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Original Research Article

Effectiveness of short duration phototherapy in government hospital setup

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ABSTRACT

Background: Neonatal hyperbilirubinemia is most common presentation of neonates. Phototherapy remains standard treatment for neonatal hyperbilirubinemia. Overcrowding in government hospital makes it difficult to give phototherapy for more than 1-2 days. The objectives of the study were to determine the effectiveness of short duration of phototherapy in treating hyperbilirubinemia and to determine the risk of rebound hyperbilirubinemia.
Methods: Study was hospital based retrospective study. The study place was GIMS kalaburagi. The study was conducted from September 2019 to December 2019. All healthy full-term neonates with serum bilirubin above cut off range according to (American academy of pediatrics) nomogram were included in the study. Requirement of phototherapy was decided on serum bilirubin levels as per AAP (American academy of pediatrics) nomogram. Phototherapy was used as treatment modality.
Results: Total 110 neonates were included in the study. Total of 56 neonates (50.9%) required 1 day of phototherapy to fall within normal limits for discharge and 46 neonates (41.8%) required 2 days of phototherapy to fall within normal limits for discharge with a significant $p<0.05$. Rebound hyperbilirubinemia requiring repeat phototherapy was seen in 6(10%) neonates who were discharged after 1 day of phototherapy and in 5 neonates (10%) who were discharged after 1 day of phototherapy with a p value of 0.05.
Conclusions: Short duration phototherapy is the effective means of treatment for most neonates in government hospital set up. Serum bilirubin has to be reviewed during follow up to assess rebound hyperbilirunemia.

Keywords: Hyperbilirubinemia, Neonates, Rebound hyperbilirubinemia, Phototherapy, Government setup

INTRODUCTION

Neonatal jaundice is caused by bilirubin deposition in skin.[1,2] It is caused by either excessive hemolysis or decreased bilirubin excretion. Incidence of jaundice varies from 54.6% to 77% in India.[3] Jaundice is the most common morbidity in first week of life occurring in 60% of term and 80% of preterm newborns.

It is the most common cause of readmission to the hospital.[4] Most of the neonates have physiological jaundice. Sometimes bilirubin can increase to such a level affecting brain and nerves which causes bilirubin encephalopathy, kernicterus and hearing impairment.[5,6] Phototherapy is effective and simple modality of treatment for neonatal hyperbilirubenemia.[7,8]

During phototherapy, skin of the neonates is exposed to specific wavelength of light (blue and white) which converts bilirubin to water soluble isomer. This isomer of bilirubin can easily excrete. Phototherapy can be given by compact fluorescent lamps or light emitting diodes.

Hyperbilirubinemia is common neonatal condition but its greater challenge in government hospital set up. This is because of excessive case load compared to the facility available. The present study is conducted to know the efficacy of short duration phototherapy to expedite the treatment in neonatal hyperbilirubiemia.

Aims and objectives

To determine the effectiveness of short duration phototherapy in treating hyperbilirubinemia. To determine the risk of rebound hyperbilirubinemia.

METHODS

It is a hospital based retrospective study conducted in Gulbarga institute of medical sciences, Kalaburagi from September 2019 to December 2019. Requirement of phototherapy was decided on serum bilirubin as per AAP (American academy of pediatrics) norm gram. Phototherapy was given as treatment modality. Phototherapy was given using single surface light emitting diodes.

Serum bilirubin was measured at admission and repeated once in 24 hours. Neonates whose bilirubin reduced below cut off range, after one day phototherapy, were shifted to mother side. Remaining neonates given phototherapy till resolution. Serum bilirubin repeated after 24 hours of discharge to look for rebound hyperbilirubinemia.

Inclusion criteria

All healthy full-term neonates with serum bilirubin above cut off range according to AAP (American academy of pediatrics) norm gram.

Exclusion criteria

Preterm neonates. Term neonates with associated morbidities (example- sepsis, asphyxia).

Sample size

Sample size was 110.

Previous studies show 10% neonates tend to have rebound hyperbilirubinemia, hence using the formula 4PQ/L 2 sample size is estimate.

Data analysis

Data was analyzed by using Statistical package for social sciences (SPSS) 17. Chi square test was applied. Level of significance was set at 0.05 (p-value).

RESULTS

Total 110 neonates were included in the study. At the end of day 1 of phototherapy, bilirubin reduced by 1-2 mg/dl in 84 (76.3%) neonates, 2-2.5 mg/dl in 22 (20%) neonates and 2.5- 3.5 mg in 4 (3.6%) neonates.

Table 1: Reduction of serum bilirubin levels after LED phototherapy.

Rebound hyperbilirubinemia in neonates	Neonates who were discharged after 1 day phototherapy, (n=56)	Neonates who were discharged after 2 days phototherapy, (n=46)
After 24 hours of phototherapy	6 (10%)	5 (10%)

Table 2: Rebound hyperbilirubenemia post 24 hours of 1 day phototherapy.

Serum bilirubin levels in mg/dl		Discharge to mother side
After day 1 of led phototherapy	**N=110**	
1-2	84 (76.3%)	44
2-2.5	22 (20%)	10
2.5- 3.5	4 (3.6%)	2
Total		56 (50.9%) N=110
After day 2 of led phototherapy	**N=54**	**N=46**
3-4	31	25
4-5	20	18
5-6	3	3
Total		46 (41.8%) N=110

Among 84 neonates whose bilirubin was reduced by 1-2 mg/dl, 44 neonates were well out of treatment range and were discharged to mother side. Among 22 neonates whose bilirubin was reduced by 2- 2.5 mg/dl, 10 neonates were out of treatment range and were discharged to mother side. Among 4 neonates whose bilirubin was reduced by 2.5-3.5 mg/dl, 2 neonates were out of treatment range and were discharged to mother side. At the end of day 2 of phototherapy, bilirubin reduced by 3-

4 mg in 25 neonates, 4-5 mg in 18 neonates and 5-6 mg in 3 neonates.

Total of 56 neonates (50.9%) required 1 day of phototherapy to fall within normal limits for discharge and 46 neonates (41.8%) required 2 days of phototherapy to fall within normal limits for discharge with a significant $p<0.05$ (Table 1 reduction of serum bilirubin levels after LED phototherapy).

Rebound hyperbilirubinemia requiring repeat phototherapy was seen in 6(10%) neonates who were discharged after 1 day of phototherapy and in 5 neonates (10%) who were discharged after 1 day of phototherapy with a p value of 0.05. (Table 2 rebound hyperbilirubenemia post 24 hrs of 1 day phototherapy).

DISCUSSION

As mentioned above in tables, 56 neonates (50.9%) required 1 day of phototherapy to fall within normal limits for discharge and 46 neonates (41.8%) required 2 days of phototherapy to fall within normal limits for discharge. Rest 8 neonates required longer duration of phototherapy more than 2 days.

Our study showed that one day of phototherapy reduced serum bilirubin levels in significant amount of neonates to a normal range to be fit for discharge. Risk of rebound hyperbilirubenemia remains same 10% among both neonates who were discharged after day 1 and day 2 of phototherapy.

There are no much studies available on similar research of short duration of phototherapy. However, there is much literature on risk of rebound hyperbilirubenemia with phototherapy. Post-phototherapy neonatal bilirubin rebound: a potential cause of significant hyperbilirubinaemia by Kaplan et al concludes that Post-phototherapy neonatal bilirubin rebound to clinically significant levels may occur, especially in cases of prematurity, direct Coombs's test positivity, and those treated ≤72 hours.[9]

This is also comparable to study conducted by KL Tan which showed adequate efficacy of phototherapy in neonatal jaundice.[10] However, neonates need to be monitored after discharge to look for rebound hyperbilirubinemia.

In resource limited setting such as Government hospitals where there is huge work load this study can be an example for certain strategies such as short duration of phototherapy to prevent overcrowding of neonates in NICU.

Limitations of the study is, this study is a retrospective study hence available data is used for analysis, only those babies who were readmitted for phototherapy after 24 hrs of primary phototherapy were considered to be in rebound phenomena.

CONCLUSION

Short duration phototherapy is the effective means of treatment for most neonates in government hospital set up. Serum bilirubin has to be reviewed during follow up to assess rebound hyperbilirunemia.

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