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RELATIONSHIP BETWEEN DURATION OF PHOTOTHERAPY AND FLUID SUPPLEMENTATION IN NEONATES WITH HYPERBILLIRUBINEMIA ADMITTED IN DMCH

Pediatrics

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ABSTRACT

Objectives: The objective of the study were to determine the relationship between duration of phototherapy and fluid supplementation in neonates with hyperbillirubinaemia admitted in DMCH. **Materials and methods:** Data were collected from the neonates admitted in Department of Paediatrics, Darbhanga Medical Hospital, Laheriasarai. **Results:** Out of 50 neonates in Group A, 27 (54%) neonates were male and 23 (46%) neonates were female that were given fluid supplementation along with breastfed. Out of 50 neonates in group B, 30 (60%) neonates were male and 20 (40%) neonates were female were only breastfed. The rate of fall of serum bilirubin level at 6 hours in Group A was 0.65 and in Group B was 0.33. At 12 hours inGroup A was 0.50 and in Group B was0.40.At 24 hours in Group A was 0.30 and in Group B was 0.20.At 48 hours in Group Awas 0.20 and in Group B was 0.15. <12 hours of duration of phototherapy therapy was required in 36 (72%)neonates in Group A and 5 (10%) neonates in Group B. 12 to 24 hours of duration of phototherapy was required in 12 (24%) neonates in Group A and 33 (66%) neonates in Group B.>24 hours duration of phototherapy was required in 2 (4%) neonates in group A and 12 (24%) neonates in Group B. **Conclusion:** Additional intravenous fluid to newborn with jaundice during phototherapy helps significantly in reduction of serum bilirubin. It also helps in reducing the duration of phototherapy.

KEYWORDS

Phototherapy, Hyperbillirubinaemia, Breastfed

INTRODUCTION

Neonatal jaundice is yellowish discolouration of the skin, sclera, and mucous membranes due to accumulation of unconjugated, non polar, lipid-soluble bilirubin pigment in the skin.[1]

The occurrence of jaundice among neonates during the first week of their life is 60%[2]among term and 80%[3]among preterm newborns.It is accountable for 70% and 10% of neonatal morbidity and mortality, respectively, worldwide.[4]

Neonatal jaundice may be classed as physiological or pathologicaland is principally caused by an increase in serum bilirubin during the neonatal period, which causes yellow discolouration of the skin, mucous membranes and sclerae. Neonatal hyperbilirubinemia is caused by an increase in blood bilirubin levels above the normal range. An increase in the levels of unconjugated bilirubin is the most common manifestation of neonatal jaundice.[5,6]

Although there are several treatment schemes available in the clinical setting, blue light is generally the preferred choice for preventing the development of bilirubin encephalopathy or nuclear jaundice caused by excessive accumulation of unconjugated bilirubin.[7] Several short- or long-term adverse effects of phototherapy, such as the interference with maternal-infant bonding, dehydration during treatment, bronze baby syndrome, increased incidence of allergic diseases, and increased incidence of melanoma.[8]

Fluid supplementation may play role in treating extreme hyperbilirubinemia. Fluid supplementation may result in the decrease in enterohepatic circulation and then a lower rate of bilirubin reabsorption from the bowel. Also, it seems that additional fluid therapy can cause dilution of serum bilirubin and also increases blood circulation in the kidneys and rising urine output and subsequently improves excretion of water soluble photo isomers in urine.[9] Non-dehydrated infants with severe jaundice appear to have a reduced risk of progressing to exchange transfusion if they receive extra fluids, either intravenous or orallyduring intensive phototherapy.[10]

The aim of the study is to determine the relationship between duration of phototherapy and fluid supplementation in neonates with hyperbillirubinaemia.

MATERIALS AND METHODS

The study was carried out in the Department of Paediatrics, Darbhanga Medical Hospital, Laheriasarai. Permission from the hospital authority and ethical committee was taken before conducting this study.

All healthy breast fed term baby (≥37 weeks gestation), Non haemolytic hyperbilirubinemia and Total Serum Bilirubin (TSB) >18 mg/dl [308 μ mol/L] to <25 mg/dl [427 μmol/L] were included in the study. A detailed informed consent was taken from the mothers whose neonates were included in the study. A detailed history from the mothers of neonates and thorough physical examination of each neonates that were included in the study was done at the time of admission.

Baby that were excluded from the study were those who were having Major congenital malformation(Congenitalheart disease, Tracheoesophageal fistula), Evidence of haemolysis (positive direct Coomb's test, evidence of hemolysis in peripheral blood smear or reticulocyte count is > 6%), Clinically dehydrated baby (sunken fontanel, reduced skin turgor, dry mucosa, tachycardia, delayed capillary refill, excessive weight loss), History of giving IV fluid, Acute bilirubin encephalopathy, Infection (congenital or acquired), Perinatal asphyxia, Infant of diabetic mother.

A total of 100 neonates were selected from the neonates admitted in the SNCU of the hospital. These neonates were randomly placed into two groups by using a random number table. Group A included 50neonates who were given IV fluids 30 ml/kg besides breast feeding and Group B includes50neonates who received only breast milk. As we have excluded any neonates with any clinical signs of dehydration, we decided to give lower range of (30ml/kg) IV fluid supplementation to the Group A. Both groups were treated with phototherapy (PT). Phototherapy was introduced by neoBLUE LED phototherapy machine by natus medical incorporated and ARDO Amelux phototherapy lamp (UK). NeoBlue LEDs emit blue light in the 450-470 nm spectrum. This range corresponds to the peak absorption wave length (458nm) at which bilirubin is broken down.During phototherapy, the eyes and genitals were shielded. The position was changed frequently so that maximum skin was exposed for phototherapy. Neonates were kept under the phototherapy round the clock and taken out only for feeding or changing wet napkins. The following clinical and laboratory variables were monitored: (1)Total Serum Bilirubin (TSB) at admission and then 6 hours,12 hours, 24 hours and 48 hours.Total serum bilirubin was measured by SIMENS Dimension RxL Max Integrated Chemistry System.(2) Hydration status by monitoring of bodyweight,vital signs,urine output.(3)

Anyclinical signsof bilirubin encephalopathy (lethargy,hypotonia, convulsion).When bilirubin was decreased below phototherapyrange according to charts of American Academy ofPediatrics 2004, phototherapy was discontinued.

P-value < 0.05 was considered significant.

RESULTS

A total of 176 deliveries occurred in the hospital during the study, out of which 100 neonates, were included in the study. Overall 76 neonates were excluded from the study.

In the study, out of 50 neonates in Group A, 27 (54%) neonates were male and 23 (46%) neonates were female. Out of 50 neonates in group B, 30 (60%) neonates were male and 20 (40%) neonates were female.

In the study it was found that, the rate of fall of serum bilirubin level at 6 hours in Group A was 0.65 and in Group B was 0.33. At 12 hours inGroup A was 0.50 and in Group B was0.40.At 24 hours in Group A was 0.30 and in Group B was 0.20.At 48 hours in Group Awas 0.20 and in Group B was 0.15. Table 1

In the study it was found that, <12 hours of duration of phototherapy therapy was required in 36 (72%)neonates in Group A and 5 (10%) neonates in Group B. 12 to 24 hours of duration of phototherapy was required in 12 (24%) neonates in Group A and 33 (66%) neonates in Group B.>24 hours duration of phototherapy was required in 2 (4%) neonates in group A and 12 (24%) neonates in Group B. It was statistically significant (proportion test, P-value <0.001). Table 2

In the study, no neonates needed exchange transfusion and None of the neonates developed any fluid related complication.

Table-1 Rate of fall of serum bilirubin level (mg/dl) per hour in different groups (n=100)

Rate of fall of serum bilirubin	Group A (n=50)	Group B (n=50)
At 6 hours	0.65	0.33
At 12 hours	0.50	0.40
At 24 hours	0.30	0.20
At 48 hours	0.20	0.15

Table-2 Duration of phototherapy of two groups (n=100)

Duration of phototherapy	Group A (n=50)	Group B (n=50)	P-value
<12 hours	36 (72%)	5 (10%)	<0.001
12-24 hours	12 (24%)	33 (66%)	
>24 hours	2 (4%)	12 (24%)	

DISCUSSION

This study was carried out to determine the relationship between duration of phototherapy therapy and fluid supplementation in neonates with hyperbillirubinaemia.

In this study, 27 male neonates and 23 female neonates were included in the fluid supplementation along with breastfeeding group and 30 male neonates and 20 female neonates were only breastfed.

In this study it was found that, rate of fall of serum bilirubin (mg/dl) per hour at 6 hrs, 12 hrs, 24 hrs and 48 hrs after admission is more in neonates that were given fluid supplementation along with breastfed than the neonates that were only breasted. It was similar to the results found in the study done by Patel et al.[11]

In the study it was found that, neonates that were given fluid supplementation along its breastfed, require phototherapy up to 24 hours to decrease bilirubin level below phototherapy range, while the neonates that were only breastfed need up to 48 hours of phototherapy. The results were similar to the results found in the study done by Barrington et al[12] and Saeidi et al[13].

This results can be explained due to the fact that fluid supplementation perhaps resulted in decrease in enterohepatic circulation and reduced bilirubin reabsorption leading to shorter duration of phototherapy. However, many more studies are needed to determine the relationship between duration of phototherapy and fluid supplementation in neonates with hyperbillirubinaemia.

CONCLUSION

From the study, we conclude that additional intravenous fluid to newborn with jaundice during phototherapy helps significantly in reduction of serum bilirubin. It also helps in reducing the duration of phototherapy.

If fluid administration is monitored properly, additional intravenous fluid besides breast feeding may help to reduce duration of phototherapy and accelerate the rate of fall of serum bilirubin. So whenever phototherapy is given, additional fluid infusion may be considered for smooth recovery.

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