemia(22%) to be the highest among biochemical adverse events.

Limitations Of The Study:

- The sample size was small
- Inclusion of only term healthy neonate.

CONCLUSION

This study showed that the biochemical adverse events are common following blood exchange transfusion for neonatal hyperbilirubinemia. The spectrum includes mainly hypocalcemia followed by hyponatremia, hypernatremia and hyperkalemia.

Thus a clear protocol of monitoring these adverse effects can help in early detection and treatment of these complications.

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